Altivar LIFT

Variable speed drive
for synchronous and asynchronous lift motors

Programming Manual

(Software V5.3)

07/2010

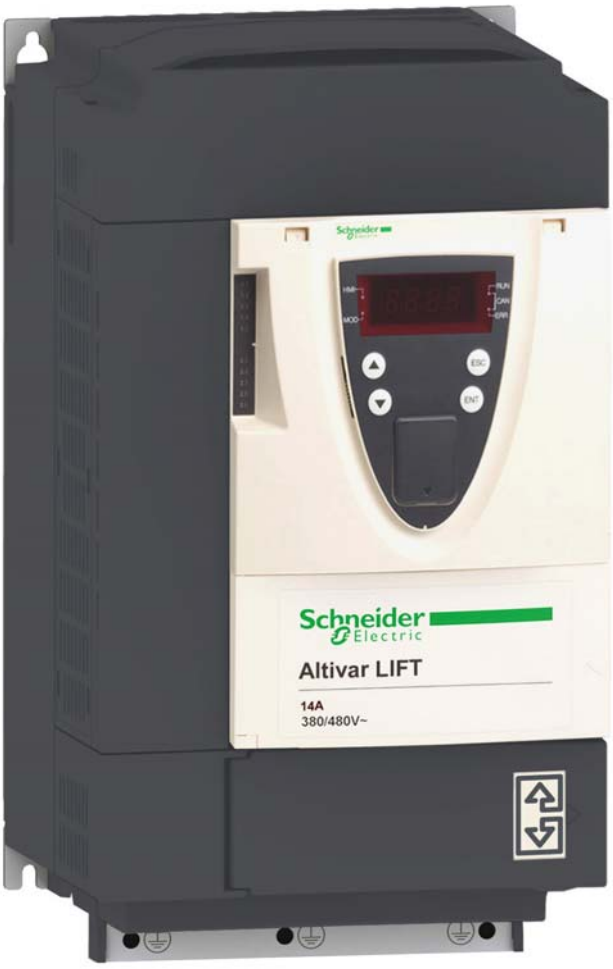

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Table of contents

Before you begin 4
Documentation structure 5
Presentation 6
Vocabulary 7
Setup procedure 8
Factory configuration 9
Setup - Preliminary recommendations 10
Graphic terminal 12
- Description of the terminal 12
- Description of the graphic screen 13
- First power-up - [5. LANGUAGE] menu 16
- Subsequent power ups 17
- Programming: Example of accessing a parameter 18
- Quick navigation 19

Integrated display terminal 22
- Functions of the display and the keys 22
- Accessing menus 23
- Accessing menu parameters 24

[2. ACCESS LEVEL] (LAC-) 25
Structure of the parameter tables 28
Interdependence of parameter values 29
Finding a parameter in this document 30
[1.1 LIFT] (LIF-) 31
[1.2 MONITORING] (SUP-) 115
[1.3 SETTINGS] (SEt-) 124
[1.4 MOTOR CONTROL] (drC-) 136
[1.5 INPUTS / OUTPUTS CFG] (I-O-) 165
[1.6 COMMAND] (CtL-) 196
[1.7 APPLICATION FUNCT.] (FUn-) 209
[1.8 FAULT MANAGEMENT] (FLt-) 261
[1.9 COMMUNICATION] (COM-) 283
[1.10 DIAGNOSTICS] 287
[1.11 IDENTIFICATION] 290
[1.12 FACTORY SETTINGS] (FCS-) 291
[1.13 USER MENU] (USr-) 294
[1.14 CONTROL. INSIDE CARD] (PLC-) 295
[3 OPEN/SAVE AS] 296
[4. PASSWORD] (COd-) 298
[6 MONITORING CONFIG.] 300
[7 DISPLAY CONFIG.] 304
[MULTIPOINT SCREEN] 309
Maintenance 310
Faults - Causes - Remedies 311
User settings tables 317
Index of functions 319
Index of parameter codes 320

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Before you begin

Read and understand these instructions before performing any procedure using this drive.

⚠⚠ DANGER

HAZARDOUS VOLTAGE

- Read and understand the Installation Manual before installing or operating the ATV LIFT drive. Installation, adjustment, repair, and maintenance must be performed by qualified personnel.
- The user is responsible for compliance with all international and national electrical standards in force concerning protective grounding of all equipment.
- Many parts in this variable speed drive, including printed wiring boards, operate at line voltage. DO NOT TOUCH. Use only electrically insulated tools.
- DO NOT touch unshielded components or terminal strip screw connections with voltage present.
- DO NOT short across terminals PA/+ and PC/- or across the DC bus capacitors.
- Install and close all the covers before applying power or starting and stopping the drive.
- Before servicing the variable speed drive
  - Disconnect all power.
  - Place a “DO NOT TURN ON” label on the variable speed drive disconnect.
  - Lock the disconnect in the open position.
- Disconnect all power including external control power that may be present before servicing the drive. WAIT 15 MINUTES to allow the DC bus capacitors to discharge. Then follow the DC bus voltage measurement procedure given in the Installation Manual to verify that the DC voltage is less than 42 Vdc. The drive LEDs are not accurate indicators of the absence of DC bus voltage.

Failure to follow these instructions will result in death or serious injury.

⚠ CAUTION

DAMAGED EQUIPMENT

Do not operate or install any drive that appears damaged.
Failure to follow this instruction can result in injury and/or equipment damage.

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Documentation structure

The following Altivar LIFT technical documents are available on www.schneider-electric.com as well as on the CD-ROM supplied with the drive.

Installation manual

This describes how to assemble and connect the drive.

Programming Manual

This describes the functions, parameters and use of the drive terminal (integrated display terminal and graphic display terminal).
The communication functions are not described in this manual, but in the manual for the bus or network used.

Communication parameters manual

This manual describes:

- The drive parameters with specific information for use via a bus or communication network.
- The operating modes specific to communication (state chart).
- The interaction between communication and local control.

Manuals for Modbus, CANopen, Ethernet, Profibus, INTERBUS, Uni-Telway, FIPIO. and Modbus Plus, etc.

These manuals describe the assembly, connection to the bus or network, signaling, diagnostics, and configuration of the communication-specific parameters via the integrated display terminal or the graphic display terminal.
They also describe the communication services of the protocols.

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Presentation

ATV LIFT has been specially developed for lift applications and therefore meets the requirements of lift installers:

- Quick, simple drive setup via a dedicated LIFT menu.
- Drive performance that offers optimum comfort.
- Integrated LIFT functions: special lift ramp, inspection function, rollback management, optimization of "half floors", UPS evacuation, etc.

ATV LIFT can only be used with lifts.

> **⚠ CAUTION**
>
> **RISK OF INAPPROPRIATE DRIVE BEHAVIOR**
>
> The speed loop implemented in the ATV LIFT is specifically adapted to lift applications.
> It must only be used in a lift application.
>
> **Failure to follow these instructions can result in injury and/or equipment damage.**

The following options are compatibles with ATV LIFT from a minimum version:

- graphic display terminal from the version V1.1IE24,
- universal encoder interface card (VW3A3409) from the version V1.2IE01.

ATV LIFT selection has been simplified: the sizing of the ATV LIFT is done with the nominal current of the motor. This new policy adapts ATV LIFT references with synchronous motors. Maximum transient current has changed. It was 1.5 In with ATV71L and is now 1.36 In with ATV LIFT.

When migrating a lift application from ATV71L to ATV LIFT, you have to check that the drive does not reach [current Limitation] (CLI) state during acceleration or deceleration.
In case of current limitation, adapt the drive parameters if necessary:

- **Increase [Acceleration time] (ACt)**
- **Decrease [Lift Leveling time] (LLt)**

To improve the comfort in the lift, you have also the possibility to use the notch filter function.

- The previous ATV71L references not listed are no longer available. You have to take the higher power ratingdrive for substitution.
- Commercial reference construction: ATV71LD**xxyy**Z where:
  - **xx** : Maximum continuous current at 380V.
  - **yy** : Three phase supply voltage M3 = 230V & N4 = 380V.

Power Rating	Current Rating	Catalog part number		Mechanical Size	
		ATV71L	ATV LIFT	ATV71L	ATV LIFT
3-phase supply voltage : 200...240V					
5,5kW	27A	ATV71LU55M3Z	ATV71LD27M3Z	175*295*161	230*400*187
7,5kW	33A	ATV71LU75M3Z	ATV71LD33M3Z	210*295*187	230*400*187
11kW	54A	ATV71LD11M3XZ	ATV71LD54M3Z	230*400*187	240*420*210
15kW	66A	ATV71LD15M3XZ	ATV71LD66M3Z	230*400*187	240*420*210
3-phase supply voltage : 380...480V					
4kW	10A	ATV71LU40N4Z	ATV71LD10N4Z	155*260*161	175*295*161
5,5kW	14A	ATV71LU55N4Z	ATV71LD14N4Z	175*295*161	175*295*161
7,5kW	17A	ATV71LU75N4Z	ATV71LD17N4Z	175*295*161	210*295*187
11kW	27A	ATV71LD11N4Z	ATV71LD27N4Z	210*295*187	230*400*187
15kW	33A	ATV71LD15N4Z	ATV71LD33N4Z	230*400*187	230*400*187
22kW	48A	ATV71LD22N4Z	ATV71LD48N4Z	240*420*210	240*550*230

Note: the transfer from the graphic display terminal to the drive is possible from ATV71L to ATV LIFT.
The transfer from ATV LIFT to ATV71 L is not possible.
See **[3 OPEN/SAVE AS]** page 296 for a complete description of configuration transfer.

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Vocabulary

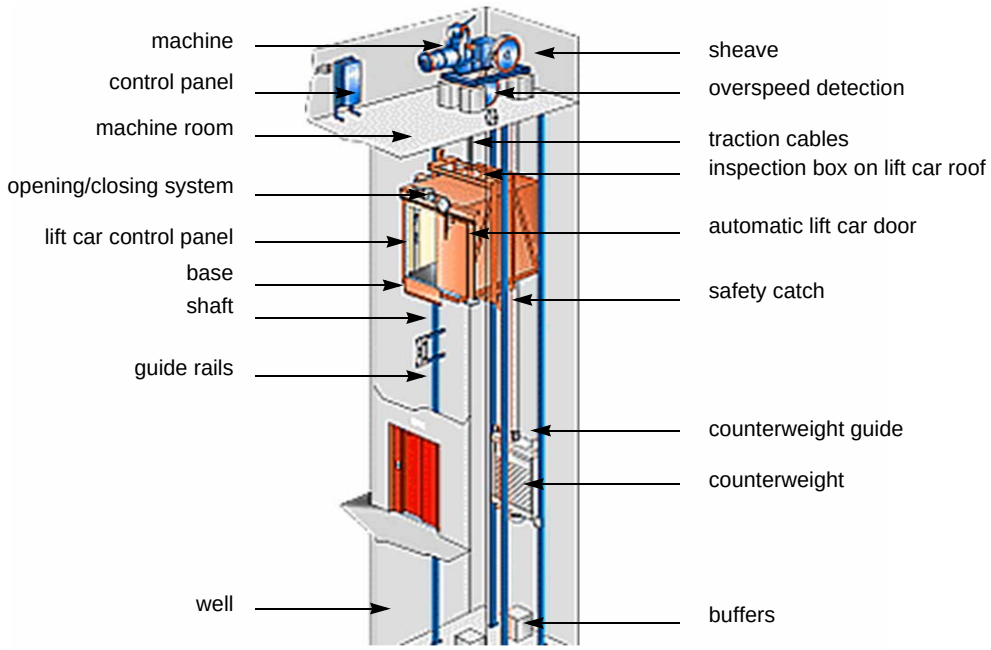
Lift command
Electronic card integrating the lift application intelligence: call management, step displays.
The lift command card monitors the slowdown and stop indicators and controls the drive.

Slowdown indicator
Sensor placed at a precise distance (slowdown length) above and below each step.
When the car passes in front of this sensor, the lift command card removes the high speed command (travel speed) and commands a low speed (lift leveling speed).

Stop indicator
Sensor placed at a precise distance (stop length) above and below each step.
When the car passes in front of this sensor, the lift command card removes the run command. The car should then stop comfortably within the [Stop length] (StL).

Rollback
Movement of the car when the brake is released. In gearless applications where the inertia at the motor is large, the brake release must be specially controlled to cancel this rollback (using an external weight sensor or the rollback management function).

Jerk
Jerk is a measurement of variations in acceleration. It is often related to comfort (comfort is improved as the jerk is reduced).



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INSTALLATION

☐ **1 Consult the Installation Manual**

PROGRAMMING

Procedure applicable if the factory configuration, page 9, and use of the [1.1 LIFT] (LIF-) menu only are sufficient for the application.

■ **2 Power up without run command**

☐ **If you are using a separate control power supply, follow the instructions on page 10.**

■ **3 Select the language, if the drive has a graphic display terminal**

■ **4 Configure the menu [1.1 LIFT] (LIF-)**

■ **5 Start**

Tips:

- **Before you start programming, complete the user setting tables, page 317.**
- **Perform an auto-tuning operation to optimize performance, page 53.**
- **If you get lost, return to the factory settings, page 293.**

☞ ***Note: Check that the wiring of the drive is compatible with its configuration.***

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Factory configuration

Drive factory settings

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

- **Motor** frequency: 50 Hz
- Normal stop mode on deceleration lift ramp
- Stop mode in the event of a fault: Freewheel
- Deceleration ramp with leveling speed step.
- Motor thermal current = rated drive current
- Standstill injection braking current = 0.7 x rated drive current, for 0.5 seconds
- No automatic starts after a fault
- Switching frequency 8 kHz.
- Logic inputs:
  - LI1: forward, LI2: reverse (2 operating directions), 2-wire control on transition
  - LI3: Inactive (not assigned)
  - LI4: Lift speed
  - LI5: Inspection mode
  - LI6: Not assigned
- Analog inputs:
  - AI1: Speed reference 0 +10 V
  - AI2: 0-20 mA, inactive (not assigned)
- Relay R1: no
- Relay R2: Brake control
- Analog output AO1: dO1 (logic output)

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

Option card factory settings

The option card inputs/outputs are not factory-set.

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Setup - Preliminary recommendations

Turning on and configuring the drive

⚠ DANGER

UNINTENDED EQUIPMENT OPERATION

- Before turning on and configuring the Altivar LIFT, check that the PWR (POWER REMOVAL) input is deactivated (at state 0) in order to prevent unintended operation.
- Before turning on the drive, or when exiting the configuration menus, check that the inputs assigned to the run command are deactivated (at state 0) since they can cause the motor to start immediately.

Failure to follow these instructions will result in death or serious injury.

⚠ CAUTION

INCOMPATIBLE LINE VOLTAGE

Before turning on and configuring the drive, ensure that the line voltage is compatible with the supply voltage range shown on the drive nameplate. The drive may be damaged if the line voltage is not compatible.

Failure to follow this instruction can result in equipment damage.

Separate control section power supply

When the drive control section is powered independently of the power section (P24 and 0V terminals), whenever an option card is added or replaced, only the power section must be supplied with power next time the drive is powered up.
By default the new card would not be recognized and it would be impossible to configure it, thereby causing the drive to lock in fault mode.

Power switching via line contactor

⚠ CAUTION

- Avoid operating the contactor frequently (premature ageing of the filter capacitors).
- Cycle times < 60 s can result in damage to the precharge resistor.

Failure to follow this instruction can result in equipment damage.

User adjustment and extension of functions

- The display unit and buttons can be used to modify the settings and to extend the functions described in the following pages.
- **Return to factory settings** is made easy by the [1.12 FACTORY SETTINGS] (FCS-) menu, see page 291.
- There are three types of parameter:
  - Display: Values displayed by the drive
  - Adjustment: 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.

⚠ DANGER

UNINTENDED EQUIPMENT OPERATION

- Check that changes made to the settings during operation do not present any danger.
- We recommend stopping the drive before making any changes.

Failure to follow these instructions will result in death or serious injury.

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Setup - Preliminary recommendations

Starting

Important:

- In factory settings mode, the motor can only be supplied with power once the “forward”, “reverse” and “DC injection stop” commands have been reset:
  - On power-up or a manual fault reset or after a stop command.

  If they have not been reset, the drive will display "nSt" but will not start.
- If the automatic restart function has been configured ([Automatic restart] (Atr) parameter in the [1.8-FAULT MANAGEMENT] (FLt-) menu, see page 265), 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, [Output Phase Loss] (OPL) detection page 268 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 [Output Phase Loss] (OPL = nO).

⚠ CAUTION

UNINTENDED EQUIPMENT OPERATION

Motor thermal protection will not be provided by the drive if the motor current is less than 0.2 times the rated drive current. Provide an alternative means of thermal protection.

Failure to follow this instruction can result in equipment damage.

Use of the LIFT menu

⚠ DANGER

RISK OF UNEXPECTED DRIVE BEHAVIOR

- Identify the precise values of [Nominal car speed] (CSP) and payload [Capacity of the lift] (LCA).
- Check the [Nominal car speed] (CSP)) by calculation (See menu [1.1 LIFT] (LIF-), submenu [LIFT DATA] (LdA-) or by measurement.

If the values of [Nominal car speed] (CSP) or [Lift capacity] (LCA) are incorrect, the stop lengths ([Deceleration length] (dEL) and [Stop length] (StL) will not be adhered to.
The speed loop preset will not be adapted to the application (risk of instability and lift car slipping).

Failure to follow these instructions will result in death or serious injury.

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Graphic terminal

The graphic terminal is optional. The graphic terminal is removable and can be located remotely (on the door of an enclosure, for example) using the cables and accessories available as options (see catalog).

Description of the terminal

1 Graphic display

2 Function keys F1, F2, F3, F4, see page 13.

3 STOP/RESET button

4 RUN button

5 Navigation button:

- Press (ENT): - To save the current value
  - To enter the selected menu or parameter
- Turn CW/ CCW: - To increment or decrement a value
  - To go to the next or previous line
  - To increase or decrease the reference if control via the display terminal is activated

6 Button for reversing the direction of rotation of the motor

7 ESC key: Aborts a value, a parameter or a menu to return to the previous selection

Note: Buttons **3**, **4**, **5** and **6** can be used to control the drive directly, if control via the display terminal is activated.

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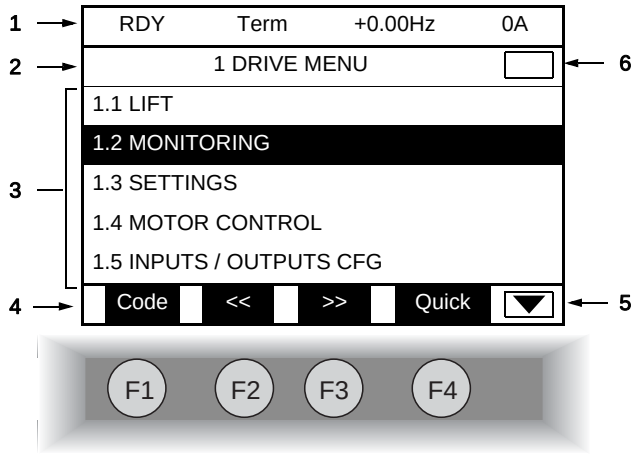
Graphic terminal

Description of the graphic screen



1. Display line. Its content can be configured; the factory settings show:
- The drive state (see page 14)
- The active control channel:
  - Term: Terminals
  - HMI: Graphic terminal
  - MDB: Integrated Modbus
  - CAN: Integrated CANopen
  - NET: Communication card
  - APP: Controller Inside card
- Frequency reference
- Current in the motor

2. Menu line. Indicates the name of the current menu or submenu.

3. Menus, submenus, parameters, values, bar charts, etc., are displayed in drop-down window format on a maximum of 5 lines. The line or value selected by the navigation button is displayed in reverse video.

4. Section displaying the functions assigned to the F1 to F4 keys and aligned with them, for example:

- Code F1 : Displays the code of the selected parameter, i.e., the code corresponding to the 7-segment display.
- HELP F1 : Contextual help
- << F2 : Navigate horizontally to the left, or go to previous menu/submenu or, for a value, go to the next digit up, displayed in reverse video (see the example on page 15).
- >> F3 : Navigate horizontally to the right or go to next menu/submenu (going to the [2 ACCESS LEVEL] menu in this example) or, for a value, go to the next digit down, displayed in reverse video (see the example on page 15).
- Quick F4 : Quick navigation, see page 19.

The function keys are dynamic and contextual.
Other functions (application functions) can be assigned to these keys via the [1.6 COMMAND] menu.

5. Indicates that there are no more levels below this display window.
Indicates that there are more levels below this display window.

6. Indicates that this display window does not scroll further up.
Indicates that there are more levels above this display window.

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Drive state codes:

- ACC: Acceleration
- CLI: Current limitation
- CTL: Controlled stop on input phase loss
- DCB: DC injection braking in progress
- DEC: Deceleration
- FLU: Motor fluxing in progress
- FST: Fast stop
- NLP: No line power (no line supply on L1, L2, L3)
- NST: Freewheel stop
- OBR: Auto-adapted deceleration
- PRA: Power Removal function active (drive locked)
- RDY: Drive ready
- RUN: Drive running
- SOC: Controlled output cut in progress
- TUN: Auto-tuning in progress
- USA: Undervoltage alarm
- ASA: Measurement of the phase-shift angle in progress

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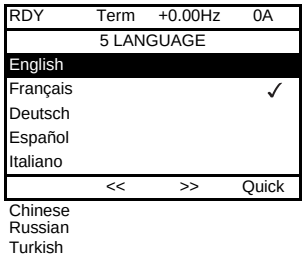
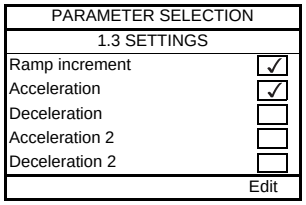
Example configuration windows:

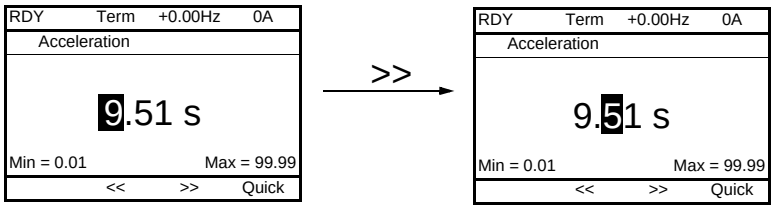


When only one selection is possible, the selection made is indicated by ✓.
E.g. Only one language can be chosen.



When multiple selection is possible, the selections made are indicated by ☑.
E.g. A number of parameters can be chosen to form the [USER MENU].

Example configuration window for one value:



The << and >> arrows (keys F2 and F3) are used to select the digit to be modified, and the navigation button is rotated to increase or decrease this number.

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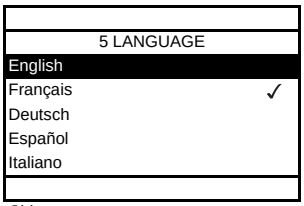
First power-up - [5. LANGUAGE] menu

The first time the drive is powered up, the user will automatically be guided through the menus as far as the [1.1. LIFT] submenu. The parameters in this submenu must be configured and auto-tuning performed before the motor is started up.

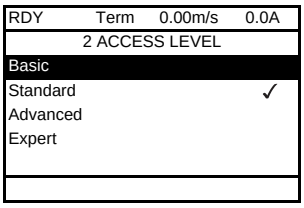
Display for 3 seconds following power-up

3 seconds

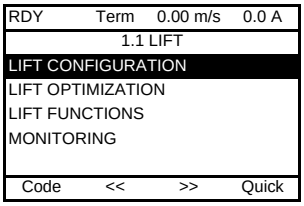


Chinese
Russian
Turkish

Automatically switches to [5 LANGUAGE] menu 3 seconds later.
Select the language and press ENT.

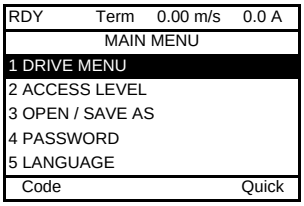


Switches to [2 ACCESS LEVEL] menu (see page 25)
Select the access level and press ENT.



Switches to [1.1 LIFT] (see page 21)

ESC
ESC



Press ESC twice to return to [MAIN MENU]

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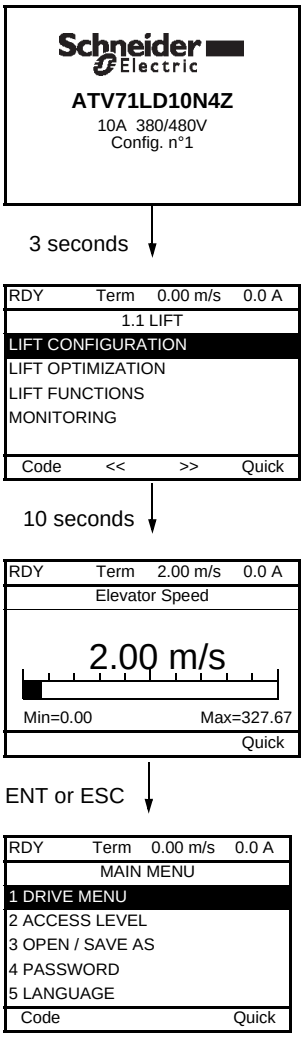
Subsequent power ups



Switches to [1.1. LIFT] 3 seconds later.

If no operator inputs are made, switches to "Display" automatically 10 seconds later (the display will vary depending on the selected configuration).

Users can return to [MAIN MENU] by pressing ENT or ESC.

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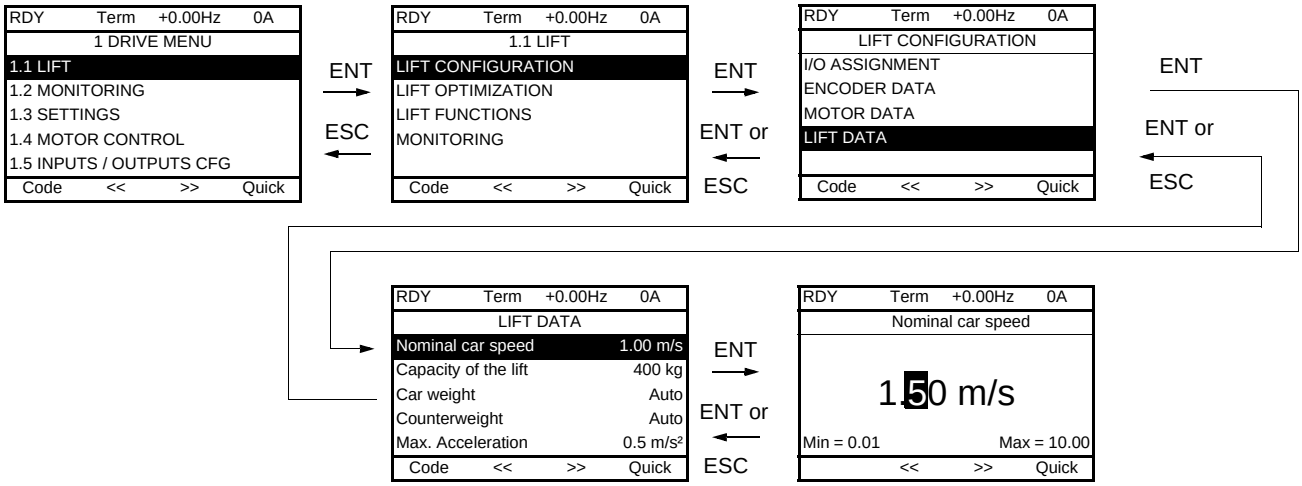
Programming: Example of accessing a parameter



Accessing the nominal car speed

Note:

- To select a parameter:
  - Turn the navigation button to scroll vertically.
- To modify a parameter:
  - Use the << and >> keys (F2 and F3) to scroll horizontally and select the digit to be modified (the selected digit changes to white on a black background).
  - Turn the navigation button to modify the digit.
- To cancel the modification:
  - Press ESC.
- To save the modification:
  - Press the navigation button (ENT).

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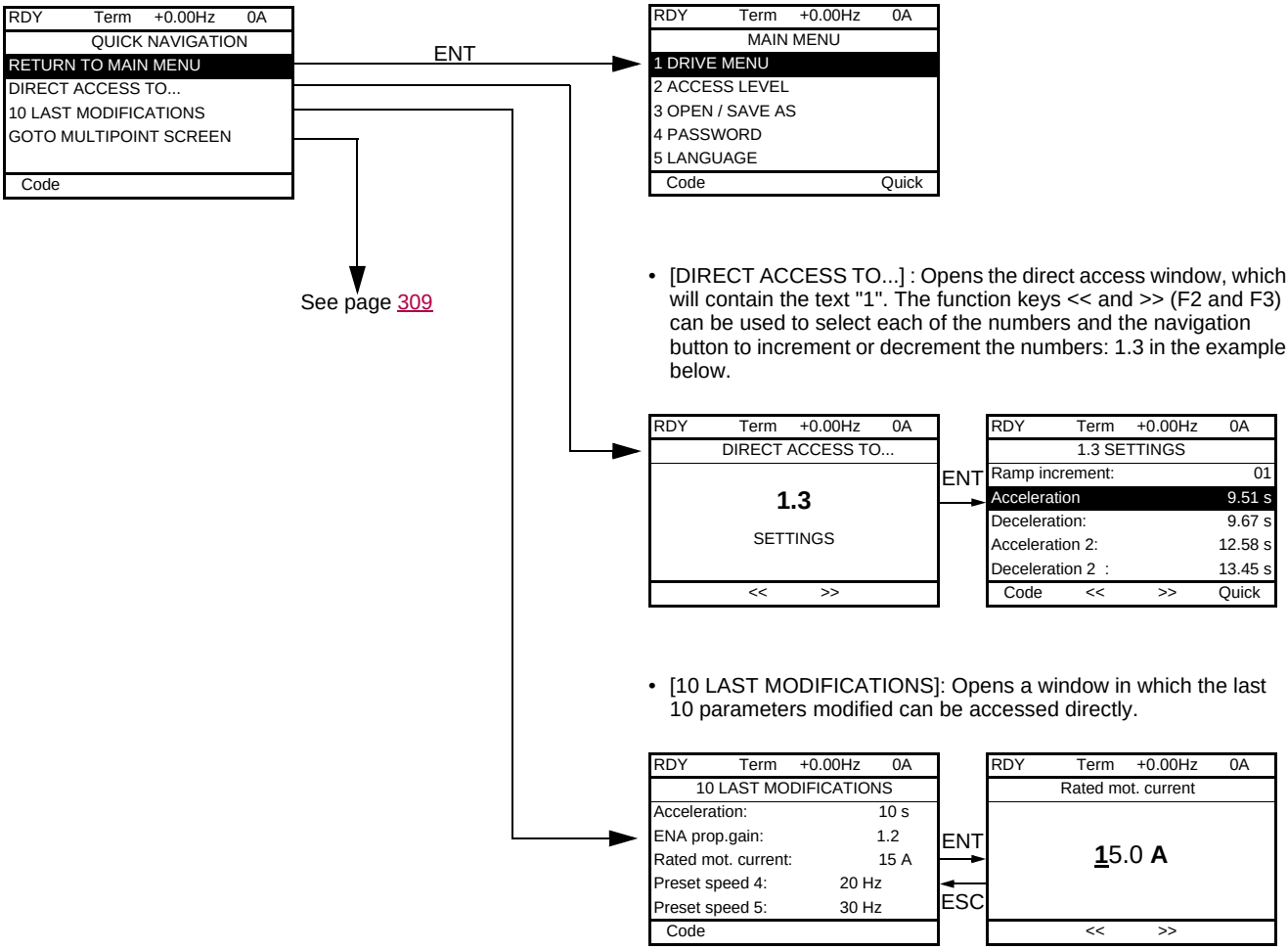
Quick navigation

If the "Quick" function is displayed above the F4 key, you can gain quick access to a parameter from any screen.

E.g.

RDY	Term	+0.00Hz	0A
1.4 MOTOR CONTROL			
Standard mot. freq:			50Hz IEC
Motor control type:			SVC U
Max frequency:			60 Hz
Output Ph rotation:			ABC
Sinus filter:			no
Code	<<	>>	Quick

Press F4 to access the Quick screen, which contains 4 selection options.



- [HOME]: Return to [MAIN MENU].
- [DIRECT ACCESS TO...] : Opens the direct access window, which will contain the text "1". The function keys << and >> (F2 and F3) can be used to select each of the numbers and the navigation button to increment or decrement the numbers: 1.3 in the example below.
- [10 LAST MODIFICATIONS]: Opens a window in which the last 10 parameters modified can be accessed directly.

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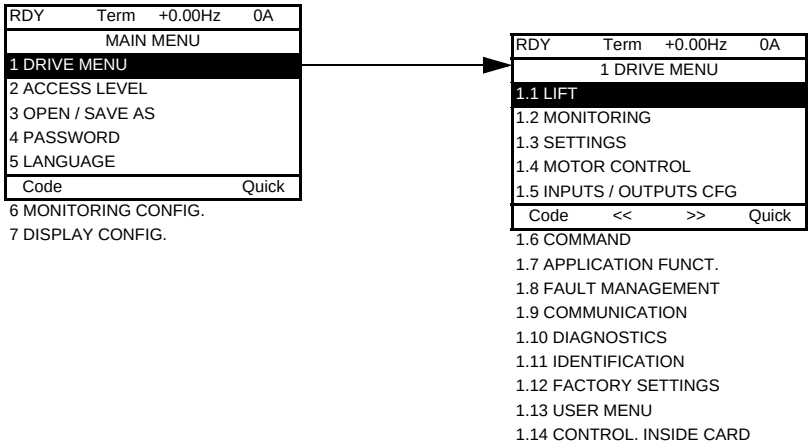
[MAIN MENU] - Menu mapping



Content of [MAIN MENU] menus

[1 DRIVE MENU]	See next page
[2 ACCESS LEVEL]	Defines which menus can be accessed (level of complexity)
[3 OPEN / SAVE AS]	Can be used to save and retrieve drive configuration files
[4 PASSWORD]	Provides password protection for the configuration
[5 LANGUAGE]	Language selection
[6 MONITORING CONFIG.]	Customization of information displayed on the graphic display terminal during operation
[7 DISPLAY CONFIG.]	• Customization of parameters • Creation of a customized user menu • Customization of the visibility and protection mechanisms for menus and parameters

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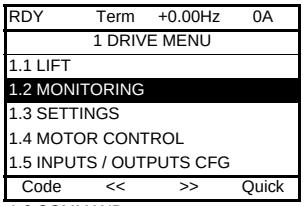
[1 DRIVE MENU]



1.6 COMMAND
1.7 APPLICATION FUNCT.
1.8 FAULT MANAGEMENT
1.9 COMMUNICATION
1.10 DIAGNOSTICS
1.11 IDENTIFICATION
1.12 FACTORY SETTINGS
1.13 USER MENU
1.14 CONTROL. INSIDE CARD

Content of [1. DRIVE MENU] menus:

[1.1 LIFT]:	Lift menu
[1.2 MONITORING]:	Visualization of current, motor and input/output values
[1.3 SETTINGS]:	Accesses the adjustment parameters, which can be modified during operation
[1.4 MOTOR CONTROL]:	Motor parameters (motor nameplate, auto-tuning, switching frequency, control algorithms, etc.)
[1.5 INPUTS / OUTPUTS CFG]:	I/O configuration (scaling, filtering, 2-wire control, 3-wire control, etc.)
[1.6 COMMAND]:	Configuration of command and reference channels (graphic display terminal, terminals, bus, etc.)
[1.7 APPLICATION FUNCT.] :	Configuration of application functions (e.g., preset speeds, PID, brake control, etc.)
[1.8 FAULT MANAGEMENT]:	Configuration of fault management
[1.9 COMMUNICATION]:	Communication parameters (fieldbus)
[1.10 DIAGNOSTICS]:	Motor/drive diagnostics
[1.11 IDENTIFICATION]:	Identifies the drive and internal options
[1.12 FACTORY SETTINGS]:	Access to configuration files and return to factory settings
[1.13 USER MENU]:	Specific menu set up by the user in the [7. DISPLAY CONFIG.] menu
[1.14 CONTROL. INSIDE CARD]:	Configuration of optional Controller Inside card

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Integrated display terminal

Altivar LIFT features an integrated display terminal with a 7-segment 4-digit display. The graphic display terminal described on the previous pages can also be connected to this drive as an option.

Functions of the display and the keys

- 2 Modbus status LEDs
- Four 7-segment displays
- Returns to the previous menu or parameter, or increases the displayed value
- Goes to the next menu or parameter, or decreases the displayed value
- 2 CANopen status LEDs
- Exits a menu or parameter, or aborts the displayed value to return to the previous value in the memory
- Enters a menu or a parameter, or saves the displayed parameter or value

Note: **• Pressing ▲ or ▼ does not store the selection.**

• Press and hold down (>2 s) ▲ or ▼ to scroll through the data quickly.

Save and store the selection: ENT

The display flashes when a value is stored.

Normal display, with no fault present and no startup:

- 43.0: Display of the parameter selected in the SUP menu (default selection: Lift speed).
- CLI: Current limitation.
- CtL: Controlled stop on input phase loss.
- dCb: DC injection braking in progress.
- FLU: Motor fluxing in progress.
- FSt: Fast stop.
- nLP: No line power (no line supply on L1, L2, L3).
- nSt: Freewheel stop.
- Obr: Auto-adapted deceleration.
- PrA: Power Removal function active (drive locked).
- rdY: Drive ready.
- SOC: Controlled output cut in progress.
- tUn: Auto-tuning in progress.
- USA: Undervoltage alarm.
- ASA: Measurement of the phase-shift angle in progress.

The display flashes to indicate the presence of a fault.

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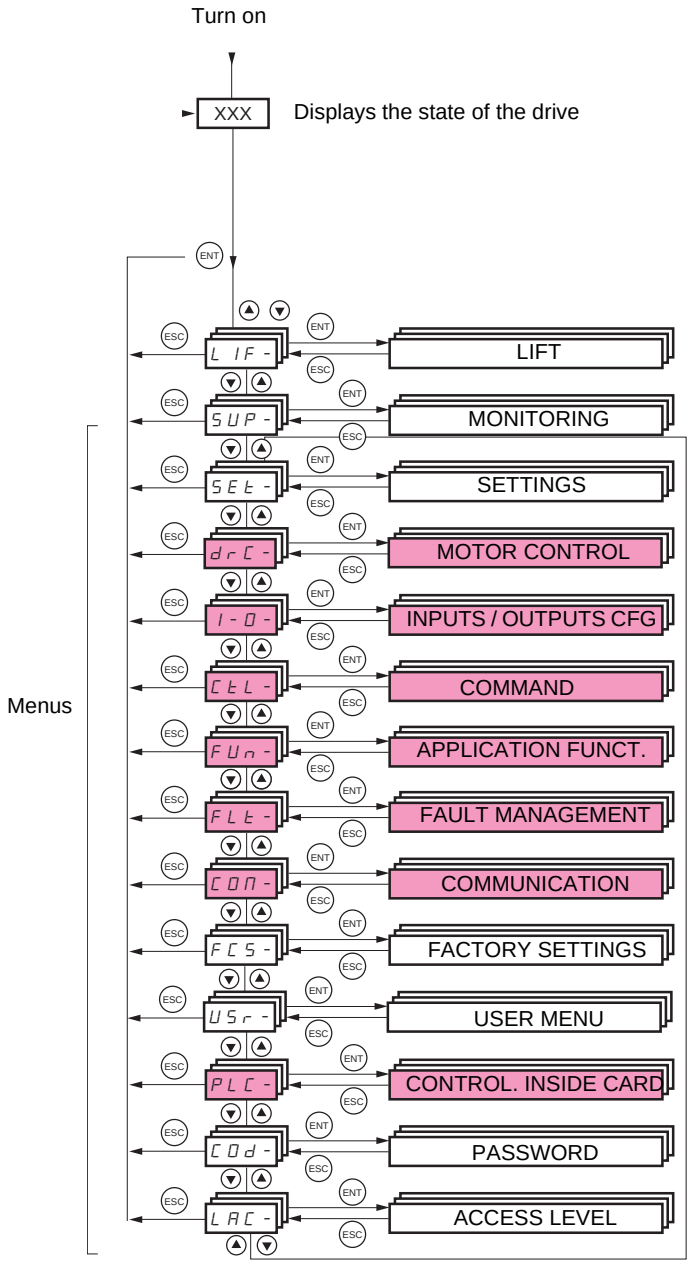
Accessing menus



(page 31) Lift menu

(page 115) Visualization of current, motor and input/output values

(page 124) Adjustment parameters, can be modified during operation

(page 136) Motor parameters (motor nameplate, auto-tuning, switching frequency, control algorithms, etc.)

(page 165) I/O configuration (scaling, filtering, 2-wire control, 3-wire control, etc.)

(page 196) Configuration of command and reference channels (graphic display terminal, terminals, bus, etc.)

(page 209) Configuration of application functions (e.g., preset speeds, brake control, etc.)

(page 260) Configuration of fault management

(page 283) Communication parameters (fieldbus)

(page 291) Access to configuration files and return to factory settings

(page 294) Specific menu, set up by the user using the graphic display terminal.

(page 295) Menu for the Controller Inside card, if present.

(page 298)

(page 25)

A dash appears after menu and submenu codes to differentiate them from parameter codes.
Examples: FUn- menu, ACC parameter.

The grayed-out menus may not be accessible depending on the control access (LAC) configuration.

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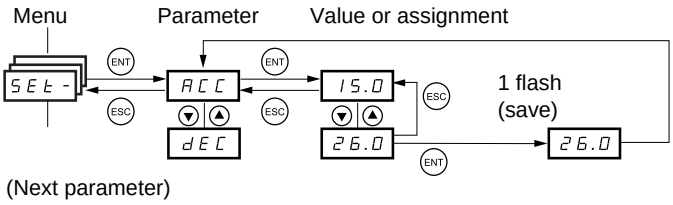
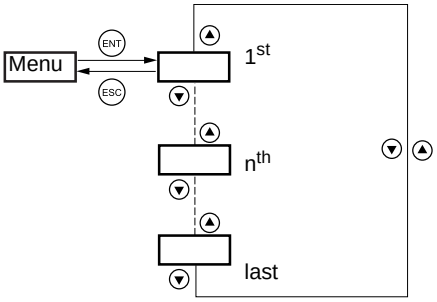
Accessing menu parameters

Save and store the displayed selection: (ENT)

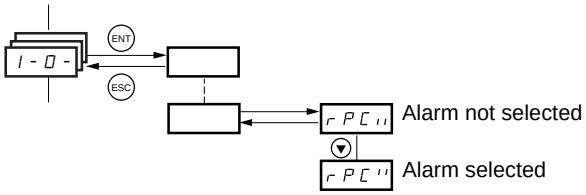


The display flashes when a value is stored.



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

Selection of multiple assignments for one parameter



E.g. List of group 1 alarms in [INPUTS / OUTPUTS CFG] (I-O-) menu
A number of alarms can be selected by "checking" them as follows.

The digit on the right indicates: 1 selected,
0 not selected.

The same principle is used for all multiple selections.

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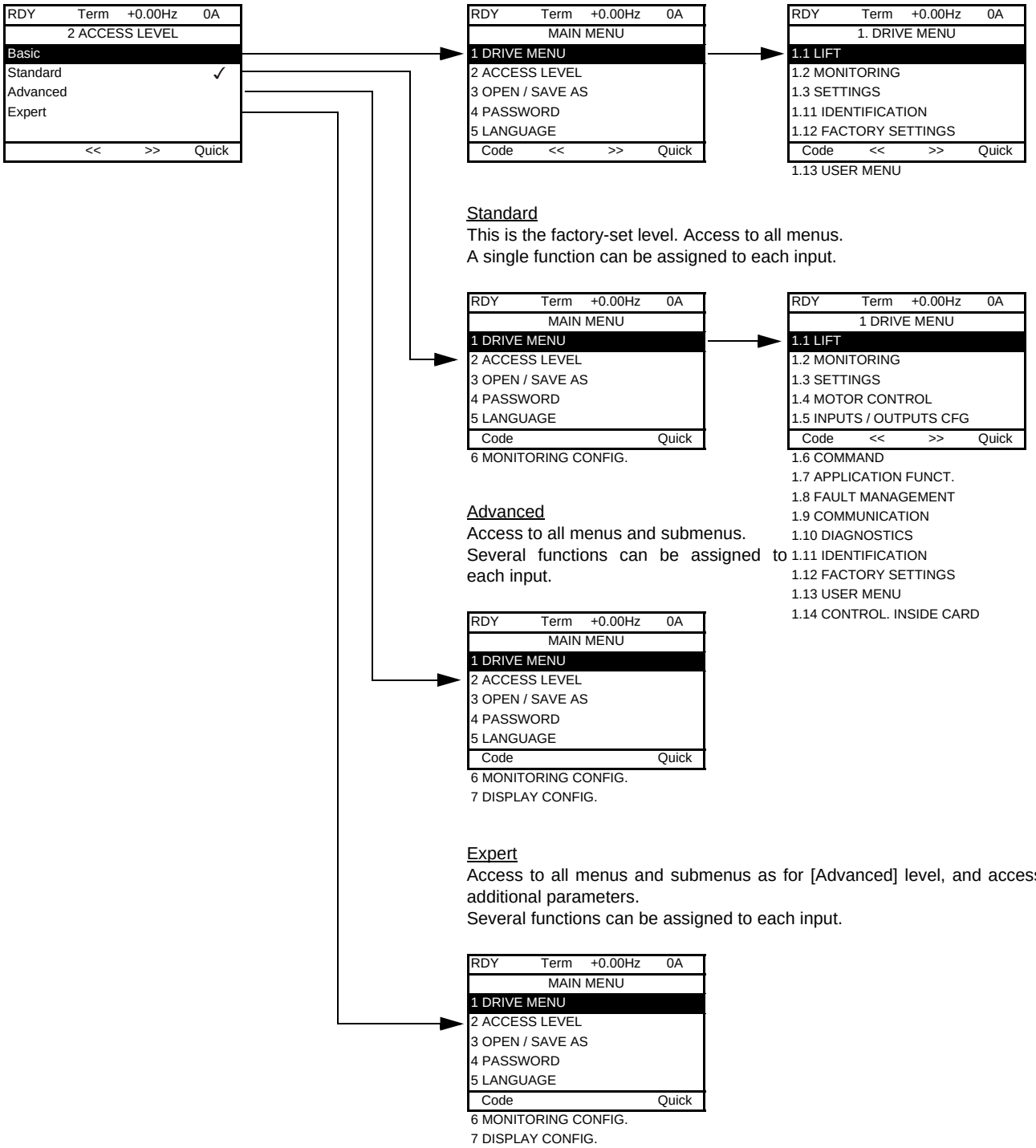
[2. ACCESS LEVEL] (LAC-)

With graphic display terminal



Basic

Access to 5 menus only, and access to 6 submenus only in the [1. DRIVE MENU] menu.

A single function can be assigned to each input.

Standard

This is the factory-set level. Access to all menus.

A single function can be assigned to each input.

Advanced

Access to all menus and submenus.

Several functions can be assigned to each input.

Expert

Access to all menus and submenus as for [Advanced] level, and access to additional parameters.

Several functions can be assigned to each input.

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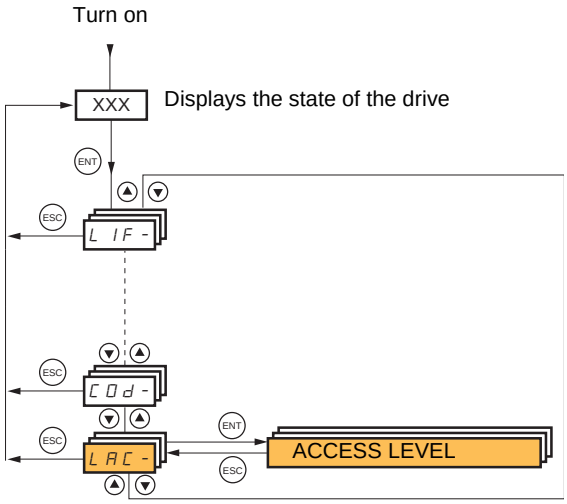
[2. ACCESS LEVEL] (LAC-)

With integrated display terminal:



Code	Name/Description	Factory setting
LAC -		Std
bAS	• bAS: Limited access to SIM, SUP, SEt, FCS, USr, COd and LAC menus. A single function can be assigned to each input.	
Std	• Std: Access to all menus on the integrated display terminal. A single function can be assigned to each input.	
AdU	• AdU: Access to all menus on the integrated display terminal. Several functions can be assigned to each input.	
EPr	• EPr: Access to all menus on the integrated display terminal and access to additional parameters. Several functions can be assigned to each input.	

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[2. ACCESS LEVEL] (LAC-)

Comparison of the menus that can be accessed on the graphic display terminal/integrated display terminal

Graphic terminal	Integrated Display Terminal	Access Level
[2 ACCESS LEVEL]	LAC - (Access level)	Basic bAS / Standard STd (factory setting) / Advanced Adv / Expert EPr
[3 OPEN/SAVE AS]	-	
[4 PASSWORD]	COd - (Password)	
[5 LANGUAGE]	-	
[1 DRIVE MENU] [1.1 LIFT]	LIF - (Lift)	
[1.2 MONITORING]	SUP - (Monitoring)	
[1.3 SETTINGS]	SEt - (Settings)	
[1.11 IDENTIFICATION]	-	
[1.12 FACTORY SETTINGS]	FCS - (Factory settings)	
[1.13 USER MENU]	USr - (User menu)	
A single function can be assigned to each input.	A single function can be assigned to each input.	
[1.4 MOTOR CONTROL]	drC - (Motor control)	Standard STd (factory setting) / Advanced Adv / Expert EPr
[1.5 INPUTS / OUTPUTS CFG]	I-O - (I/O configuration)	
[1.6 COMMAND]	CtL - (Command)	
[1.7 APPLICATION FUNCT.]	Fun - (Application functions)	
[1.8 FAULT MANAGEMENT]	FLt - (Fault management)	
[1.9 COMMUNICATION]	COM - (Communication)	
[1.10 DIAGNOSTICS]	-	
[1.14 CONTROL. INSIDE CARD] (1)	PLC - (Controller Inside card) (1)	
[6 MONITORING CONFIG.]	-	
A single function can be assigned to each input.	A single function can be assigned to each input.	
[7 DISPLAY CONFIG.]	-	Advanced Adv / Expert EPr
Several functions can be assigned to each input.	Several functions can be assigned to each input.	
Expert parameters	Expert parameters	Expert EPr
Several functions can be assigned to each input.	Several functions can be assigned to each input.	

(1) Can be accessed if the Controller Inside card is present.

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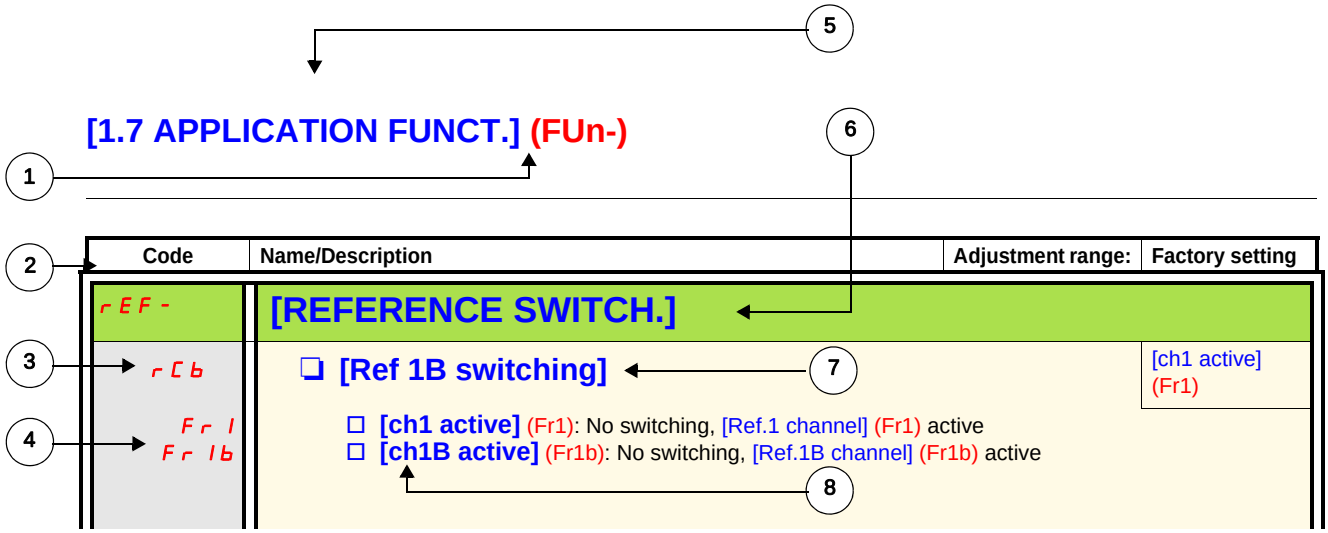
Structure of the parameter tables

The parameter tables in the descriptions of the various menus can be used with both the graphic display terminal and the integrated display terminal. They therefore contain information for these two terminals in accordance with the description below.

E.g.



1. Name of menu on 4-digit 7-segment display.
2. Submenu code on 4-digit 7-segment display.
3. Parameter code on 4-digit 7-segment display.
4. Parameter value on 4-digit 7-segment display.
5. Name of menu on graphic display terminal.
6. Name of submenu on graphic display terminal.
7. Name of parameter on graphic display terminal
8. Value of parameter on graphic display terminal

Note:

- The text in square brackets [ ] indicates what you will see on the graphic display terminal.

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Interdependence of parameter values

The configuration of certain parameters modifies the adjustment range of other parameters, in order to reduce the risk of errors. **This may result in the modification of a factory setting or a value you have already selected.**

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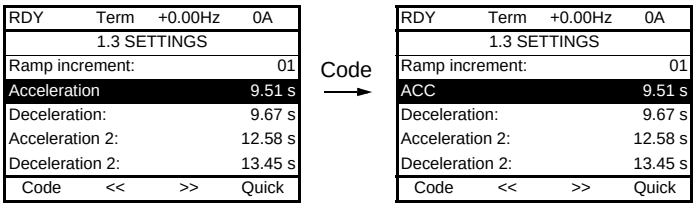
Finding a parameter in this document

The following assistance with finding explanations on a parameter is provided:

- **With the integrated display terminal:** Direct use of the parameter code index, page 320, to find the page giving details of the displayed parameter.
- **With the graphic display terminal:** Select the required parameter and press F1 : [Code]. The parameter code is displayed instead of its name while the key is held down.

  Example: ACC



  Then use the parameter code index, page 320, to find the page giving details of the displayed parameter.

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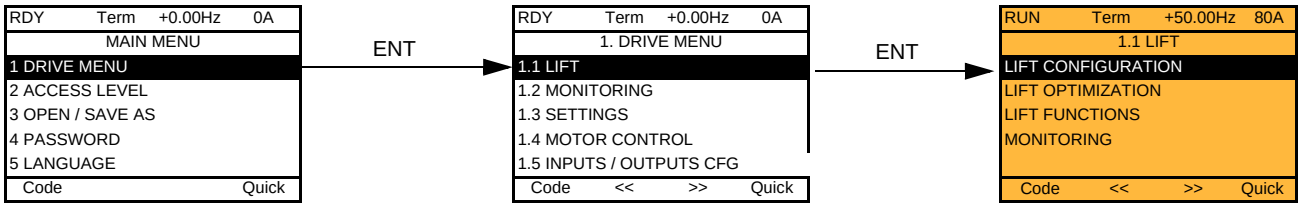
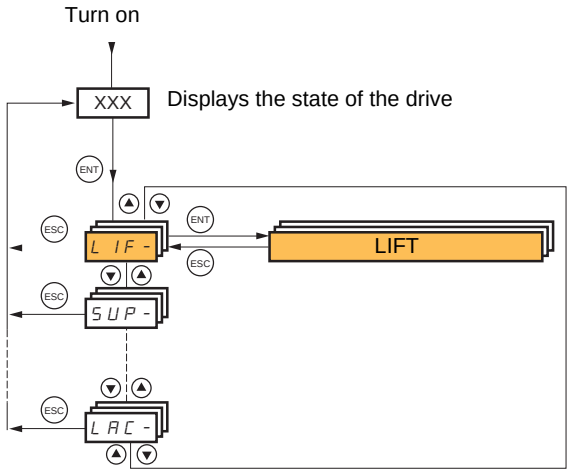
[1.1 LIFT] (LIF-)

With graphic display terminal:



With integrated display terminal:



The [1.1 LIFT] (LIF-) menu is used to apply settings for a lift application.

Note: The parameters of the [1.1 LIFT] (LIF-) menu must be entered in the order in which they appear, as the later ones are dependent on the first ones.

The [1.1 LIFT] (LIF-) menu should be configured **on its own or before the other drive configuration menus**. If a modification has previously been made to any of them, in particular in [1.4 MOTOR CONTROL] (drC-), some [1.1 LIFT] (LIF-) parameters may be changed, for example, the motor parameters if a synchronous motor has been selected. Returning to the [1.1 LIFT] (LIF-) menu after modifying another drive configuration menu **is unnecessary** but does not pose any risk. Changes following modification of another configuration menu **are not therefore described**, to avoid unnecessary complication in this section.

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542 291 58 92 - 0 242 335 40 42

[1.1 LIFT] (LIF-)

Lift configuration

To get started quickly on the ATV LIFT it is essential to follow the instructions below.

The LIFT menu has been designed to be browsed in a linear manner. Go through this menu step by step in order to enter all the parameters required for correct lift configuration.

Before starting to program the drive, identify the data below carefully:

Code	Name/Description	Value
[I/O ASSIGNMENTS] (LIO-)	*I/O menu*	
	LI1 assignment LI2 assignment LI3 assignment LI4 assignment LI5 assignment LI6 assignment AI1 assignment AI2 assignment R1 assignment R2 assignment	....
[ENCODER DATA] (End-)	*Encoder Data menu*	
 [Number of pulses] (PGI)	**Incremental encoder** Number of pulses	....
 [Freq.Excit.Resolve] (FreS) [Resolver poles nbr] (rppn)	**Resolver encoder** Resolver Excit Freq. Resolver poles nbr	 ....
 [Encoder supply volt.] (UECU) [Sincos lines count] (UELC)	**SinCos encoder** Encoder supply volt. Number of lines	 ....
 [Encoder supply volt.] (UECU) [Sincos lines count] (UELC)	**Dual SinCos encoder** Encoder supply volt. Number of lines	 ....
 [Sincos lines count] (UELC)	**SinCos EnDat encoder** Sincos lines count	 .....
[MOTOR DATA] (Mot-)	*Motor Data menu*	
[Motor control type] (Ctt)	Motor control type	..... SVC V or FVC or FSY or SYN
 [Rated motor power] (nPr) [Rated motor volt.] (UnS) [Rated mot. current] (nCr) [Rated motor freq.] (FrS) [Rated motor speed] (nSP)	**Asynchronous** Rated motor power Rated motor volt. Rated mot. current Rated motor freq. Rated motor speed or	 ..... kW ..... V ..... A ..... Hz ..... rpm
 [Motor torque] (tqS) [Nominal I sync.] (nCrS) [Nom motor spdsync.] (nSPS) [Pole pairs] (PPnS)	**Synchronous** Motor torque Nominal I sync. Nom motor spdsync Pole pairs	 ..... Nm ..... A ..... rpm .....
[LIFT DATA] (LdA-)	*Lift Data menu*	
[Nominal car speed] (CSP) [Capacity of the lift] (LCA) [Lift top speed] (LTS) [Deceleration length] (dEL) [Lift leveling time] (LLt) [Stop length] (StL) [Lift leveling speed] (LLS)	Nominal car speed at FRS Payload Travel speed Deceleration length Lift leveling time Stop length Lift leveling speed	..... m/s ..... kg ..... m/s ..... cm ..... s ..... cm ..... m/s

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Assignment of the inputs/outputs

The ATV LIFT is factory-set with the following I/O assignments:

Logic inputs

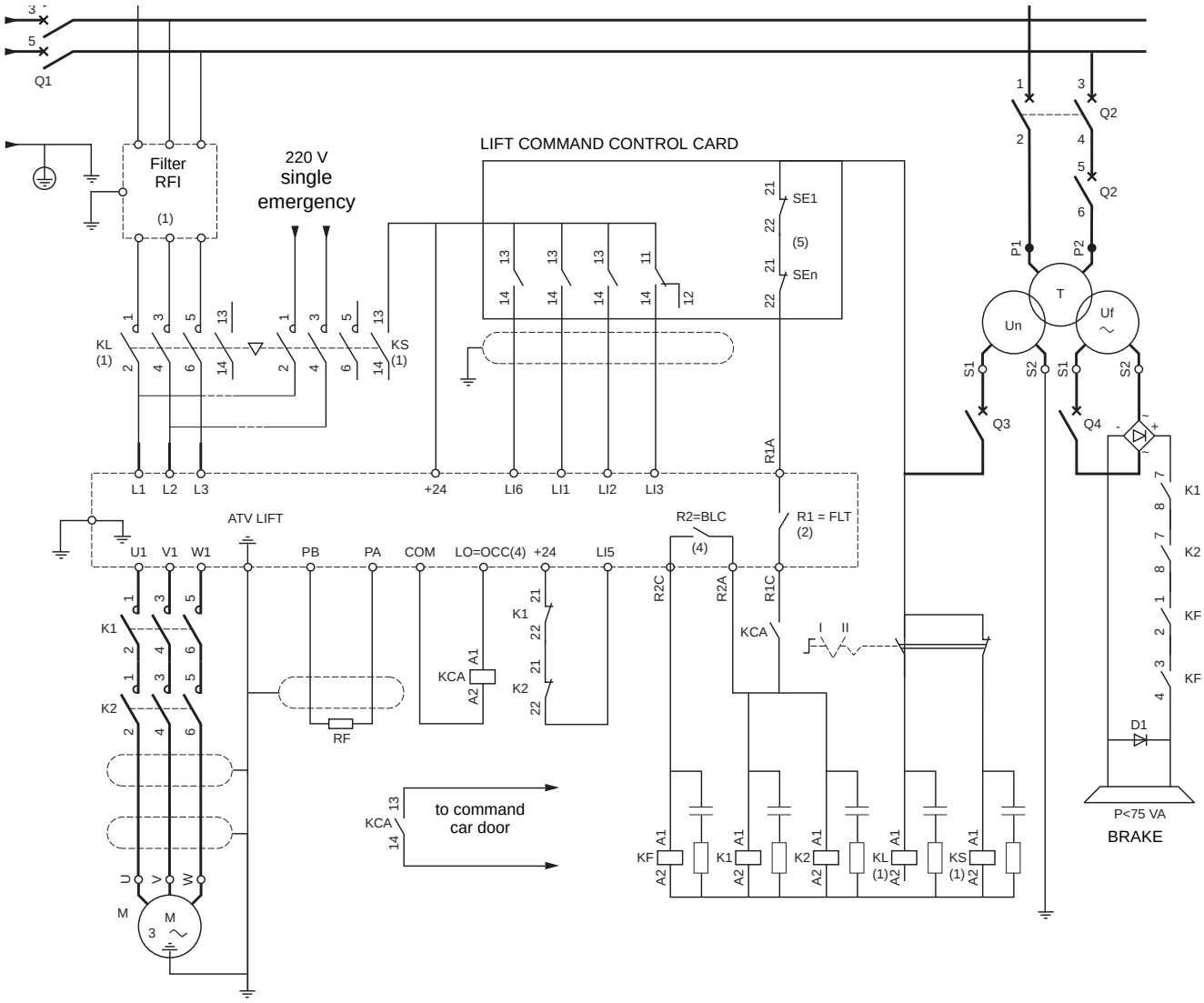
- LI1: Forward
- LI2: Reverse
- LI3: Not assigned
- LI4: Lift speed management
- LI5: Inspection mode
- LI6: Not assigned

Logic outputs

- R1: No
- R2: Brake sequence
- dO1: Output contactor

Analog inputs

- AI1: Channel reference



(1) Optional elements.
(2) Fault relay contacts for remote signalling of drive status (reassignable).
(3) Internal +24 V. If an external +24V supply is used, connect the 0 V on the external supply to the COM terminal, do not use the +24 terminal on the drive, and connect the common of the LI inputs to the +24 V of the external supply.
(4) Assignable relay R2 and logic output LO.
(5) Safety circuit.

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[1.1 LIFT] (LIF-)

Code	Name/Description	Adjustment range	Factory setting
LCO-	**[LIFT CONFIGURATION]**		
LIO-	**[I/O ASSIGNMENTS]**		
INP-	**[INPUTS]**		
Frd	❏ **[Forward]**		[LI1] (LI1)
	☐ **[No]** (nO): Not assigned ☐ **[LI1]** (LI1) to **[LI6]** (LI6) ☐ **[LI7]** (LI7) to **[LI10]** (LI10): If VW3A3201 logic I/O card has been inserted ☐ **[LI11]** (LI11) to **[LI12]** (LI12): If VW3A3203 ESIM card has been inserted ☐ **[LI11]** (LI11) to **[LI14]** (LI14): If VW3A3202 extended I/O card has been inserted ☐ **[C101]** (C101) to **[C115]** (C115): With integrated Modbus in [I/O profile] (IO) ☐ **[C201]** (C201) to **[C215]** (C215): With integrated CANopen in [I/O profile] (IO) ☐ **[C301]** (C301) to **[C315]** (C315): With a communication card in [I/O profile] (IO) ☐ **[C401]** (C401) to **[C415]** (C415): With a Controller Inside card in [I/O profile] (IO) ☐ **[CD00]** (Cd00) to **[CD13]** (Cd13): In [I/O profile] (IO) can be switched with possible logic inputs ☐ **[CD14]** (Cd14) to **[CD15]** (Cd15): In [I/O profile] (IO) can be switched without logic inputs Reads the forward command assignment.		
rrS	❏ **[Reverse]**		[LI2] (LI2)
	☐ **[No]** (nO): Not assigned ☐ **[LI1]** (LI1) to **[LI6]** (LI6) ☐ **[LI7]** (LI7) to **[LI10]** (LI10): If VW3A3201 logic I/O card has been inserted ☐ **[LI11]** (LI11) to **[LI12]** (LI12): If VW3A3203 ESIM card has been inserted ☐ **[LI11]** (LI11) to **[LI14]** (LI14): If VW3A3202 extended I/O card has been inserted ☐ **[C101]** (C101) to **[C115]** (C115): With integrated Modbus in [I/O profile] (IO) ☐ **[C201]** (C201) to **[C215]** (C215): With integrated CANopen in [I/O profile] (IO) ☐ **[C301]** (C301) to **[C315]** (C315): With a communication card in [I/O profile] (IO) ☐ **[C401]** (C401) to **[C415]** (C415): With a Controller Inside card in [I/O profile] (IO) ☐ **[CD00]** (Cd00) to **[CD13]** (Cd13): In [I/O profile] (IO) can be switched with possible logic inputs ☐ **[CD14]** (Cd14) to **[CD15]** (Cd15): In [I/O profile] (IO) can be switched without logic inputs Reverse direction command assignment.		
nSt	❏ **[Freewheel stop ass.]**		[No] (nO)
	☐ **[No]** (nO): Not assigned ☐ **[LI1]** (LI1) to **[LI6]** (LI6) ☐ **[LI7]** (LI7) to **[LI10]** (LI10): If VW3A3201 logic I/O card has been inserted ☐ **[LI11]** (LI11) to **[LI12]** (LI12): If VW3A3203 ESIM card has been inserted ☐ **[LI11]** (LI11) to **[LI14]** (LI14): If VW3A3202 extended I/O card has been inserted ☐ **[C101]** (C101) to **[C115]** (C115): With integrated Modbus in [I/O profile] (IO) ☐ **[C201]** (C201) to **[C215]** (C215): With integrated CANopen in [I/O profile] (IO) ☐ **[C301]** (C301) to **[C315]** (C315): With a communication card in [I/O profile] (IO) ☐ **[C401]** (C401) to **[C415]** (C415): With a Controller Inside card in [I/O profile] (IO) ☐ **[CD00]** (Cd00) to **[CD13]** (Cd13): In [I/O profile] (IO) can be switched with possible logic inputs ☐ **[CD14]** (Cd14) to **[CD15]** (Cd15): In [I/O profile] (IO) can be switched without logic inputs The stop is activated when the input or bit is at inactive state. If the input returns to active state and the run command is still active, the motor will only restart if [2/3 wire control] (tCC) page 166 = [2 wire] (2C) and [2 wire type] (tCt) = [Level] (LEL) or [Fwd priority] (PFO). If not, a new run command must be sent.		

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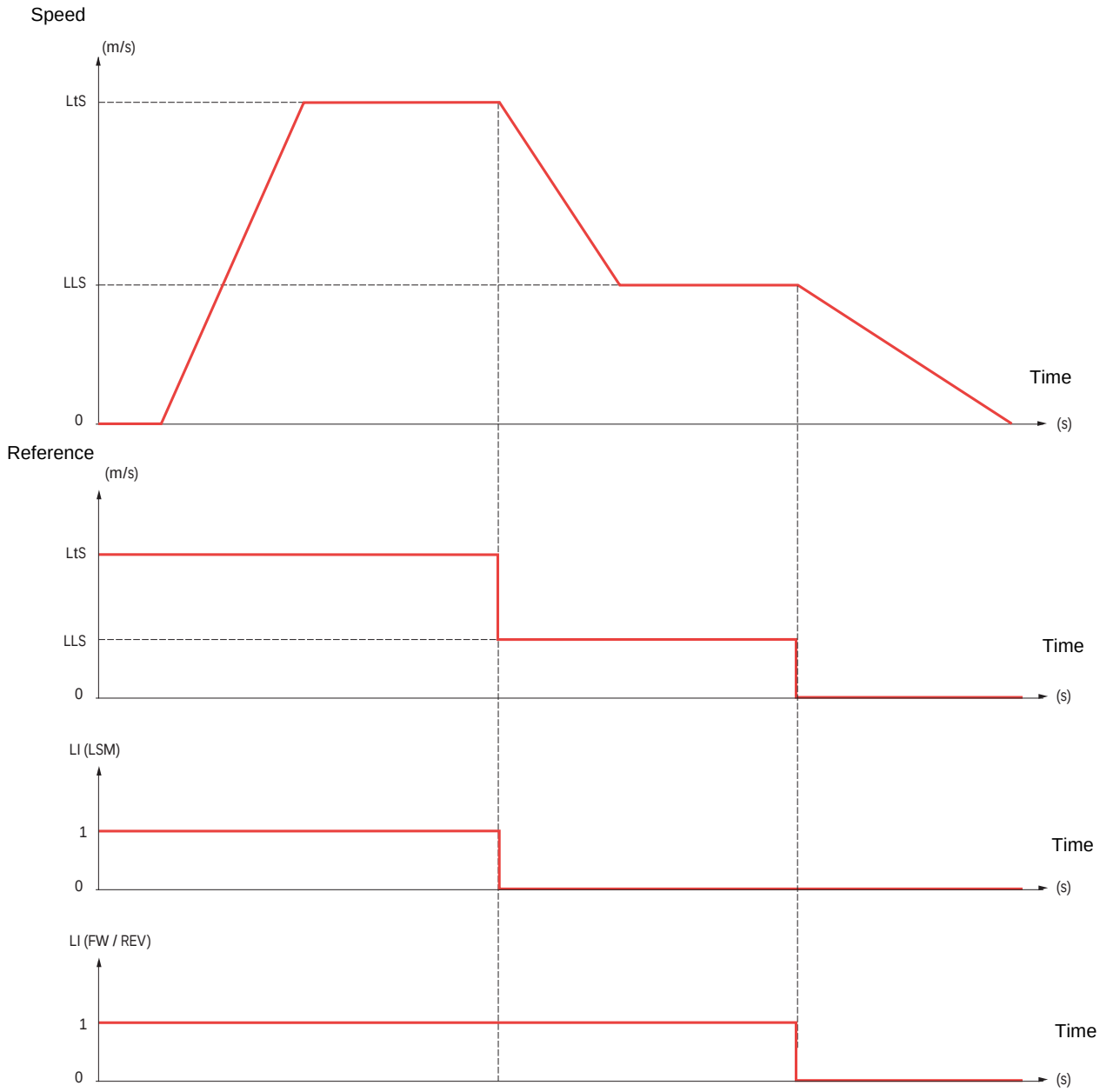
Lift ramp

Assignment of [Lift Speed Mgt] (LSM) activates the ramp profile specific to the lift.



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Code	Name/Description	Adjustment range	Factory setting
LCO-	**[LIFT CONFIGURATION]** continued		
LIO-	**[I/O ASSIGNMENTS]** continued		
INP-	**[INPUTS]** continued		
ISP nO LI1 - - LI14	❏ **[Inspection]** This parameter can be accessed if brake logic control [Brake assignment] (bLC) page 233 have been assigned. ☐ **[No]** (nO): Function not assigned ☐ **[LI1]** (LI1) to **[LI6]** (LI6) ☐ **[LI7]** (LI7) to **[LI10]** (LI10): If VW3A3201 logic I/O card has been inserted ☐ **[LI11]** (LI11) to **[LI12]** (LI12): If VW3A3203 ESIM card has been inserted ☐ **[LI11]** (LI11) to **[LI14]** (LI14): If VW3A3202 extended I/O card has been inserted. Inspection mode is activated when the assigned input changes to active state.		[LI5] (LI5)
LSM nO LI1 - - LI14 C101 - - - CD00 -	❏ **[Lift Speed Mgt]** Management of the lift speed Assignment of LSM activates the ramp profile specific to the lift. ☐ **[No]** (nO): Function not assigned ☐ **[LI1]** (LI1) to **[LI6]** (LI6) ☐ **[LI7]** (LI7) to **[LI10]** (LI10): If VW3A3201 logic I/O card has been inserted ☐ **[LI11]** (LI11) to **[LI12]** (LI12): If VW3A3203 ESIM card has been inserted ☐ **[LI11]** (LI11) to **[LI14]** (LI14): If VW3A3202 extended I/O card has been inserted ☐ **[C101]** (C101) to **[C115]** (C115): With integrated Modbus in [I/O profile] (IO) ☐ **[C201]** (C201) to **[C215]** (C215): With integrated CANopen in [I/O profile] (IO) ☐ **[C301]** (C301) to **[C315]** (C315): With a communication card in [I/O profile] (IO) ☐ **[C401]** (C401) to **[C415]** (C415): With a Controller Inside card in [I/O profile] (IO) ☐ **[CD00]** (Cd00) to **[CD13]** (Cd13): In [I/O profile] (IO) can be switched with possible logic inputs ☐ **[CD14]** (Cd14) to **[CD15]** (Cd15): In [I/O profile] (IO) can be switched without logic inputs ☞ **Note:** If LSM has not been assigned, the standard ramp is active (see the [RAMP] (rPt-) submenu in the [1.7 APPLICATION FUNCT.] (Fun-) menu on page 217). The input assigned to the lift ramp function commands [Lift top speed] (LtS) page 59. **Reference (1)** / **LI (Fwd) or LI (Rev)** / **LI** [Lift Speed Mgt] (LSM) STOP / 0 / X [Lift top speed] (LtS) / 1 / 1 [Lift leveling speed] (LLS) / 1 / 0		[LI4] (LI4)
rCA nO LI1 - - -	❏ **[Output contact. fdbk]** ☐ **[No]** (nO): Function inactive ☐ **[LI1]** (LI1) : : ☐ **[...]** (...): See the assignment conditions on page 204.		[No] (nO)
rFt nO LI1 - - LI14	❏ **[Evacuation assign.]** ☐ **[No]** (nO): Function not assigned. ☐ **[LI1]** (LI1) to **[LI6]** (LI6) ☐ **[LI7]** (LI7) to **[LI10]** (LI10) : If VW3A3201 logic I/O card has been inserted. ☐ **[LI11]** (LI11) to **[LI12]** (LI12) : If VW3A3203 ESIM card has benn inserted. ☐ **[LI11]** (LI11) to **[LI14]** (LI14) : If VW3A3202 extended I/O card has been inserted. Evacuation is activated when the assigned input is at active state, if the drive is stationary. Evacuation is activated when the assigned input is at inactive state, as soon as the drive stops.		[No] (nO)

(1) Note: This table is applicable to 2-wire control.

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Code	Name/Description	Adjustment range	Factory setting
LCO-	**[LIFT CONFIGURATION]** continued		
LIO-	**[I/O ASSIGNMENTS]** continued		
INP-	**[INPUTS]** continued		
bCI	❏ **[Brake contact]**		[No] (nO)
	If the brake has a monitoring contact (closed for released brake).		
nO	☐ **[No] (nO)**: Function inactive		
LI1	[LI1] (LI1)		
-	:		
-	:		
-	☐ **[...] (...)**: See the assignment conditions on page 204.		
Fr1	❏ **[Ref.1 channel]**		[AI1] (AI1)
AI1	☐ **[AI1]** (AI1): Analog input,		
AI2	☐ **[AI2]** (AI2): Analog input,		
AI3	☐ **[AI3]** (AI3): Analog input, if VW3A3202 extension card has been inserted,		
AI4	☐ **[AI4]** (AI4): Analog input, if VW3A3202 extension card has been inserted,		
LCC	☐ **[HMI]** (LCC): Graphic display terminal,		
Mdb	☐ **[Modbus]** (Mdb): Integrated Modbus,		
CAn	☐ **[CANopen]** (CAn): Integrated CANopen,		
nEt	☐ **[Com. card]** (nEt): Communication card (if inserted),		
APP	☐ **[C.Insid. card]** (APP): Controller Inside card (if inserted),		
PI	☐ **[RP]** (PI): Frequency input, if VW3A3202 extension card has been inserted,		
PG	☐ **[Encoder]** (PG): Encoder input, if encoder card has been inserted.		
PES	❏ **[Weight sensor ass.]**		[No] (nO)
	This function can be accessed if brake logic control has been assigned (see page 233).		
	If [Weight sensor ass.] (PES) is not [No] (nO), [Movement type] (bSt) page 233 is forced to [Hoisting] (UEr).		
nO	☐ **[No]** (nO): Function inactive,		
AI1	☐ **[AI1]** (AI1): Analog input,		
AI2	☐ **[AI2]** (AI2): Analog input,		
AI3	☐ **[AI3]** (AI3): Analog input, if VW3A3202 extension card has been inserted,		
AI4	☐ **[AI4]** (AI4): Analog input, if VW3A3202 extension card has been inserted,		
PI	☐ **[RP]** (PI): Frequency input, if VW3A3202 extension card has been inserted,		
PG	☐ **[Encoder]** (PG): Encoder input, if encoder card has been inserted.		
AIU1	☐ **[Network AI]** (AIU1): Virtual input via communication bus, to be configured via [AI net. channel] (AIC1) page 175.		

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

If the equipment switches to forced local mode (see page 286), the virtual input remains frozen at the last value transmitted.

Do not use the virtual input and forced local mode in the same configuration.

Failure to follow this instruction can result in death or serious injury.

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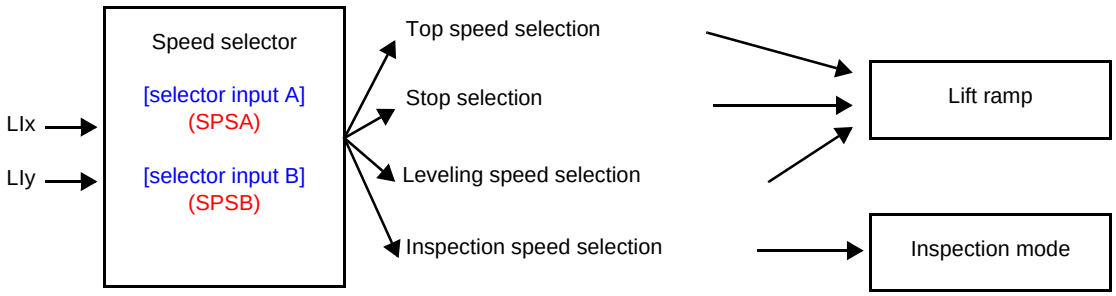
Speed selector and lift ramp

This function is accessible only if [ACCESS LEVEL] = [Expert].
A specific mechanism exists for speed selector.

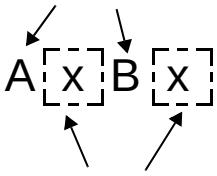


2 or 4 speeds can be selected, requiring 1 or 2 logic inputs respectively.

Combination table for speed selector

Parameter	Assignment possible (1)	State SPSA	State SPSB
[LTS selection] (LtSS)	no	no	no
	A0B0	inactive	inactive
	A1B0	active	inactive
	A0B1	inactive	active
	A1B1	active	active
[LLS selection] (LLSS)	no	no	no
	A0B0	inactive	inactive
	A1B0	active	inactive
	A0B1	inactive	active
	A1B1	active	active
[Stop selection] (StPS)	no	no	no
	A0B0	inactive	inactive
	A1B0	active	inactive
	A0B1	inactive	active
	A1B1	active	active
[ISP selection] (ISPS)	no	no	no
	A0B0	inactive	inactive
	A1B0	active	inactive
	A0B1	inactive	active
	A1B1	active	active

(1) A and B represent 2 inputs used as selector



These 2 figures represent the state of the corresponding logical input

Example : If SPSA = LI4 and SPSB = LI5, then A0B1 represent LI4 = 0 and LI5 = 1.

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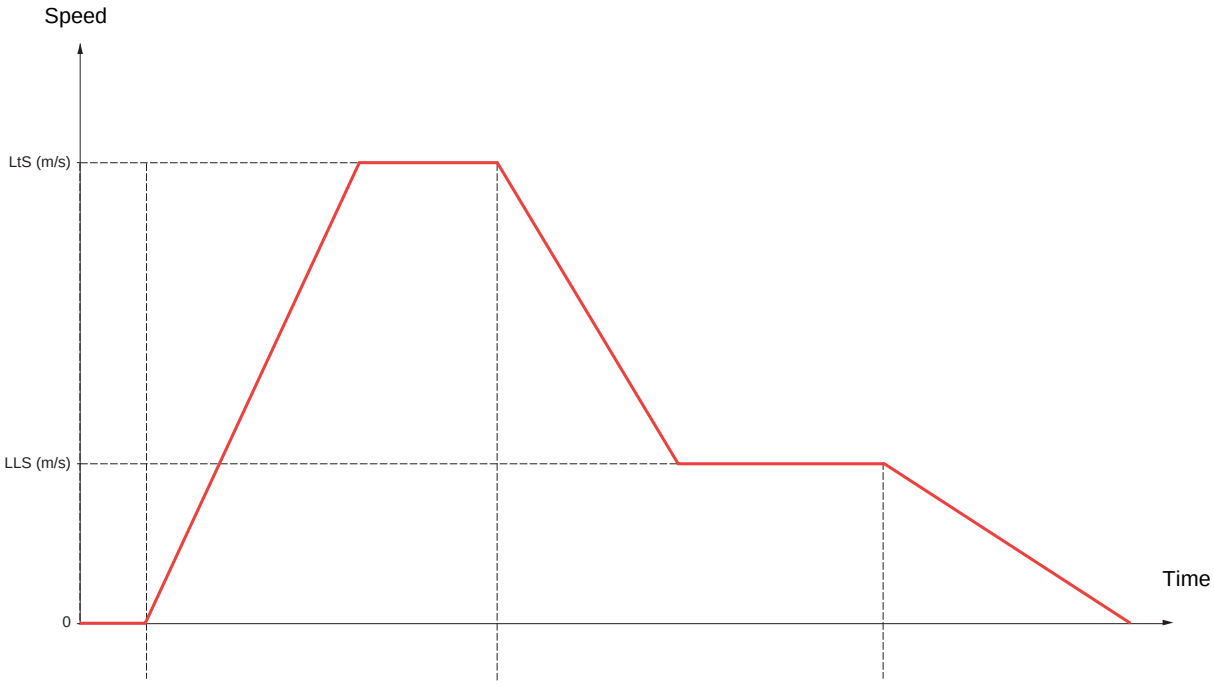
Speed selector and lift ramp (continued)



LtS selected	LLS selected	Stop selected
LtSS = A0B0 (SPSA = 0 ; SPSB = 0) or A0B1 (SPSA = 0 ; SPSB = 1) or A1B0 (SPSA = 1 ; SPSB = 0) or A1B1 (SPSA = 1 ; SPSB = 1)	LLSS = A0B0 (SPSA = 0 ; SPSB = 0) or A0B1 (SPSA = 0 ; SPSB = 1) or A1B0 (SPSA = 1 ; SPSB = 0) or A1B1 (SPSA = 1 ; SPSB = 1)	StPS = A0B0 (SPSA = 0 ; SPSB = 0) or A0B1 (SPSA = 0 ; SPSB = 1) or A1B0 (SPSA = 1 ; SPSB = 0) ru A1B1 (SPSA = 1 ; SPSB = 1)

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Code	Name/Description	Adjustment range	Factory setting
LCO-	**[LIFT CONFIGURATION]** continued		
LIO-	**[I/O ASSIGNMENTS]** continued		
INP-	**[INPUTS]** continued		
SPS-	**[SPEED SELECTOR]** Menu accessible if [Lift Speed Mgt] (LSM) page 36 is equal to [No] (nO) and if [ACCESS LEVEL] = [Expert].		
SPSA nO LI1 - - LI14 C101 - - - Cd00 -	❑ **[selector input A]** ☐ **[No]** (nO): Not assigned ☐ **[LI1]** (LI1) to **[LI6]** (LI6) ☐ **[LI7]** (LI7) to **[LI10]** (LI10): If VW3A3201 logic I/O card has been inserted ☐ **[LI11]** (LI11) to **[LI12]** (LI12): If VW3A3203 ESIM card has been ☐ **[LI11]** (LI11) to **[LI14]** (LI14): If VW3A3202 extended I/O card has been inserted ☐ **[C101]** (C101) to **[C115]** (C115): With integrated Modbus in [I/O profile] (IO) ☐ **[C201]** (C201) to **[C215]** (C215): With integrated CANopen in [I/O profile] (IO) ☐ **[C301]** (C301) to **[C315]** (C315): With a communication card in [I/O profile] (IO) ☐ **[C401]** (C401) to **[C415]** (C415): With a Controller Inside card in [I/O profile] (IO) ☐ **[CD00]** (Cd00) to **[CD13]** (Cd13): In [I/O profile] (IO) can be switched with possible logic inputs ☐ **[CD14]** (Cd14) to **[CD15]** (Cd15): In [I/O profile] (IO) can be switched without logic inputs		[No] (nO)
SPSB	❑ **[selector input B]** Identical to [selector input A] (SPSA).		[No] (nO)
LTSS nO A0B0 A1B0 A0B1 A1B1	❑ **[LTS selection]** ☐ **[No]** (nO) : Not assigned. ☐ **[A0B0]** (SPS A0 B0) ☐ **[A1B0]** (SPS A1 B0) ☐ **[A0B1]** (SPS A0 B1) ☐ **[A1B1]** (SPS A1 B1)		[No] (nO)
LLSS	❑ **[LLS selection]** Identical to [LTS selection] (Ltss).		[No] (nO)
STPS	❑ **[Stop selection]** Identical to [LTS selection] (Ltss). **Note:** The brake is closed even if the RUN order is still availlable (RUN is displayed on the drive)		[No] (nO)
ISPS	❑ **[ISP selection]** Identical to [LTS selection] (Ltss).		[No] (nO)

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Code	Name/Description	Adjustment range	Factory setting
LCO-	**[LIFT CONFIGURATION]** continued		
LIO-	**[I/O ASSIGNMENTS]** continued		
OUt-	**[OUTPUTS]**		
bLC	❏ **[Brake assignment]**		[R2] (R2)
	☞ **Note: If the brake is assigned, only a ramp stop is possible.** Check the [Type of stop] (Stt) page 221. Brake logic control can only be assigned if [Motor control type] (Ctt) page 137 = [SVC V] (UUC), [SVC I] (CUC), [FVC] (FUC) or [Sync.CL] (FSY). Logic output or control relay		
nO	☐ **[No]** (nO): Function not assigned (in this case, none of the function's parameters can be accessed)		
r2 - r5	☐ **[R2]** (r2) to **[R5]** (r5): Relay (selection extended to R3, R4 or R5 if I/O or ESIM cards have been inserted)		
LO1 - LO4	☐ **[LO1]** (LO1) to **[LO4]** (LO4): Logic output (if one or two I/O cards have been inserted, LO1 to LO2 or LO4 can be selected).		
dO1	☐ **[dO1]** (dO1): Analog output AO1 functioning as a logic output. Selection can be made if [AO1 assignment] (AO1) page 191 = [No] (nO).		
OCC	❏ **[Out. contactor ass.]**		[dO1] (dO1)
	Logic output or control relay		
nO	☐ **[No]** (nO): Function not assigned (in this case, none of the function's parameters can be accessed).		
LO1 - LO4	☐ **[LO1]** (LO1) to **[LO4]** (LO4): Logic output (if one or two I/O cards have been inserted, LO1 to LO2 or LO4 can be selected).		
r1 - r5	**[R1]** (r1) to **[R5]** (r5): Relay (selection extended to R3, R4 or R5 if I/O or ESIM cards have been inserted)		
dO1	☐ **[dO1]** (dO1): Analog output AO1 functioning as a logic output. Selection can be made if [AO1 assignment] (AO1) page 191 = [No] (nO).		

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542 291 58 92 - 0 242 335 40 42

[1.1 LIFT] (LIF-)

Code	Name/Description	Adjustment range	Factory setting
LCO-	**[LIFT CONFIGURATION]** continued		
LIO-	**[I/O ASSIGNMENTS]** continued		
OUt-	**[OUTPUTS]** continued		
r1	❏ **[R1 Assignment]**		[No] (nO)
nO	☐ **[No]** (nO): **Not assigned**		
FLt	☐ **[No drive flt]** (FLt): Drive not faulty (relay normally energized, and de-energized if there is a fault)		
rUn	☐ **[Drv running]** (rUn): Drive running		
FtA	☐ **[Freq. Th. attain.]** (FtA): Frequency threshold attained ([Freq. threshold] (Ftd) page 135)		
FLA	☐ **[HSP attain.]** (FLA): High speed attained		
CtA	☐ **[I attained]** (CtA): Current threshold attained ([Current threshold] (Ctd) page 134)		
SrA	☐ **[Freq.ref.att]** (SrA): Frequency reference attained		
tSA	☐ **[Th.mot. att.]** (tSA): Motor 1 thermal state attained		
AP2	☐ **[AI2 AI. 4-20]** (AP2): Alarm indicating absence of 4-20 mA signal on input AI2		
F2A	☐ **[Freq. Th. 2 attain.]** (F2A): Frequency threshold 2 attained ([Freq. threshold 2] (F2d) page 135)		
tAd	☐ **[Th.drv.att.]** (tAd): Drive thermal state attained		
ttHA	☐ **[High tq. att.]** (ttHA): Motor torque greater than high threshold [High torque thd.] (ttH) page 134.		
ttLA	☐ **[Low tq. att.]** (ttLA): Motor torque less than low threshold [Low torque thd.] (ttL) page 134.		
MFrd	☐ **[Forward]** (MFrd): Motor running forward		
MrrS	☐ **[Reverse]** (MrrS): Motor running in reverse		
tS2	☐ **[Th.mot2 att.]** (tS2): Motor 2 thermal state attained		
tS3	☐ **[Th.mot3 att]** (tS3): Motor 3 thermal state attained		
AtS	☐ **[Neg Torque]** (AtS): Negative torque (braking)		
CnF0	☐ **[Cnfg.0 act.]** (CnF0): Configuration 0 active		
CnF1	☐ **[Cnfg.1 act.]** (CnF1): Configuration 1 active		
CnF2	☐ **[Cnfg.2 act.]** (CnF2): Configuration 2 active		
CFP1	☐ **[Set 1 active]** (CFP1): Parameter set 1 active		
CFP2	☐ **[Set 2 active]** (CFP2): Parameter set 2 active		
CFP3	☐ **[Set 3 active]** (CFP3): Parameter set 3 active		
dbL	☐ **[DC charged]** (dbL): DC bus charging		
brS	☐ **[In braking]** (brS): Drive braking		
PrM	☐ **[P. removed]** (PRM): Drive locked by "Power removal" input		
FqLA	☐ **[Fr.met. alar.]** (FqLA): Measured speed threshold attained: [Pulse warning thd.] (FqL) page 135.		
MCP	☐ **[I present]** (MCP): Motor current present		
LSA	☐ **[Limit sw. att]** (LSA): Limit switch reached		
AG1	☐ **[Alarm Grp 1]** (AGI): Alarm group 1		
AG2	☐ **[Alarm Grp 2]** (AG2): Alarm group 2		
AG3	☐ **[Alarm Grp 3]** (AG3): Alarm group 3		
P1A	☐ **[PTC1 alarm]** (P1A): Probe alarm 1		
P2A	☐ **[PTC2 alarm]** (P2A): Probe alarm 2		
PLA	☐ **[LI6=PTC al.]** (PLA): LI6 = PTC probe alarm		
EFA	☐ **[Ext. fault al]** (EFA): External fault alarm		
USA	☐ **[Under V. al.]** (USA): Undervoltage alarm		
UPA	☐ **[Uvolt warn]** (UPA): Undervoltage warning		
AnA	☐ **[slipping al.]** (AnA): Slipping alarm		
tHA	☐ **[AI. °C drv]** (tHA): Drive overheating		
bSA	☐ **[Load mvt al]** (bSA): Braking speed alarm		
bCA	☐ **[Brk cont. al]** (bCA): Brake contact alarm		
SSA	☐ **[Lim T/I att.]** (SSA): Torque limit alarm		
rtA	☐ **[Trq. ctrl. al.]** (rtA): Torque control alarm		
tJA	☐ **[IGBT al.]** (tJA): IGBT alarm		
bOA	☐ **[Brake R. al.]** (bOA): Braking resistor temperature alarm		
APA	☐ **[Option al.]** (APA): Alarm generated by the Controller Inside card		
AP3	☐ **[AI3 AI. 4-20]** (AP3): Alarm indicating absence of 4-20 mA signal on input AI3		
AP4	☐ **[AI4 AI. 4-20]** (AP4): Alarm indicating absence of 4-20 mA signal on input AI4		
rdY	☐ **[Ready]** (rdY): Drive ready		

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Code	Name/Description	Adjustment range	Factory setting
LCO-	**[LIFT CONFIGURATION]** continued		
LIO-	**[I/O ASSIGNMENTS]** continued		
OUt-	**[OUTPUTS]** continued		
r2	❏ **[R2 Assignment]**		[Brk control] (bLC)
	Identical to R1 (see page 42) with the addition of (shown for information only as these selections can only be configured in the [1.7 APPLICATION FUNCT.] (Fun-) menu): ☐ **[Brk control]** (bLC): Brake contactor control ☐ **[Input cont.]** (LLC): Line contactor control ☐ **[Output cont]** (OCC): Output contactor control ☐ **[DC charging]** (dCO): DC bus precharging contactor control		
bLC LLC OCC dCO			
dO1	❏ **[DO1 assignment]**		[Output cont] (OCC)
	Identical to R1 (see page 42) with the addition of (shown for information only as these selections can only be configured in the [1.7 APPLICATION FUNCT.] (Fun-) menu): ☐ **[Brk control]** (bLC): Brake contactor control ☐ **[Input cont.]** (LLC): Line contactor control ☐ **[Output cont]** (OCC): Output contactor control ☐ **[DC charging]** (dCO): DC bus precharging contactor control		
bLC LLC OCC dCO			
AO1	❏ **[AO1 assignment]**		[dO1] (dO1)
nO	☐ **[No]** (nO): Not assigned		
OCr	☐ **[I motor]** (OCr): Current in the motor, between 0 and 2 In (In = rated drive current indicated in the Installation Manual and on the drive nameplate).		
OFr	☐ **[Motor freq.]** (OFr): Output frequency, between 0 and [Max frequency] (tFr)		
OrP	☐ **[Ramp out.]** (OrP): Between 0 and [Max frequency] (tFr)		
trq	☐ **[Motor torq.]** (trq): Motor torque, between 0 and 3 times the rated motor torque.		
Stq	☐ **[Sign. torque]** (Stq): Signed motor torque, between -3 and +3 times the rated motor torque. The + sign corresponds to motor mode and the - sign to generator mode (braking).		
OrS	☐ **[sign ramp]** (OrS): Signed ramp output, between - [Max frequency] (tFr) and + [Max frequency] (tFr)		
OPr	☐ **[Mot. power]** (OPr): Motor power, between 0 and 2.5 times [Rated motor power] (nPr)		
tHr	☐ **[Mot thermal]** (tHr): Motor thermal state, between 0 and 200% of the rated thermal state.		
tHd	☐ **[Drv thermal]** (tHd): Drive thermal state, between 0 and 200% of the rated thermal state.		
tqMS	☐ **[Torque 4Q]** (tqMS): Signed motor torque, between -3 and +3 times the rated motor torque. The + sign and the - sign correspond to the physical direction of the torque, regardless of mode (motor or generator). Example of usage: "master-slave" with the [TORQUE CONTROL] (tOr-) function, page 241.		
OFrr	☐ **[Meas.mot.fr]** (OFrr): Measured motor speed.		
OFS	☐ **[Sig. o/p frq.]** (OFS): Signed output frequency, between - [Max frequency] (tFr) and + [Max frequency] (tFr)		
tHr2	☐ **[Mot therm2]** (tHr2): Thermal state of motor 2, between 0 and 200% of the rated thermal state.		
tHr3	☐ **[Mot therm3]** (tHr3): Thermal state of motor 3, between 0 and 200% of the rated thermal state.		
Utr	☐ **[Uns.TrqRef]** (Utr): Torque reference, between 0 and 3 times the rated motor torque.		
Str	☐ **[Sign trq ref.]** (Str): Signed torque reference, between -3 and +3 times the rated motor torque.		
tqL	☐ **[Torque lim.]** (tqL): Torque limit, between 0 and 3 times the rated motor torque.		
UOP	☐ **[Motor volt.]** (UOP): Voltage applied to the motor, between 0 and [Rated motor volt.] (UnS)		
dO1	☐ **[dO1]** (dO1): Assigned as logic output. This assignment can only appear if [DO1 assignment] (dO1) page 188 has been assigned. This is the only possible choice in this case, and is displayed for information purposes only.		

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Code	Name/Description	Adjustment range	Factory setting
LCO-	**[LIFT CONFIGURATION]** continued		
End-	**[ENCODER DATA]**		
EnS	❑ **[Encoder type]** This parameter can be accessed if an incremental encoder card has been inserted. To be configured in accordance with the type of encoder used. nO ☐ **[No]** (nO): Function inactive. AAbb ☐ **[AABB]** (AAbb): For signals A, A-, B, B- or A, A-, B, B-, Z, Z-. Ab ☐ **[AB]** (Ab): For signals A, B. A ☐ **[A]** (A): For signal A. Value cannot be accessed if [Encoder usage] (EnU) = [Spd fdk reg.] (rEG).		[AABB] (AAbb)
EnU	❑ **[Encoder usage]** This parameter can be accessed if an encoder card has been inserted (1). nO ☐ **[No]** (nO): Function inactive. SEC ☐ **[Fdbk monit.]** (SEC): The encoder provides speed feedback for monitoring only. rEG ☐ **[Spd fdk reg.]** (rEG): The encoder provides speed feedback for regulation and monitoring. This configuration is automatic if the drive is configured for closed-loop operation ([Motor control type] (Ctt) = [FVC] (FUC) or [Sync.CL] (FSY). If [Motor control type] (Ctt) = [SVC V] (UUC) the encoder operates in speed feedback mode and enables static correction of the speed to be performed. This configuration is not accessible for other [Motor control type] (Ctt) values. PGr ☐ **[Speed ref.]** (PGr)**:** The encoder provides a reference. Can only be selected with an incremental encoder card.		[No] (nO)
Enr I	❑ **[Coder rotation inv.]** This parameter can be accessed if an encoder card has been inserted. Activates reversal of encoder rotation. In some assemblies, the encoder positive direction of rotation is reversed in relation to the motor direction. When this is the case, this parameter needs to be activated in order for the motor and the encoder both to have a positive direction of rotation. nO ☐ **[No]** (nO): Reversal not activated YES ☐ **[Yes]** (YES): Reversal activated		[No] (nO)
PGI	❑ **[Number of pulses]** Number of pulses per encoder revolution. This parameter can be accessed if a VW3 A3 401 to 407 or VW3 A3 410 and VW3 A3 411 card has been inserted.	100 to 10000	1024
PGA	❑ **[Reference type]** This parameter can be accessed if [Encoder usage] (EnU) = [Speed ref.] (PGr). EnC ☐ **[Encoder]** (EnC): Use of an encoder (incremental encoder only). PtG ☐ **[Freq. gen.]** (PtG): Use of a frequency generator (unsigned reference).		[Encoder] (EnC)
EIL	❑ **[Freq. min. value]** This parameter can be accessed if [Encoder usage] (EnU) = [Speed ref.] (PGr) and if [Reference type] (PGA) = [Freq. gen.] (PtG). Frequency corresponding to the minimum speed.	- 300 to 300 kHz	0 kHz
EFr	❑ **[Freq. max value]** This parameter can be accessed if [Encoder usage] (EnU) = [Speed ref.] (PGr) and if [Reference type] (PGA) = [Freq. gen.] (PtG). Frequency corresponding to the maximum speed.	0.00 to 300.00 kHz	300.00 kHz
EFI	❑ **[Freq. signal filter]** This parameter can be accessed if [Encoder usage] (EnU) = [Speed ref.] (PGr). Interference filtering.	0 to 1000 ms	0 ms

(1) The encoder parameters can only be accessed if the encoder card has been inserted, and the available selections will depend on the type of encoder card used. The encoder configuration can also be accessed in the [1.5 - INPUTS / OUTPUTS CFG] (I/O) menu.

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Code	Name/Description	Adjustment range	Factory setting
LCO-	**[LIFT CONFIGURATION]** continued		
End-	**[ENCODER DATA]** continued		
FrES	❑ **[Resolver Exct. Freq.]**		[8 kHz] (8)
	Resolver excitation frequency. This parameter can be accessed if a VW3 A3 408 encoder card (for resolver) has been inserted.		
4	☐ **[4 kHz]** (4): 4 kHz		
8	☐ **[8 kHz]** (8): 8 kHz		
12	☐ **[12 kHz]** (12): 12 kHz		
rPPn	❑ **[Resolver poles nbr]**		[2 poles] (2P)
	Number of resolver poles. This parameter can be accessed if a VW3 A3 408 encoder card (for resolver) has been inserted.		
2P	☐ **[2 poles]** (2P): 2 poles, max. speed 7500 rpm		
4P	☐ **[4 poles]** (4P): 4 poles, max. speed 3750 rpm		
6P	☐ **[6 poles]** (6P): 6 poles, max. speed 2500 rpm		
8P	☐ **[8 poles]** (8P): 8 poles, max. speed 1875 rpm		
	☞ **If the number of motor poles is not a whole multiple of the number of resolver poles**, the resolver is a relative encoder and no longer absolute. You should therefore set the [Angle setting activ.] (AtA) parameter = [Power On] (POn) or [Run order] (AUtO).		
UECP	❑ **[Encoder protocol]**		[Undefined] (Und)
	Type of encoder used.		
Und	☐ **[Undefined]** (Und): Not defined		
End	☐ **[EnDat 2.1]** (End): Endat encoder.		
SCHP	☐ **[Hiperface]** (SCHP): Hiperface encoder		
SC	☐ **[SinCos]** (SC): SinCos encoder		
SSI	☐ **[SSI]** (SSI): SSI encoder		
EnSC	☐ **[EndatSincos]** (EnSC): EndatSincos encoder		
UECU	❑ **[Encoder supply volt.]**		[Undefined] (Und)
	Rated voltage of encoder used. The parameter can be accessed if [Encoder protocol] (UECP) is not **[Undefined]** (Und).		
Und	☐ **[Undefined]** (Und): Not defined		
5U	☐ **[5 volts]** (5U): 5 Volts. Only possible value if [Encoder protocol] (UECP) = [EnDat 2.1] (End) or [EndatSincos] (EnSC).		
8U	☐ **[8 volts]** (8U): 8 Volts		
12U	☐ **[12 volts]** (12U): 12 Volts		
	To make any changes to this parameter with the integrated display terminal, press and hold down the "ENT" key for 2 s for the change to be taken into account. When using the graphic display terminal, confirmation is requested.		
UELC	❑ **[Sincos lines count]**		[Undefined] (Und)
	Number of lines. This parameter can be accessed if [Encoder protocol] (UECP) = [SinCos] (SC) or [EndatSinCos](End).		
Und	☐ **[Undefined]** (Und): Not defined		
-	☐ **1 to 10000**: 1 to 10,000 lines		
SSCP	❑ **[SSI parity]**		[Undefined] (Und)
	Parity. This parameter can be accessed if [Encoder protocol] (UECP) = [SSI] (SSI).		
Und	☐ **[Undefined]** (Und): Not defined		
nO	☐ **[No parity]** (nO): No parity		
Odd	☐ **[Odd parity]** (Odd): Odd parity		
EUEn	☐ **[Even parity]** (EUEn): Even parity		

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542 291 58 92 - 0 242 335 40 42

Code	Name/Description	Adjustment range	Factory setting
LCO-	**[LIFT CONFIGURATION]** continued		
End-	**[ENCODER DATA]** continued		
SSFS	❑ **[SSI frame size]**		[Undefined] (Und)
	Frame length (number of bits). This parameter can be accessed if [Encoder protocol] (UECP) = [SSI] (SSI). ☐ **[Undefined]** (Und): Not defined. Only possible value if [SSI parity] (SSCP) = [Undefined] (Und). ☐ **10 to 27**: 10 to 25 if [SSI parity] (SSCP) = [No parity] (nO) 12 to 27 if [SSI parity] (SSCP) = [Odd parity] (Odd) or [Even parity] (EUEn).		
Und			
-			
EnMr	❑ **[Nbr of revolution]**		[Undefined] (Und)
	Format of the number of revolutions (in number of bits). This parameter can be accessed if [Encoder protocol] (UECP) = [SSI] (SSI). ☐ **[Undefined]** (Und): Not defined. Only possible value if [SSI frame size] (SSFS) = [Undefined] (Und) ☐ **0 to 15**: 0 to [SSI frame size] (SSFS) - 10 if [SSI parity] (SSCP) = [No parity] (nO). 0 to [SSI frame size] (SSFS) - 12 if [SSI parity] (SSCP) = [Odd parity] (Odd) or [Even parity] (EUEn)		
Und			
-			
Entr	❑ **[Turn bit resolution]**		[Undefined] (Und)
	Resolution per revolution (in number of bits). This parameter can be accessed if [Encoder protocol] (UECP) = [SSI] (SSI). ☐ **[Undefined]** (Und): Not defined. Only value possible if [Nbr of revolution] (EnMr) = [Undefined] (Und) ☐ **10 to 25**: If [SSI parity] (SSCP) = [No parity] (nO), the maximum value is: [SSI frame size] (SSFS) - [Nbr of revolution] (EnMr). If [SSI parity] (SSCP) = [Odd parity] (Odd) or [Even parity] (EUEn), the maximum value is: [SSI frame size] (SSFS) - [Nbr of revolution] (EnMr) - 2.		
Und			
-			
SSCd	❑ **[SSI code type]**		[Undefined] (Und)
	Type of code. This parameter can be accessed if [Encoder protocol] (UECP) = [SSI] (SSI). ☐ **[Undefined]** (Und): Not defined ☐ **[Binary code** (bIn): Binary code ☐ **[Gray code]** (GrAY): Gray code.		
Und			
bIn			
GrAY			
EnSP	❑ **[Clock frequency]**		[500 kHz] (500)
	This parameter can be accessed if **[ACCESS LEVEL] = [Expert]** and if [Encoder protocol] (UECP) = [SSI] (SSI) or [EnDat 2.1] (End) ou [EndatSincos] (EnSC). Clock frequency for Endat encoder, SSI encoder and Endat Sincos encoder. ☐ **[160 kHz]** (160) ☐ **[200 kHz]** (200) ☐ **[300 kHz]** (300) ☐ **[400 kHz]** (400) ☐ **[500 kHz]** (500) ☐ **[600 kHz]** (600) ☐ **[700 kHz]** (700) ☐ **[800 kHz]** (800) ☐ **[Auto]** (AUtO) : This value appears only if [Encoder protocol] (UECP) = [SSI] (SSI) and if the version of this encoder board is upper or equal to V1.2IE01.		
160			
200			
300			
400			
500			
600			
700			
800			
AUtO			
FFA	❑ **[Encoder filter activ.]**		[No] (nO)
	This parameter can be accessed if **[ACCESS LEVEL] = [Expert]** Activation of encoder feedback filter. ☐ **[No]** (no): Filter deactivated. ☐ **[Yes]** (YES): Filter activated.		
nO			
YES			

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542 291 58 92 - 0 242 335 40 42

Code	Name/Description	Adjustment range	Factory setting
LCO-	**[LIFT CONFIGURATION]** continued		
End-	**[ENCODER DATA]** continued		
FFr	❏ **[Encoder filter value]**	0 to 50 ms	Acc. to encoder type
	This parameter can be accessed if **[ACCESS LEVEL]** = **[Expert]** and if [Encoder filter activ.] (FFA) = [Yes] (YES). Encoder feedback filter time constant in milliseconds.		
nPL	❏ **[LI Active at]**		[Positive] (POS)
	This parameter can be accessed if a VWA3203 ESIM card has been inserted. (To be taken into account on the next power-up).		
POS	☐ **[Positive]** (POS): Filter deactivated.		
nEG	☐ **[Negative]** (nEg): Filter deactivated.		
PDI	❏ **[Encod counter div]**	1 to 16	1
	This parameter can be accessed if a VWA3203 ESIM card has been inserted. This parameter allows to adapt the number of pulses on the ESIM card output depending on the king of input signal : In case of VW3A3401 to VW3A3407 and VW3A3411 card for incremental encoder, output pulses number is [Number of pulses] (PGI) / [Pulses divider] (PDI). In case of VW3A3408 for resolver encoder, output pulses number is 2048 / (PDI). In case of VW3A3409 and VW3A3410 for SinCos encoder, output pulses number is 8192 / (PDI).		

VW3A3203 **ESIM output pulses number**	VW3A3401 to VW3A3407 and VW3A3411 **Incremental encoder 2048**	VW3A3401 to VW3A3407 and VW3A3411 **Incremental encoder 4096**	VW3A3401 to VW3A3407 and VW3A3411 **Incremental encoder 8192**	VW3A3401 to VW3A3407 and VW3A3411 **Not dependind on resolution**	VW3A3401 to VW3A3407 and VW3A3411 **Not dependind on resolution**
512	PDI = 4	PDI = 8	PDI = 16	PDI = 4	PDI = 16
1024	PDI = 2	PDI = 4	PDI = 8	PDI = 2	PDI = 8
2048	PDI = 1	PDI = 2	PDI = 4	PDI = 1	PDI = 4
4096	Encoder resolution is too low	PDI = 1	PDI = 2	Encoder resolution is too low	PDI = 2
8192	Encoder resolution is too low	Encoder resolution is too low	PDI = 1	Encoder resolution is too low	PDI = 1

☞ ESIM card could emulate an encoder signal only if an encoder board is already inserted in the drive.

Parameter that can be modified during operation or when stopped.

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542 291 58 92 - 0 242 335 40 42

Code	Name/Description	Adjustment range	Factory setting
LCO-	**[LIFT CONFIGURATION]** continued		
MOt-	**[MOTOR DATA]**		
Ctt	❏ **[Motor control type]**		[SVC V] (UUC)
UUC	☐ **[SVC V]** (UUC): Open-loop voltage flux vector control with automatic slip compensation according to the load. This type of control is recommended when replacing an ATV58. It supports operation with a number of motors connected in parallel on the same drive (if the motors are identical).		
CUC	☐ **[SVC I]** (CUC): Open-loop current flux vector control. This type of control is recommended when replacing an ATV58F used in an open-loop configuration. It does not support operation with a number of motors connected in parallel on the same drive.		
FUC	☐ **[FVC]** (FUC): Closed-loop current flux vector control for motor with encoder. This selection is only possible if an encoder card has been inserted. This type of operation is not possible, however, when using an incremental encoder that generates signal "A" only. This type of control is recommended when replacing an ATV58F used in a closed-loop configuration. It provides better performance in terms of speed and torque accuracy and enables torque to be obtained at zero speed. It does not support operation with a number of motors connected in parallel on the same drive. ☞ **It is essential that the encoder check detailed on page 141 is performed successfully before selecting [FVC] (FUC).**		
UF2	☐ **[V/F 2pts]** (UF2): Simple V/F profile without slip compensation. See page 137 for more details of this parameter.		
UF5	☐ **[V/F 5pts]** (UF5): 5-segment V/F profile: Similar to V/F 2 pts profile but also supports the avoidance of resonance phenomena (saturation).See page 137 for more details of this parameter.		
SYn	☐ **[Sync. mot.]** (SYn): For permanent magnet synchronous motors with sinusoidal electromotive force (EMF) only. This selection makes the asynchronous motor parameters inaccessible, and the synchronous motor parameters accessible.		
FSY	☐ **[Sync.CL]** (FSY): Closed-loop synchronous motor. For permanent magnet synchronous motors with sinusoidal electromotive force (EMF) only, with encoder. This selection is only possible if an encoder card has been inserted; it makes the asynchronous motor parameters inaccessible, and the synchronous motor parameters accessible. This type of operation is not possible, however, when using an incremental encoder that generates signal "A" only. ☞ **It is essential that the encoder check detailed on page 141 is performed successfully before selecting [Sync.CL] (FSY).**		

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542 291 58 92 - 0 242 335 40 42

Code	Name/Description	Adjustment range	Factory setting
LCO-	**[LIFT CONFIGURATION]** continued		
nOt-	**[MOTOR DATA]** continued		
rEtP	❏ **[Read motor param.]**		[No] (nO)

This parameter can only be used with BDH, BRH and BSH type motors from the Telemecanique range.
Can only be accessed if [Encoder protocol] (UECP) page 180 = [Hiperface] (SCHP).
Request to load motor parameters from the encoder EEPROM memory.
- nO ☐ **[No]** (nO): Loading not performed or has failed.
- YES ☐ **[Yes]** (YES): Loading is performed as soon as possible, then the parameter automatically changes to [Done] (dOnE).
- dOnE ☐ **[Done]** (dOnE):Loading done.

The following parameters are loaded: [Angle offset value] (ASU) page 152, [Nom motor spdsync] (nSPS) page 148, [Nominal I sync.] (nCrS) page 148, [Pole pairs] (PPnS) page 148, [Syn. EMF constant] (PHS) page 148, [Cust. stator R syn] (rSAS) page 148, [Autotune L d-axis] (LdS) page 148, and [Autotune L q-axis] (LqS) page 148.

Note:
• During loading the drive is in "Freewheel Stop" state with the motor turned off.
• If a "line contactor" or "output contactor" function has been configured, the contactor closes during loading.

rEtP	❏ **[Status motor param]**		[Not done] (tAb)

Can only be accessed if [Encoder protocol] (UECP) page 180 = [Hiperface] (SCHP).
Information on the request to load motor parameters from the encoder EEPROM memory (not modifiable).
- tAb ☐ **[Not done]** (tAb): Loading has not been performed, default motor parameters will be used.
- PrOG ☐ **[In Progress]** (PrOG): Loading in progress.
- FAIL ☐ **[Failed]** (FAIL) : Loading has failed.
- dOnE ☐ **[Done]** (dOnE): Loading completed successfully.
- CUS ☐ **[Customized]** (CUS): Loading completed successfully but one or more motor parameters have subsequently been modified by the user via the display terminal or serial link, or auto-tuning has been performed by [Auto-tuning] (tUn).

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542 291 58 92 - 0 242 335 40 42

Asynchronous motor parameters:

These parameters can be accessed if [Motor control type] (Ctt) page 137 = [SVC V] (UUC), [SVC I] (CUC), [FVC] (FUC), [V/F 2pts] (UF2) or [V/F 5pts] (UF5). In this case, the synchronous motor parameters cannot be accessed.

Code	Name/Description	Adjustment range	Factory setting
LCO-	**[LIFT CONFIGURATION]** continued		
nOt-	**[MOTOR DATA]** continued		
nPr	❑ **[Rated motor power]**	Acc. to drive rating	Acc. to drive rating
	Rated motor power given on the nameplate, in kW if [Standard mot. freq] (bFr) = [50Hz IEC] (50), in HP if [Standard mot. freq] (bFr) = [60Hz NEMA] (60). nPr = Uns x nCr x √3 x η x cos φ Avec : η = rendement et cos φ = facteur de puissance Exemple: Si [Tension nom. mot.] (Uns) = 400 V et [Courant nom. mot.] (nCr) = 11 A, alors nPr = 400 x 11 x √3 x 0,85 x 0,7 nPr = 4,54 kW		
UnS	❑ **[Rated motor volt.]**	Acc. to drive rating	According to drive rating and [Standard mot. freq] (bFr)
	Rated motor voltage given on the nameplate. ATV71L●●●M3Z: 100 to 240 V ATV71L●●●N4Z: 200 to 480 V		
nCr	❑ **[Rated mot. current]**	0.25 to 1.5 In (1)	According to drive rating and [Standard mot. freq] (bFr)
	Rated motor current given on the nameplate.		
FrS	❑ **[Rated motor freq.]**	10 to 500 Hz	50 Hz
	Rated motor frequency given on the nameplate. The factory setting is 50 Hz, or preset to 60 Hz if [Standard mot. freq] (bFr) is set to 60 Hz.		
nSP	❑ **[Rated motor speed]**	0 to 65535 rpm	Acc. to drive rating
	Rated motor speed given on the nameplate. 0 to 9999 rpm then 10.00 to 65.53 krpm on the integrated display terminal. **If, rather than the rated speed, the nameplate indicates the synchronous speed and the slip** in Hz or as a %, calculate the rated speed as follows: • Rated speed = Synchronous speed x $\frac{100 - \text{slip as a \%}}{100}$ or • Rated speed = Synchronous speed x $\frac{50 - \text{slip in Hz}}{50}$ (50 Hz motors) or • Rated speed = Synchronous speed x $\frac{60 - \text{slip in Hz}}{60}$ (60 Hz motors) **If the motor is old or wrong motor nameplate**, calculate the rated speed as follows: nSP = Synchronous speed - 1,5 x (Synchronous speed - nominal speed) Example : nSP = 1500 - 1,5 x (1500 - 1430) nSP = 1395 RPM		

(1) In corresponds to the rated drive current indicated in the Installation Manual and on the drive nameplate.

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542 291 58 92 - 0 242 335 40 42

Synchronous motor parameters:

These parameters can be accessed if [Motor control type] (Ctt) page 137 = [Sync. mot.] (SYn) or [Sync.CL] (FSY). In this case, the asynchronous motor parameters cannot be accessed.

☞ **Important:** For synchronous motors, it is crucial to set the current limit. See [Current Limitation] (CLI) page 52.

CAUTION

RISK OF EQUIPMENT DAMAGE
Check that the motor will withstand this current, particularly in the case of permanent magnet synchronous motors, which are susceptible to demagnetization.
Failure to follow this instruction can result in equipment damage.

Code	Name/Description	Adjustment range	Factory setting
LCO-	**[LIFT CONFIGURATION]** continued		
MOt-	**[MOTOR DATA]** continued		
PPnS	❑ **[Pole pairs]** Number of pairs of poles on the synchronous motor.	1 to 50	According to drive rating
nCrS	❑ **[Nominal I sync.]** Rated synchronous motor current given on the nameplate.	0.25 to 1.5 In (1)	According to drive rating
nSPS	❑ **[Nom motor spdsync]** Rated synchronous motor speed given on the nameplate. On the integrated display unit: 0 to 9999 rpm then 10.00 to 60.00 krpm.	0 to 60000 rpm	According to drive rating
tqS	❑ **[Motor torque]** Rated motor torque given on the nameplate.	1 to 65,535 Nm	According to drive rating

(1) In corresponds to the rated drive current indicated in the Installation Manual and on the drive nameplate.

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542 291 58 92 - 0 242 335 40 42

Code	Name/Description	Adjustment range	Factory setting
LCO-	**[LIFT CONFIGURATION]** continued		
MOT-	**[MOTOR DATA]** continued		
ITH	❑ **[Mot. therm. current]**	0.2 to 1.5 In (1)	According to drive rating
	Motor thermal protection current, to be set to the rated current indicated on the nameplate.		
CLI	❑ **[Current Limitation]**	0 to 1.36 In (1)	1.36 In (1)

CAUTION

Check that the motor will withstand this current, particularly in the case of permanent magnet synchronous motors, which are susceptible to demagnetization.

Failure to follow this instruction can result in equipment damage.

Used to limit the motor current.

☞ **Note 1:** If the setting is less than 0.25 In, the drive may lock in [Output Phase Loss] (OPF) fault mode if this has been enabled (see page 268). If it is less than the no-load motor current, the limitation no longer has any effect.

Note 2: In synchronous mode, this is the maximum permissible current for the motor. If this value has not been defined, use 150% of [Nominal I sync.] (nCrs)

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542 291 58 92 - 0 242 335 40 42

Code	Name/Description	Adjustment range	Factory setting
LCO-	**[LIFT CONFIGURATION]** continued		
nOt-	**[MOTOR DATA]** continued		
tUn	❏ **[Auto tuning]**		[No] (nO)

⚠⚠ DANGER

HAZARD OF ELECTRIC SHOCK OR ARC FLASH

- During auto-tuning, the motor operates at rated current.
- Do not service the motor during auto-tuning.

Failure to follow these instructions will result in death or serious injury.

⚠ WARNING

LOSS OF CONTROL

- It is essential that the following parameters [Rated motor volt.] (UnS), [Rated motor freq.] (FrS), [Rated mot. current] (nCr), [Rated motor speed] (nSP) and [Rated motor power] (nPr) are correctly configured before starting auto-tuning for asynchronous motor.
- It is essential that the following parameters [Nominal I sync] (nCrS), [Nom motor spdsync] (nSPS), [Pole pairs.] (PPnS) and [Motor torque] (TqS) are correctly configured before starting auto-tuning for synchronous motor.
- When one or more of these parameters have been changed after auto-tuning has been performed, [Auto tuning] (tUn) will return [No] (nO) and the procedure will have to be repeated.

Failure to follow these instructions can result in death or serious injury.

nO
YES
donE

☐ **[No]** (nO): Auto-tuning not performed.
☐ **[Yes]** (YES): Auto-tuning is performed as soon as possible, then the parameter automatically changes to [Done] (dOnE).
☐ **[Done]** (dOnE): Use of the values given the last time auto-tuning was performed.

Note:

- Auto-tuning is only performed if no stop command has been activated. If a "freewheel stop" or "fast stop" function has been assigned to a logic input, this input must be inactive.
- Auto-tuning takes priority over any run or prefluxing commands, which will be taken into account after the auto-tuning sequence.
- If auto-tuning fails, the drive displays [No] (nO) and, depending on the configuration of [Autotune fault mgt] (tnL) page 280, may switch to [Auto-tuning] (tnF) fault mode.
- Auto-tuning may last for 1 to 2 seconds. Do not interrupt the process. Wait for the display to change to "[Done] (dOnE)" or "[No] (nO)".

(1) In corresponds to the rated drive current indicated in the Installation Manual and on the drive nameplate.

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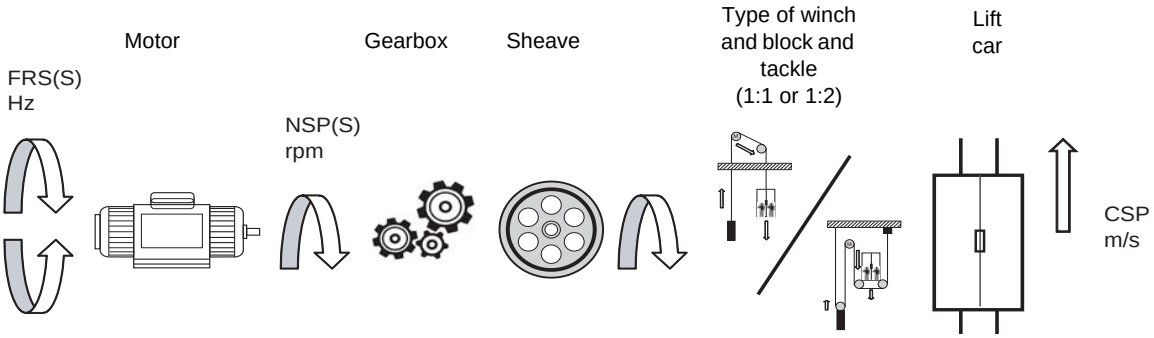
Lift data

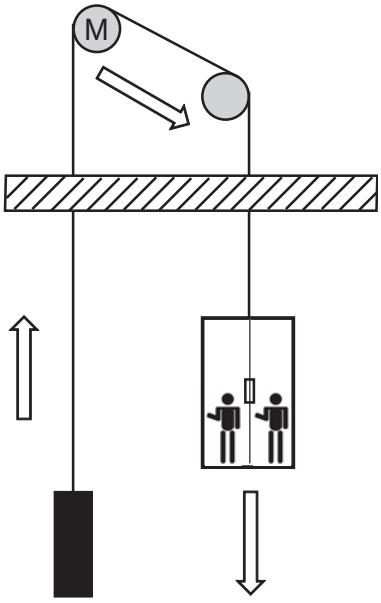
Identification of the [Nominal car speed] (CSP) and payload [Capacity of the lift] (LCA)



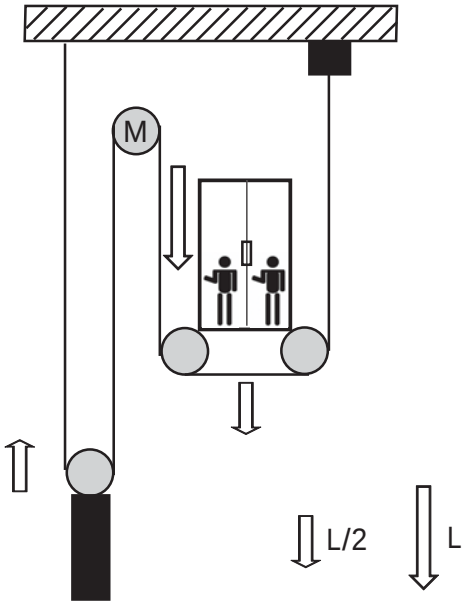
For the nominal motor frequency [Rated motor freq.] (FrS) / [Nominal freq sync.] (FrSS) the car speed is [Nominal car speed] (CSP) = ... m/s.

Ratio 1:1
CSP [m/s] = 3.14 x Sheave radius [meters] x NSP(S) [rpm]/(60 x Gearbox radius)

Ratio 1:2
CSP [m/s] = 1.57 x Sheave radius [meters] x NSP(S) [rpm]/(60 x Gearbox radius)



Ratio 1:1
The car movement is equal to the length of cable unwound by the motor.



Ratio 1:2
The car movement is equal to half the length of cable unwound by the motor.

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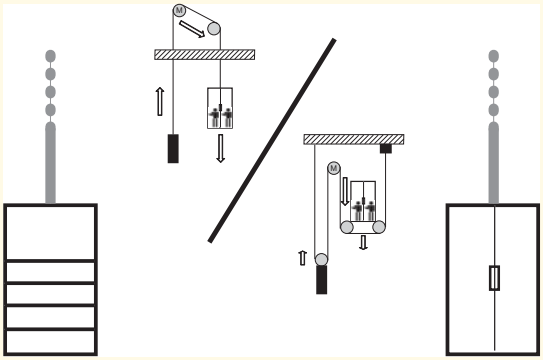
Code	Name/Description	Adjustment range	Factory setting
LCO-	**[LIFT CONFIGURATION]** continued		
LdA-	**[LIFT DATA]**		
CSP	❑ **[Nominal car speed]**	0.01 to 10.00 m/s	1.00 m/s

The nominal car speed corresponds to the linear speed of the lift car when the motor runs at its rated speed ([Rated motor freq.] (FrS) for an asynchronous motor or [Nominal freq sync.] (FrSS) for a synchronous motor). The [Nominal car speed] (CSP) therefore integrates the various gear ratios (sheave sizes, type of block and tackle, use of a gearbox or not).

Type of winch
and block and tackle
(1:1 or 1:2)



[Capacity of the lift] (LCA)
LCA = …… kg

[Counterweight] (CtM)
CTM = …… kg

[Car weight] (CMA)
CMA = …… kg

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542 291 58 92 - 0 242 335 40 42

Code	Name/Description	Adjustment range	Factory setting
LCO-	**[LIFT CONFIGURATION]** continued		
LdA-	**[LIFT DATA]** continued		
LCA	❏ **[Capacity of the lift]** The payload corresponds to the maximum permissible load in the lift car. It must always be stated in the lift car (for example: 630 kg - 8 persons) This value can only be trusted • If the lift has been balanced correctly, i.e., if the weight of the counterweight is similar to the weight of the car when half-loaded. In other words if CtM is similar to CMA + (LCA/2) • The weight of the empty car is similar to the payload If not, the values of CtM and CMA calculated by the drive must be re-entered manually.	0 to 48,000 kg	400 kg
CMA AUtO	❏ **[Car weight]** This parameter can be accessed if **[ACCESS LEVEL]** = **[Expert]** Weight of lift car When CMA = AUTO the system inertia calculation uses an estimated car weight. When CMA <> AUTO the system inertia calculation uses the car weight entered by the user. ☐ **[Estimated] (AUtO)**		[Estimated] (AUtO)
CtN AUtO	❏ **[Counterweight]** This parameter can be accessed if **[ACCESS LEVEL]** = **[Expert]** Weight of counterweight When CtM = AUTO the system inertia calculation uses an estimated counterweight. When CtM <> AUTO the system inertia calculation uses the counterweight entered by the user. ☐ **[Estimated] (AUtO)**		[Estimated] (AUtO)
ACn	❏ **[Comfort accel.]** This parameter can be accessed if **[ACCESS LEVEL]** = **[Expert]** This parameter defines the maximal acceleration and deceleration authorized during the movements of the lift.	0.10 to 5.00 m/s^2	0.80 m/s^2

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542 291 58 92 - 0 242 335 40 42

Parameters management

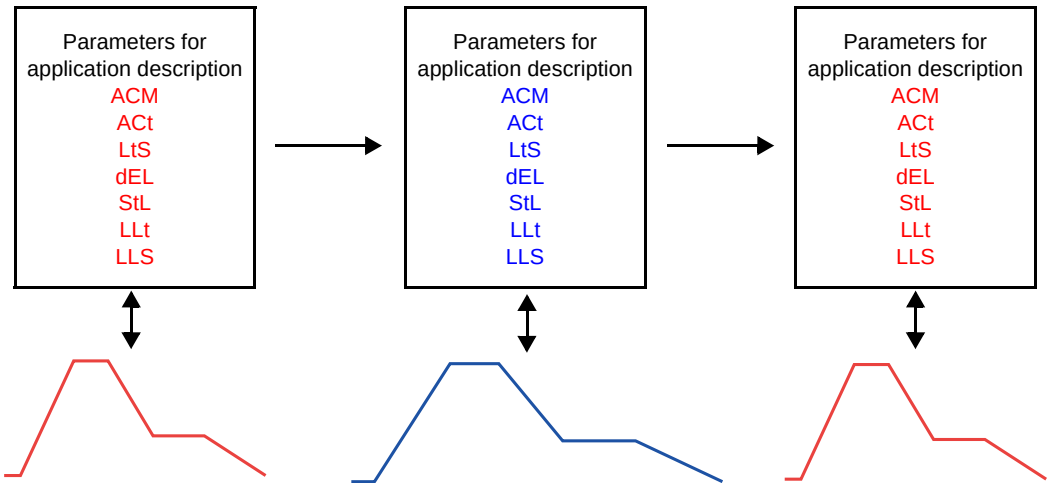
Regarding the parameters that define the ramp profile, 2 kinds of parameters can be defined:

- Parameters for the application description: [Acceleration time] (ACt), [Lift top speed] (LtS), [Deceleration length] (dEL), [Stop length] (StL), [Lift leveling time] (LLt), [Lift leveling speed] (LLS), [Comfort accel.] (ACM) page 59, 60 and 56.

- Parameters for optimization : [Jerk round 1] (JAr1), [Jerk round 2] (JAr2), [Jerk round 3] (JAr3), [Jerk round 4] (JAr4), [Jerk round 5] (JAr5), [Jerk round 6] (JAr6) page 61.

When the application parameters are the same, the same default (that is to say without optimization settings) behaviour must be provided by the drive.

In the following drawings, identical colours indicates identical value and behaviour.



Once the application decription parameters are set, an optimization phase can start.

Nota: The adjustment of optimization parameters and [Comfort accel.] (ACM) parameter can modify parameters for application description in order to stay consistent with the optimization required.

Following interaction can eventually occur:

- The modification of [Jerk round 1] (JAr1) and [Jerk round 2] (JAr2) parameters can update [Acceleration time] (ACt).
- The modification of [Jerk round 3] (JAr3) and [Jerk round 4] (JAr4) parameters can update [Lift leveling speed] (LLS) and / or [Lift leveling time] (LLt).
- The modification of [Jerk round 5] (JAr5) and [Jerk round 6] (JAr6) parameters can update [Lift leveling speed] (LLS) and / or [Lift leveling time] (LLt).
- The modification of [Comfort accel.] (ACM) can update [Acceleration time] (ACt), [Lift leveling speed] (LLS) and / or [Lift leveling time] (LLt).

Whatever the optimization choices, [Comfort accel.] (ACM), [Lift top speed] (LtS), [Deceleration length] (dEL) and [Stop length] (StL) parameters cannot be changed.

The setting of optimization parameters must be done as the last step of commissionning. During this optimization phase, if the application description parameters are modified to some unacceptable values, then it is necessary to modify them again.
In this case, any modification of one of the application description parameters will have as consequence to reset the optimization parameters.

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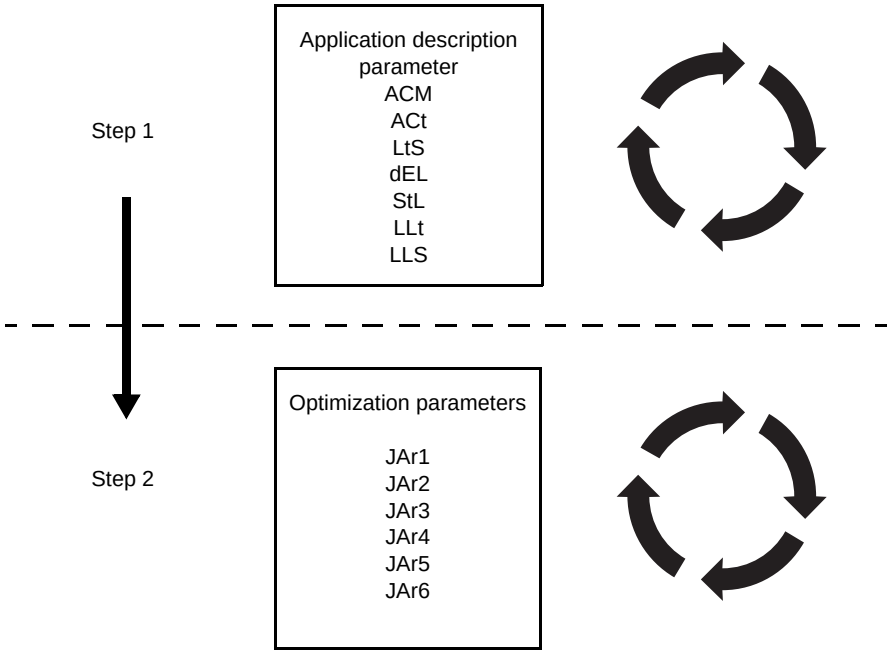
Parameters management (continued)

In conclusion, the lift menu allows to adjust the ramp in 2 steps.
Step 1 : Adjust only the application description parameters. Once these parameters are well adjusted, go to the second step.
Step 2 : Adjust optimization parameters.



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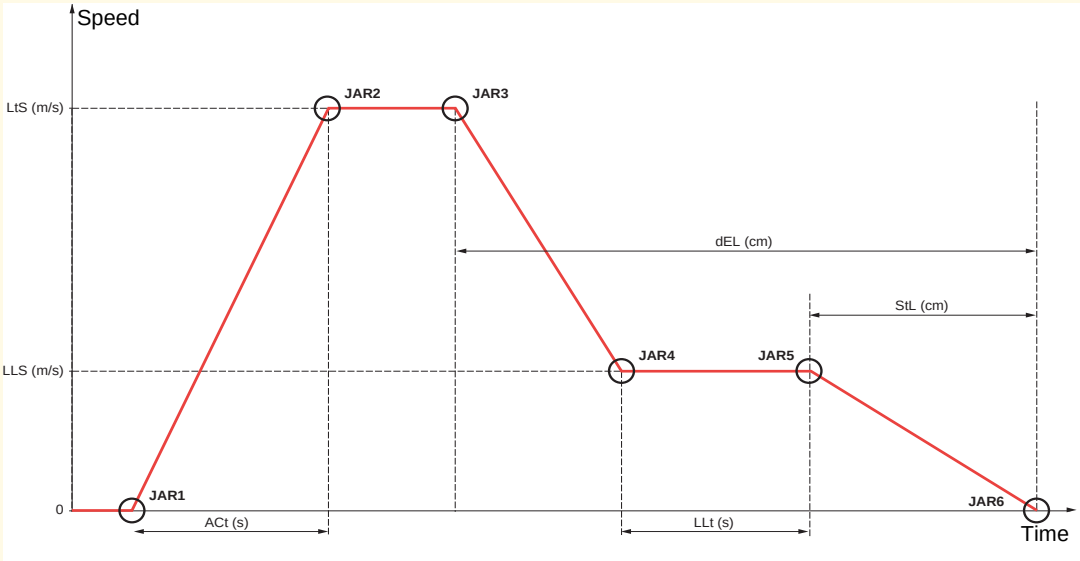
Code	Name/Description	Adjustment range	Factory setting
LCO-	**[LIFT CONFIGURATION]** continued		
LdA-	**[LIFT DATA]** continued		
LtS	❑ **[Lift top speed]**	0.10 to 10.00 m/s	1.00 m/s
	This parameter can be accessed if [Lift Speed Mgt] (LSM) is not [No] (nO) The travel speed corresponds to the linear speed of the car in steady state (high speed). This can be less than the [Nominal car speed] (CSP) if the motor is oversized in relation to the installation.		
ACt	❑ **[Acceleration time]**	0.50 to 60.00 s	3 s
	This parameter can be accessed if [Lift Speed Mgt] (LSM) is not [No] (nO) The acceleration time corresponds to the time the car will take to attain its [Lift top speed] (LtS). The acceleration time should be consistent with the desired travel speed so that the car travels at a constant speed for at least a few seconds. If the acceleration time is too short, acceleration will be too strong, making the ride uncomfortable. If the acceleration time is too long, the travel speed can never be attained and the half floor function will then be activated systematically. The travel time will not therefore be optimized for normal floors.		
			
StL	❑ **[Stop length]**	1.0 to 300, 0 cm	10.0 cm
	This parameter can be accessed if [Lift Speed Mgt] (LSM) is not [No] (nO). The stop length corresponds to the distance separating the stop indicator from the step the car is destined to reach. The drive considers the [Stop length] (StL) as being the distance still to be traveled by the car when the drive loses the run command. This distance is taken into account when calculating the deceleration profile.		

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542 291 58 92 - 0 242 335 40 42

Code	Name/Description	Adjustment range	Factory setting
LCO-	**[LIFT CONFIGURATION]** continued		
LdA-	**[LIFT DATA]** continued		
LLS	❑ **[Lift leveling speed]** This parameter can be accessed if [Lift Speed Mgt] (LSM) is not [No] (nO). The lift leveling speed is calculated by the drive automatically. If the calculated speed is not suitable (because it corresponds to a mechanical resonance frequency for example), it can be re-entered manually. In this case, the lift leveling time should be recalculated.	0.01 to 0.50 m/s	0.10 m/s
LLt	❑ **[Lift leveling time]** This parameter can be accessed if [Lift Speed Mgt] (LSM) is not [No] (nO). The lift leveling time corresponds to the time the car will spend at lift leveling speed in steady state. If the lift leveling time is too short, the ride will be uncomfortable (rolling sensation). If the lift leveling time is too long, the ramp between LtS and LLS will be intense (loss of comfort).	0.50 to 10.00 s	2.00 s
dEL	❑ **[Deceleration length]** This parameter can be accessed if [Lift Speed Mgt] (LSM) is not [No] (nO). The slowdown length corresponds to the distance separating the slowdown indicator from the floor the car is destined to reach. The drive considers the dEL as being the distance still to be traveled by the car when the drive receives the low speed signal (or loss of the high speed signal). This distance is taken into account when calculating the deceleration profile.	10.0 to 999.9 cm	120.0 cm

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Ramp optimisation

Jerks JAR1 to JAR6 correspond to the maximum permissible jerk values for each rounding.
If one of the roundings is not satisfactory (for example: starting too sudden) it can be re-entered manually. In this case, the associated rounding (for example: arrival at travel speed) will automatically be revised to keep it consistent. Some application data can also be modified (travel speed, lift leveling time, acceleration time). However, the slowdown and stop lengths are always adhered to.

Code	Name/Description	Adjustment range	Factory setting
LCO-	**[LIFT CONFIGURATION]** continued		
LdA-	**[LIFT DATA]** continued		
rOP-	**[RAMP OPTIM.]** ☞ **Note:** This function can be accessed if [Lift Speed Mgt] (LSM) is not [No] (nO)		
JAr 1	❑ **[Jerk round 1]** Decreasing JAr1 and JAr2 may increase the acceleration time [Acceleration time] (ACt).	0.01 to 3.00 m/s^3	According to application parameters
JAr 2	❑ **[Jerk round 2]** Decreasing JAr1 and JAr2 may increase the acceleration time [Acceleration time] (ACt).	0.01 to 3.00 m/s^3	According to application parameters
JAr 3	❑ **[Jerk round 3]** Decreasing JAr3 and JAr4 may decrease the time at [Lift leveling time] (LLt).	0.01 to 3.00 m/s^3	According to application parameters
JAr 4	❑ **[Jerk round 4]** Decreasing JAr3 and JAr4 may decrease the time at [Lift leveling time] (LLt).	0.01 to 3.00 m/s^3	According to application parameters
JAr 5	❑ **[Jerk round 5]** Decreasing JAr5 and JAr6 may decrease the [Lift leveling speed](LLS).	0.01 to 3.00 m/s^3	According to application parameters
JAr 6	❑ **[Jerk round 6]** Decreasing JAr5 and JAr6 may decrease the [Lift leveling speed] (LLS).	0.01 to 3.00 m/s^3	According to application parameters

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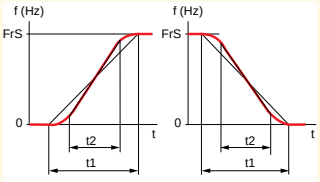
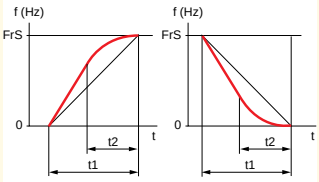
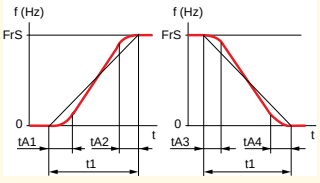
542 291 58 92 - 0 242 335 40 42

Code	Name/Description	Adjustment range	Factory setting
LCO-	**[LIFT CONFIGURATION]** continued		
LdA-	**[LIFT DATA]** continued		
Inr	❏ **[Ramp increment]** This parameter can be accessed if [Lift Speed Mgt] (LSM) is equal to [No] (nO). 0.01 **[0.01]**: Ramp up to 99.99 seconds 0.1 **[0.1]**: Ramp up to 999.9 seconds 1 **[1]**: Ramp up to 6000 seconds This parameter is valid for [Acceleration] (ACC), [Deceleration] (dEC), [Acceleration 2] (AC2) and [Deceleration 2] (dE2).	0.01 - 0.1 - 1	0.1
ACC	❏ **[Acceleration]** This parameter can be accessed if [Lift Speed Mgt] (LSM) is equal to [No] (nO). Time to accelerate from 0 to the [Rated motor freq.] (FrS) (page 50). Make sure that this value is compatible with the inertia being driven.	0.01 to 6000 s (1)	3.0 s
dEC	❏ **[Deceleration]** This parameter can be accessed if [Lift Speed Mgt] (LSM) is equal to [No] (nO). Time to decelerate from the [Rated motor freq.] (FrS) (page 50) to 0. Make sure that this value is compatible with the inertia being driven.	0.01 to 6000 s (1)	3.0 s
rPt	❏ **[Ramp type]** This parameter can be accessed if [Lift Speed Mgt] (LSM) is equal to [No] (nO). LIn **[Linear]** (LIn) S **[S ramp]** (S) U **[U ramp]** (U) CUS **[Customized]** (CUS) S ramps  The rounding coefficient is fixed, where t2 = 0.6 x t1 and t1 = set ramp time. U ramps  The rounding coefficient is fixed, where t2 = 0.5 x t1 and t1 = set ramp time. Customized ramps  tA1: adjustable from 0 to 100% tA2: adjustable from 0 to (100% - tA1) tA3: adjustable from 0 to 100% tA4: adjustable from 0 to (100% - tA3) As a % of t1, where t1 = set ramp time		[Linear] (LIn)

(1) Range 0.01 to 99.99 s or 0.1 to 999.9 s or 1 to 6000 s according to [Ramp increment] (Inr).

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542 291 58 92 - 0 242 335 40 42

Code	Name/Description	Adjustment range	Factory setting
LCO-	**[LIFT CONFIGURATION]** continued		
LdA-	**[LIFT DATA]** continued		
tA1	❏ **[Begin Acc round]** (1) This parameter can be accessed if [Lift Speed Mgt] (LSM) is equal to [No] (nO). Rounding of start of acceleration ramp as a % of the [Acceleration] (ACC) or [Acceleration 2] (AC2) ramp time. Can be set between 0 and 100%	0 to 100%	50%
tA2	❏ **[End Acc round]** (1) This parameter can be accessed if [Lift Speed Mgt] (LSM) is equal to [No] (nO). Rounding of end of acceleration ramp as a % of the [Acceleration] (ACC) or [Acceleration 2] (AC2) ramp time. Can be set between 0 and (100% - [Begin Acc round] (tA1)).		50%
tA3	❏ **[Begin Dec round]** (1) This parameter can be accessed if [Lift Speed Mgt] (LSM) is equal to [No] (nO). Rounding of start of deceleration ramp as a % of the [Deceleration] (dEC) or [Deceleration 2] (dE2) ramp time. Can be set between 0 and 100%	0 to 100%	40%
tA4	❏ **[End Dec round]** (1) This parameter can be accessed if [Lift Speed Mgt] (LSM) is equal to [No] (nO). Rounding of end of deceleration ramp as a % of the [Deceleration] (dEC) or [Deceleration 2] (dE2) ramp time Can be set between 0 and (100% - [Begin Dec round] (tA3)).		60%
Frt	❏ **[Ramp 2 threshold]** This parameter can be accessed if [Lift Speed Mgt] (LSM) is equal to [No] (nO). Ramp switching threshold The 2nd ramp is switched if the value of Frt is not 0 (0 deactivates the function) and the output frequency is greater than Frt. Threshold ramp switching can be combined with [Ramp switch ass.] (rPS) switching as follows:	0 to 500 or 1600 Hz according to rating	0 Hz
rPS	❏ **[Ramp switch ass.]** Ramp switching threshold This parameter can be accessed if [Lift Speed Mgt] (LSM) is equal to [No] (nO). ☐ **[No]** (nO): Not assigned. ☐ **[LI1] (LI1)** : ☐ **[...] (...):** See the assignment conditions on page 204. • ACC and dEC are enabled when the assigned input or bit is at inactive state. • AC2 and dE2 are enabled when the assigned input or bit is at active state.		[No] (nO)
nO LI1 -			

LI or bit	Frequency	Ramp
0	<Frt	ACC, dEC
0	>Frt	AC2, dE2
1	<Frt	AC2, dE2
1	>Frt	AC2, dE2

(1) Parameter can also be accessed in the [1.3 SETTINGS] (SEt-) menu.

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542 291 58 92 - 0 242 335 40 42

[1.1 LIFT] (LIF-)

Code	Name/Description	Adjustment range	Factory setting
LCO-	**[LIFT CONFIGURATION]** continued		
LdA-	**[LIFT DATA]** continued		
AC2 ★	❑ **[Acceleration 2]** See page 219 This parameter can be accessed if [Lift Speed Mgt] (LSM) is equal to [No] (nO). Time to accelerate from 0 to the [Rated motor freq.] (FrS). Make sure that this value is compatible with the inertia being driven.	0.01 to 6000 s (1)	5.0 s
dE2 ★	❑ **[Deceleration 2]** See page 219 This parameter can be accessed if [Lift Speed Mgt] (LSM) is equal to [No] (nO). Time to decelerate from the [Rated motor freq.] (FrS) to 0. Make sure that this value is compatible with the inertia being driven.	0.01 to 6000 s (1)	5.0 s

(1) Range 0.01 to 99.99 s or 0.1 to 999.9 s or 1 to 6000 s according to [Ramp increment] (Inr).

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

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542 291 58 92 - 0 242 335 40 42

[1.1 LIFT] (LIF-)

The [LIFT OPTIMISATION] menu is used to make adjustments easily in order to optimise the lift ride comfort if necessary.

Code	Name/Description	Adjustment range	Factory setting
LOP-	**[LIFT OPTIMISATION]** **Note:** This menu is visible from **[ACCESS LEVEL]** = **[Standard]**		
nCO-	**[MOTOR OPTIMISATION]**		
tUS	❏ **[Auto tuning state]** For information only, cannot be modified. ☐ **[Not done]** (tAb): The default stator resistance value is used to control the motor. ☐ **[Pending]** (PEnd): Auto-tuning has been requested but not yet performed. ☐ **[In Progress]** (PrOG): Auto-tuning in progress. ☐ **[Failed]** (FAIL): Auto-tuning has failed. ☐ **[Done]** (dOnE): The stator resistance measured by the auto-tuning function is used to control the motor. ☐ **[Entered R1]** (Strd) The drive uses the stator resistance given by the parameter (rSC) ☐ **[Customized]** (CUS): Auto-tuning has been performed, but at least one of the parameters [Autotune L d-axis] (LdS), [Autotune L q-axis] (LqS) or [Cust. stator R syn] (rSAS) has subsequently been modified. The following auto-tuning parameters are affected: • [Cust stator resist.] (rSA), [Idw] (IdA), [LFw] (LFA) and [Cust. rotor t const.] (trA) page 147 for asynchronous motors. • [Cust. stator R syn] (rSAS) page 148 for synchronous motors. tAb PEnd PrOG FAIL dOnE Strd CUS		[Not done] (tAb)

These parameters can be accessed in asynchronous motor profiles and in [Expert] mode.

Code	Name/Description	Adjustment range	Factory setting
rSM	❏ **[Stator R measured]** Cold stator resistance, calculated by the drive, in read-only mode. Value in milliohms (mΩ) up to 75 kW (100 HP), and in hundredths of milliohms (mΩ/100) above 75 kW (100 HP).		
rSA	❏ **[Cust stator resist.]** Cold state stator resistance (per winding), modifiable value. In milliohms (mΩ) up to 75 kW (100 HP), and in hundredths of milliohms (mΩ/100) above 75 kW (100 HP). On the integrated display unit: 0 to 9999 then 10.00 to 65.53 (10000 to 65536).		
LFM	❏ **[Lfr]** Leakage inductance in mH, calculated by the drive, in read-only mode.		
LFA	❏ **[Lfw]** Leakage inductance in mH, modifiable value.		
IdM	❏ **[Idr]** Magnetizing current in A, calculated by the drive, in read-only mode.		
IdA	❏ **[Idw]** Magnetizing current in A, modifiable value.		
trM	❏ **[T2r]** Rotor time constant in mS, calculated by the drive, in read-only mode.		
trA	❏ **[Cust. rotor t const.]** Rotor time constant in mS, modifiable value.		

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542 291 58 92 - 0 242 335 40 42

[1.1 LIFT] (LIF-)

These parameters can be accessed in synchronous motor profiles.

Code	Name/Description	Adjustment range	Factory setting
LOP-	**[LIFT OPTIMISATION]** continued		
nCO-	**[MOTOR OPTIMISATION]** continued		
rSnS	❏ **[R1rS]** This parameter can be accessed if **[ACCESS LEVEL]** = **[Expert]** Cold state stator resistance (per winding), in read-only mode. This is the drive factory setting or the result of the auto-tuning operation, if it has been performed. Value in milliohms (mΩ). On the integrated display unit: 0 to 9999 then 10.00 to 65.53 (10000 to 65536).		
rSAS	❏ **[Cust. stator R syn]** This parameter can be accessed if **[ACCESS LEVEL]** = **[Expert]** Cold state stator resistance (per winding) The factory setting is replaced by the result of the auto-tuning operation, if it has been performed. The value can be entered by the user, if he knows it. Value in milliohms (mΩ). On the integrated display unit: 0 to 9999 then 10.00 to 65.53 (10000 to 65536).	According to drive rating	According to drive rating
LdnS	❏ **[Measured Ld-axis]** This parameter can be accessed if **[ACCESS LEVEL]** = **[Expert]**		
LdS	❏ **[Autotune L d-axis]** Axis "d" stator inductance in mH (per phase). On motors with smooth poles [Autotune L d-axis] (LdS) = [Autotune L q-axis] (LqS) = Stator inductance L.	0 to 655.3	According to drive rating
LqnS	❏ **[Measured Lq-axis]** This parameter can be accessed if **[ACCESS LEVEL]** = **[Expert]**		
LqS	❏ **[Autotune L q-axis]** Axis "q" stator inductance in mH (per phase). On motors with smooth poles [Autotune L d-axis] (LdS) = [Autotune L q-axis] (LqS) = Stator inductance L.	0 to 655.3	According to drive rating
PHS	❏ **[Syn. EMF constant]** Synchronous motor EMF constant, in 0.1 mV per rpm or 1 mV per rpm (peak voltage per phase), according to the value of [Increment EMF] (IPHS). On the integrated display unit: 0 to 9999 then 10.00 to 65.53 (10000 to 65536).	0 to 65535	According to drive rating
IPHS 0.1 1	❏ **[Increment EMF]** Increment for the [Syn. EMF constant] (PHS) parameter. ☐ **[0.1 mV/rpm]** (0.1): 0.1mV per rpm ☐ **[1 mV/rpm]** (1): 1mV per rpm		[0.1mV/rpm] (0.1)

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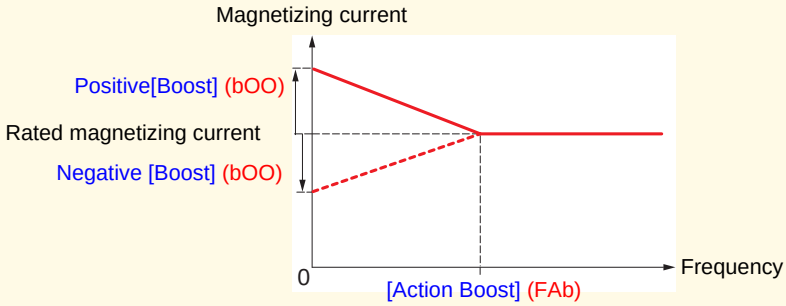
542 291 58 92 - 0 242 335 40 42

Code	Name/Description	Adjustment range	Factory setting
LOP-	**[LIFT OPTIMISATION]** continued		
nCO-	**[MOTOR OPTIMISATION]** continued		
bOO	❑ **[Boost]**	- 100 to 100%	0
	This parameter can be accessed if **[ACCESS LEVEL]** = **[Expert]** and if [Motor control type] (Ctt) page 137 is not [Sync.CL] (FSY). Adjustment of the motor magnetizing current at low speed, as a % of the rated magnetizing current. This parameter is used to increase or reduce the time taken to establish the torque. It allows gradual adjustment up to the frequency set by [Action Boost] (FAb). Negative values apply particularly to tapered rotor motors.  		
FAb	❑ **[Action Boost]**	0 to 500 Hz	0 Hz
	This parameter can be accessed if **[ACCESS LEVEL]** = **[Expert]** and if [Motor control type] (Ctt) page 137 is not [Sync.CL] (FSY). Frequency above which the magnetizing current is no longer affected by [Boost] (bOO).		
SLP	❑ **[Slip compensation]**	0 to 300 %	100 %
	This parameter can be accessed if [Motor control type] (Ctt) is not [V/F 2pts] (UF2) or [V/F 5pts] (UF5). Adjusts the slip compensation around the value set by the rated motor speed. The speeds given on motor nameplates are not necessarily exact. • If slip setting < actual slip: the motor is not rotating at the correct speed in steady state, but at a speed lower than the reference. • If slip setting > actual slip: The motor is overcompensated and the speed is unstable.		

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542 291 58 92 - 0 242 335 40 42

Velocity Loop

The ATV LIFT speed loop ensures optimum comfort in the lift car while complying with the speed references produced by the automatic ramp profile.
The ATV LIFT speed loop is configured automatically by the drive from the application data (car speed and payload).

In the majority of applications, there is no need to re-enter the speed loop settings. However, if you are not satisfied with the lift behavior, refer to the Procedure for setting the speed loop paragraph on page 70.

Description of the loop

The ATV LIFT speed loop consists of the following elements:

- [Fr.Loop.Stab] (StA): Stability (attenuation coefficient)
- [FreqLoopGain] (FLG): Gain (passband)
- [K speed loop filter] (SFC): Reference filter constant
- [Real motor inertia] (JMOt) and [Estim. motor inertia] (JCAL): Motor inertia (JMOt can be accessed in read/write mode and JCAL is read-only.
- [Application Inertia] (JAPL): Application inertia (pre-calculated)

The total inertia used in the loop is

- JMOt + JAPL when JMOt is not 0
- JCAL + JAPL when JMOt = Auto

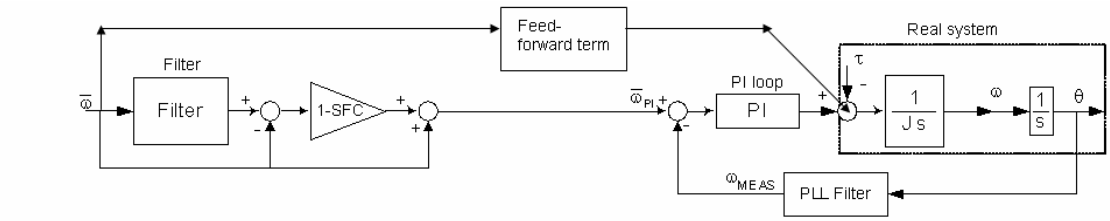
In expert mode:

- [Feed forward] (FFP): Feed forward term gain
- [Bandwidth feedfor.] (FFU): Feed forward term bandwidth

This description of the loop can include the filter on the speed measurement, as it is closely linked to the final setting of this loop:

- [Encoder filter value] (FFr): Filter time constant
- [Encoder filter active] (FFA): Activation of the filter

Here then is the block diagram for this speed loop:



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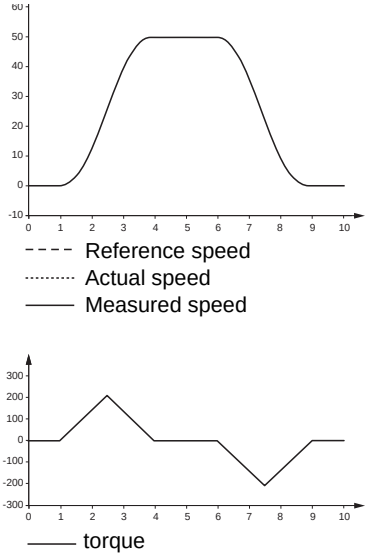
542 291 58 92 - 0 242 335 40 42

Basic operation

In the case of standard operation, the speed loop should be preset using the [Capacity of the lift] (LCA) and [Nominal car speed] (CSP) parameters as follows:

1. The total weight of the application is estimated using [Capacity of the lift] (LCA)
2. The total inertia of the application is estimated using the total weight, [Nominal car speed] (CSP) and [Nom motor spdsync] (nSPS) (or [Rated motor speed] (nSP) for asynchronous motors)
3. The speed regulator bandwidth and attenuation are predefined and adapted to the lift application
4. The regulator is predefined as being a PI speed regulator (SFC = 100%) for synchronous motors and as having intermediate behavior between a PI and an IP for synchronous motors (SFC = 65%). Note: An IP speed regulator is obtained if SFC = 0%.
5. The filter constant applied to the speed reference is calculated using SFC
6. The speed controller **Kp and Ki gains** are calculated using the inertia, the bandwidth and the attenuation
7. The lift speed loop also has an additional **feedforward compensation** term for the acceleration and deceleration torque. By default this is not active. Its gain can be set by [Feed forward] (FFP), set initially at 0%. This term is based on an acceleration observer whose predefined bandwidth corresponds to [Bandwidth feedfor.] (FFU) = 100%. This can be modified if necessary.
8. When a closed-loop control profile (with speed feedback) is being used, there is the possibility of using a **filter on the measured speed**, to reduce the measurement noise. This filter is preset according to the [Motor torque] (TqS) and the resolution of the encoder used (resolution detected automatically)

Thus, in the case of fairly good correspondence between the drive inertia and the actual inertia, for the usual lift ramps, an encoder with resolution >2^16 (=>[Encoder filter value] (FFR) = 3 ms), the actual speed should follow the reference speed exactly:



In the above example, the default inertia is that of the drive and the inertia parameter equals the default inertia. The roundings are all at 50% and the ramps at 3 s.

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Procedure for setting the speed loop

This procedure must be used in inspection mode (see page 36). The lift ramps should then be set. It can be re-entered from setting item 6 in normal operation if necessary.

As explained in previous sections, **the inertia** is the essential (and in the great majority of cases the only) parameter to be set.

1. Start by entering the lift capacity [Capacity of the lift] (LCA) correctly and checking that the linear speed [Nominal car speed] (CSP), [Rated motor speed] (nSP) or [Nom. motor spdsync] (nSPS) and rated frequency for asynchronous motors [Rated motor freq.] (FrS) or the number of pole pairs for synchronous motors [Pole pairs] (PPnS) are entered correctly

2. The [Car weight] (CMA) et [Counterweight] (CtM) parameters are updated again depending on [Capacity of the lift] (LCA), and therefore the total inertia of the application is calculated. If the the car weight and counterweight weight are known, it is better to enter them separately

3. The synchronous motor torque [Motor torque] (tqS) and the number of motor pole pairs [Poles pair number] (PPn) or [Pole pairs] (PPnS) update the estimated motor inertia (JCAL in read-only and [Real motor inertia] (JMOt) in read/write mode). If the motor inertia is known, it is better to enter it in [Real motor inertia] (JMOt). You should be aware that our estimate of the inertia takes account of a "long cylinder" lift motor model. If a flat lift motor is used, it is vital to fill in this parameter.

To sum up, in order to find the inertia you should enter:

At minimum	As a preference
[Capacity of the lift] (LCA) [Nominal car speed] (CSP) [Rated motor speed] (nSP) or [Nom motor spdsync] (nSPS) [Motor torque] (tqS) [Poles pair number] (PPn) or [Pole pairs] (PPnS)	[Capacity of the lift] (LCA) [Nominal car speed] (CSP) [Rated motor speed] (nSP) or [Nom motor spdsync] (nSPS) [Motor torque] (tqS) [Poles pair number] (PPn) or [Pole pairs] (PPnS)
	[Car weight] (CMA) [Counterweight] (CtM) [Real motor inertia] (JMOt)

4. When little is known about the parameters (weights, rated speed, etc.), the total application inertia can be set directly as follows:
   - Increase [Real motor inertia] (JMOt) and/or [Capacity of lift] (LCA) (to increase [Application Inertia] (JAPL)) up to the system stability limit (noise and strong vibrations in the car)
   - Reduce [Real motor inertia] (JMOt) and/or [Capacity of lift] (LCA) (to reduce [Application Inertia] (JAPL)) to eliminate strong vibrations; these can be reduced until slow oscillations on the speed or speed overshoots occur which are easily felt in the car; in this case the inertia should be increased again

5. The default values of StA, FLG, SFC, FFP, FFU are suitable in the vast majority of cases. The pre-calculated value of [Encoder filter value] (FFR) is suitable in the vast majority of applications.

Exceptions:

6. A very loud noise and rapid oscillations on starting in inspection mode can be due to overestimation of the inertia (see "Influence of the [Fr.Loop.Stab] (StA) et [FreqLoopGain] (FLG)" paragraph, page 75). The parameters involved in calculating the inertia, items 1, 2 and 3, should be reviewed.

7. Should the revised inertia (item 4) not give satisfactory results, it is possible to make the control system slacker, by reducing [FreqLoopGain] (FLG) and/or increasing [Fr.Loop.Stab.] (StA), or more reactive, by increasing [FreqLoopGain] (FLG) and/or reducing [Fr.Loop. Stab.] (StA) (see "Influence of the [Fr.Loop.Stab.] (StA) and [FreqLoopGain] (FLG)parameters" paragraph).

8. Background noise (high-frequency vibration) during operation or during rollback can be reduced by increasing the [Encoder filter value] (FFr) parameter (see "Influence of the [Encoder filter value] (FFr) parameter" paragraph, page 79). In this case, do not forget to re-enter [FreqLoopGain] (FLG) if necessary.

9. If it is necessary to reduce [Encoder filter value] (FFr) for the rollback (to have a faster reaction) and if the system allows it (without increasing the background noise), there is no need to re-enter [FreqLoopGain] (FLG), because it will also be correct for a smaller [Encoder filter value] (FFr).

10. If a system mechanical resonance is reached at a particular speed, rather slow oscillations may appear. You can:
    - Reduce [FreqLoopGain] (FLG)
    - And/or increase [Fr.Loop.Stab] (StA)
    - And/or increase [Feed forward] (FFP) (to increase the gains only in transient operation, not at steady state)
    - And/or reduce [K speed loop filter] (SFC) (in this case you need to re-enter the ramp settings, as delays will be introduced during speed following)

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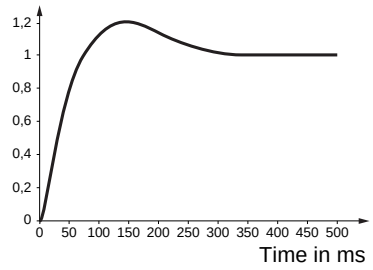
Influence of the [FreqLoopGain](FLG) and [Fr.Loop.Stab] (StA) parameters

These parameters are used to adjust the response of the speed loop obtained from the inertia, in particular when this is not known.

- [Fr.Loop.Stab] (StA): Used to adapt the return to steady state after a speed transient, according to the dynamics of the machine. Gradually increase the stability to increase control loop attenuation and thus reduce any overspeed.
- [FreqLoopGain] (FLG): Used to adapt the response of the machine speed transients according to the dynamics (passband). For machines with high resistive torque, high inertia or fast cycles, increase the gain gradually.

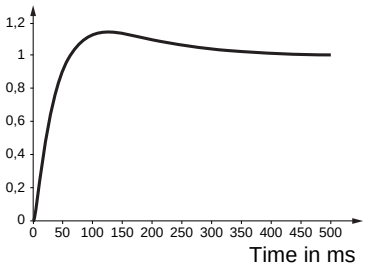
Initial response

Reference division



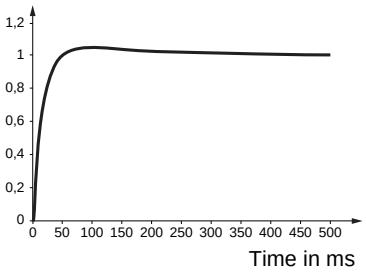
Increase in StA ↗

Reference division



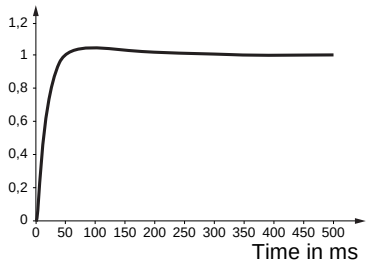
Increase in StA ↗↗

Reference division



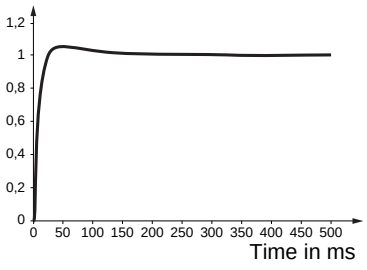
Initial response

Reference division



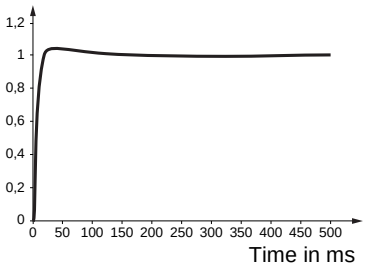
Increase in FLG ↗

Reference division



Increase in FLG ↗↗

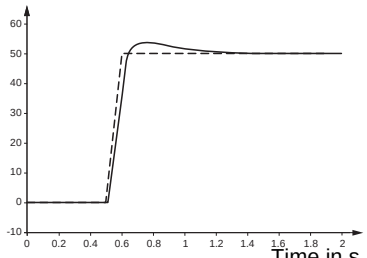
Reference division



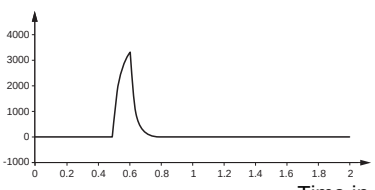
For a better understanding of the influence of the [FreqLoopGain] (FLG) and [Fr.Loop.Stab] (StA) parameters, we will look at 2 types of example:

- A very short linear ramp (a very unlikely scenario for the lift, but very useful for the example)
- The same ramp rounded (ACC=DEC=3s) as before (like the lift)

1. Very short linear ramp

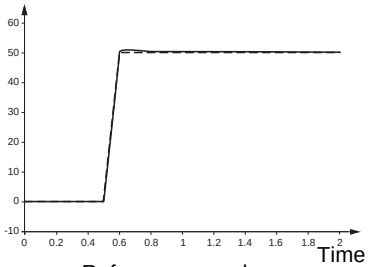


---- Reference speed
..... Actual speed
—— Measured speed

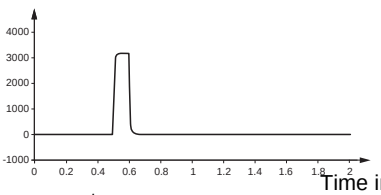


—— torque

1) Default loop settings, Jvar = J real



---- Reference speed
..... Actual speed
—— Measured speed



—— torque

2) Fig. 1 + STA increased to 80

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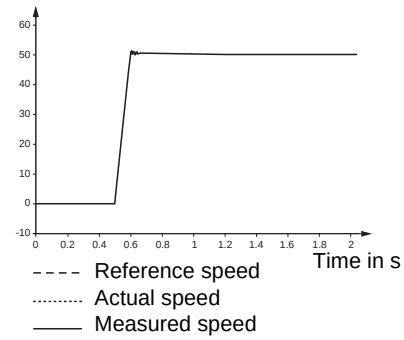
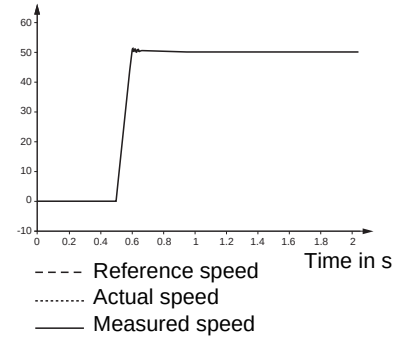
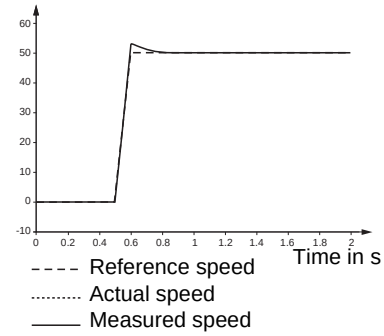


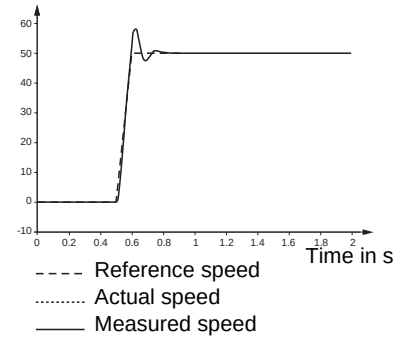
3) Fig. 2 + FLG increased to 60



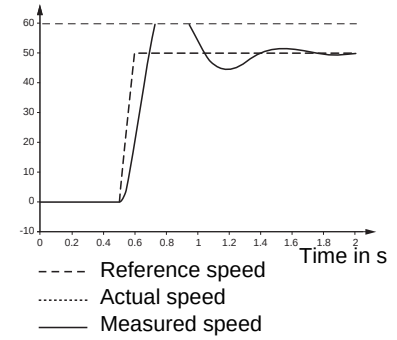
4) Fig. 3 + FLG increased to 100



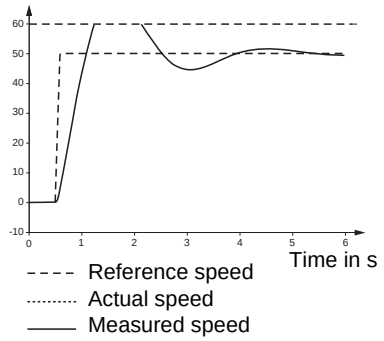
5) Fig. 4 + STA decreased to 20



6) Fig. 5 + STA decreased to 5



7) Fig. 6 + FLG decreased to 20



8) Fig. 7 + FLG decreased to 5

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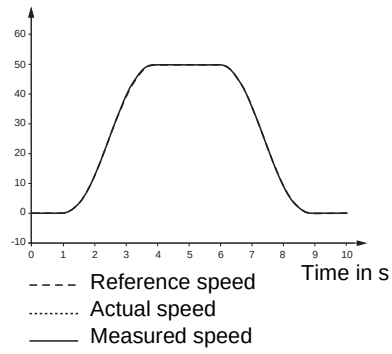
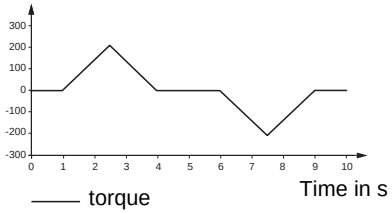
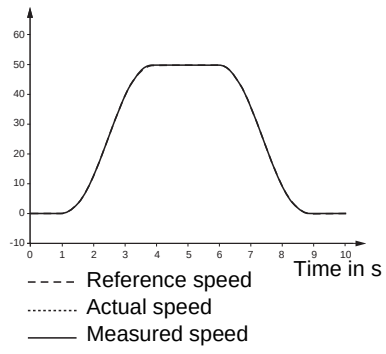
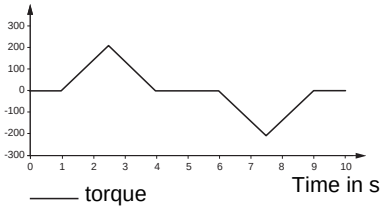
2. Ramp rounded to 3 s



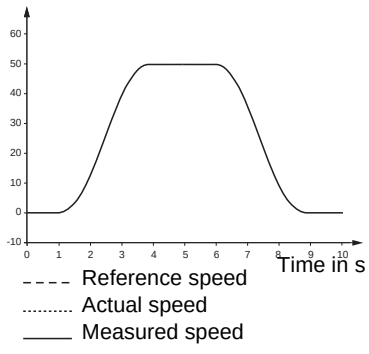


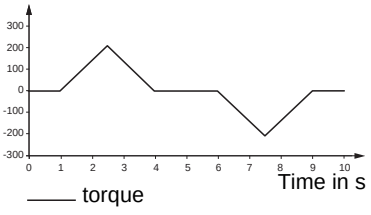
1) Default loop settings Jvar = J real



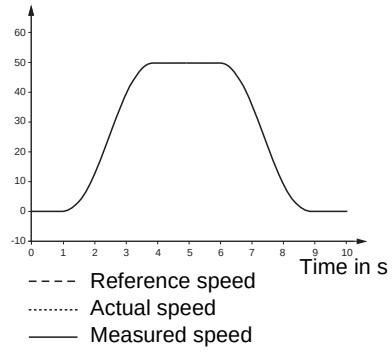


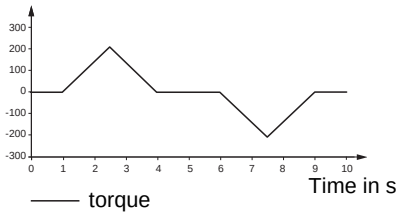
2) Fig. 1 + STA increased to 80



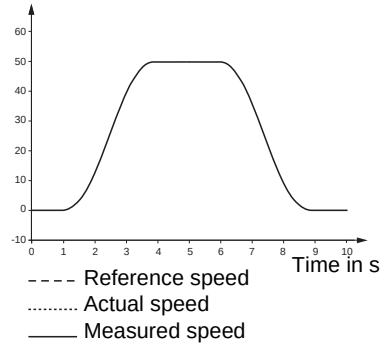


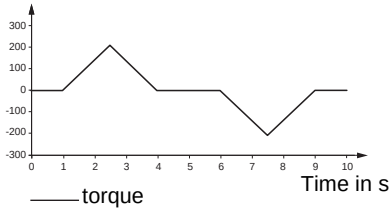
3) Fig. 2 + FLG increased to 60



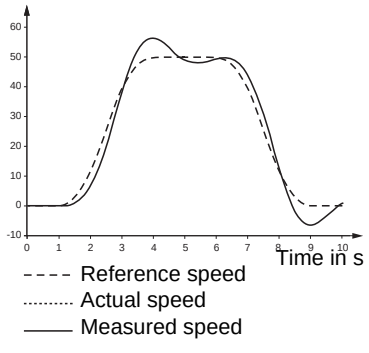


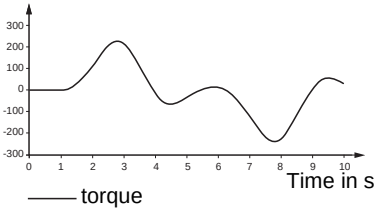
4) Fig. 3 + FLG increased to 100





5) Fig. 4 + STA decreased to 5





6) Fig. 5 + FLG decreased to 5

From these latest figures (except the last), we can clearly see the little influence of [FreqLoopGain] (FLG) and [Fr.Loop.Stab] (StA) when the inertia is well defined (drive inertia adapted to the actual inertia). In summary, only an important dip in the [FreqLoopGain] (FLG) (bandwidth) can make the control system very slack, and therefore oscillating.

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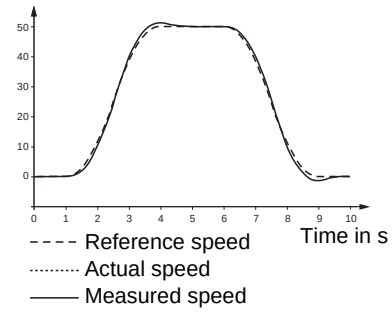
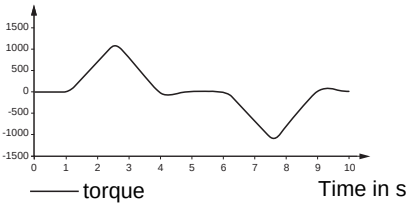
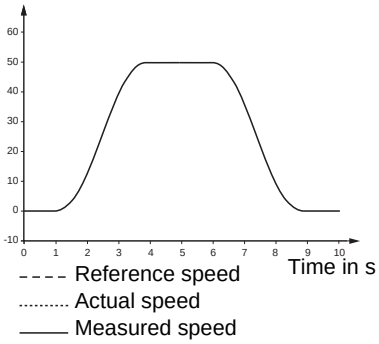
Robustness of basic operation

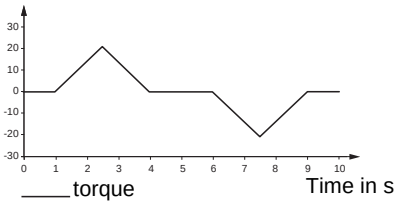
Speed following is very robust when large variations of inertia occur. Let us look at the same example (with all default values, except for inertia):



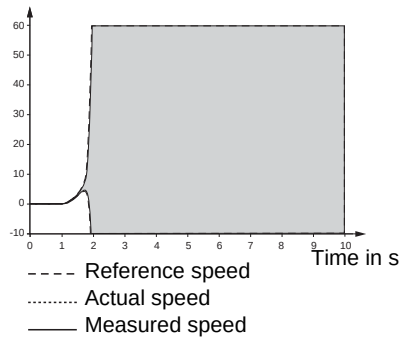


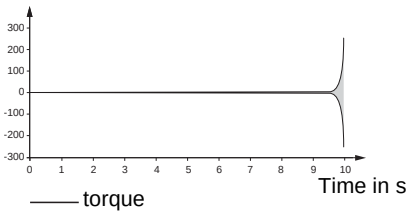
Underestimation of the inertia by a factor of 5 (actual inertia is 5 kg.m2) is also hardly noticeable.



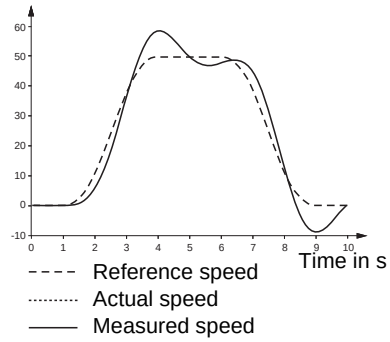


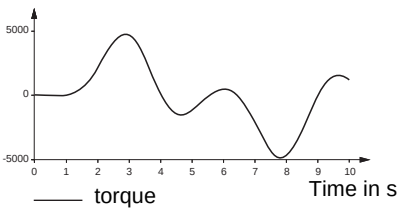
Underestimation of the inertia (actual inertia is 0.1 kg.m2) brings the system toward the limit of stability, but a factor of 10 is acceptable.





Significant overestimation of the actual inertia (ratio 33.33).





Significant underestimation of the actual inertia (ratio 20).

Note that underestimation by a ratio of 30 is preferable to overestimation by a ratio of 30, since the control system remains stable (**Note:** in this case the risk is that the response will be too slow and the lift will be caught too late).

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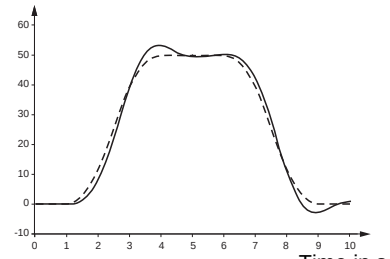
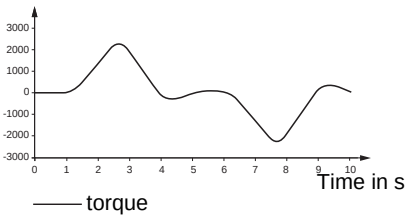
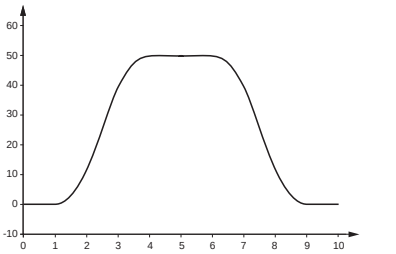
Influence of the [FreqLoopGain] (FLG) and [Fr.Loop.Stab] (StA) parameters for the ATV LIFT

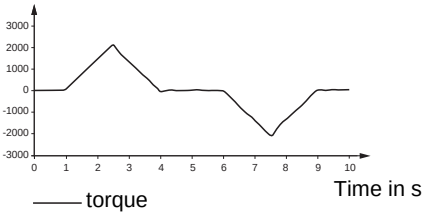
Given these latest results, in the great majority of lift applications, there is no point in changing the settings of [Fr.Loop.Stab] (StA) and [FreqLoopGain] (FLG).
Moreover, the settings of StA/FLG differ from the default values and usually hide incorrectly defined inertia:



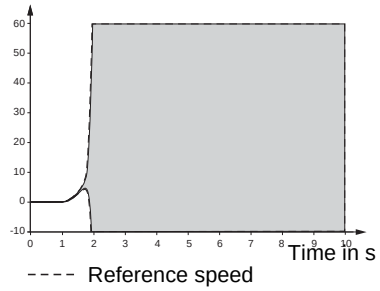


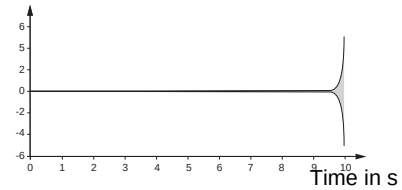
Inertia underestimated by a ratio of 10, default loop values.



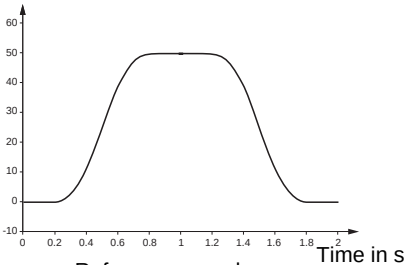


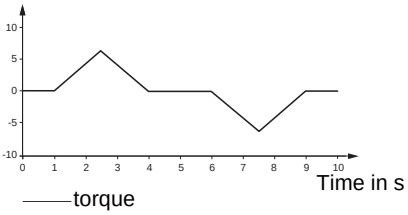
An increase of FLG to 100% resolves the problem of speed following while producing torque oscillations.





Significant overestimation of the actual inertia (ratio 33.33).





A decrease of FLG resolves the problem of speed following, while nonetheless covering incorrect estimation of the inertia.

The inertia should therefore be redefined rather than changing the gains [FreqLoopGain] (FLG) or [Fr.Loop.Stab] (StA).

However, even in the case of well defined inertia, it is sometimes useful to reduce the gain [FreqLoopGain] (FLG) or increase the stability [Fr.Loop.Stab] (StA) to make the system even slacker. A slack control system is useful for example to avoid exciting the mechanical resonance frequencies of the lift or the motor.

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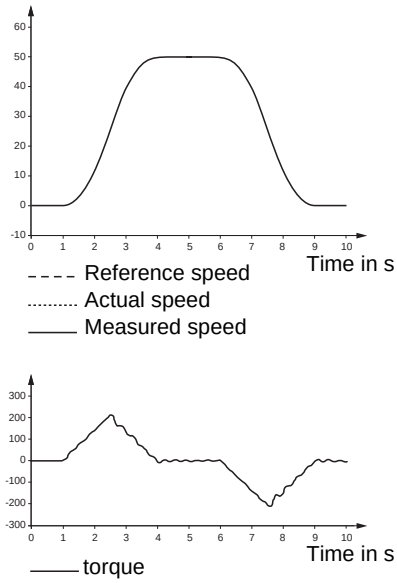
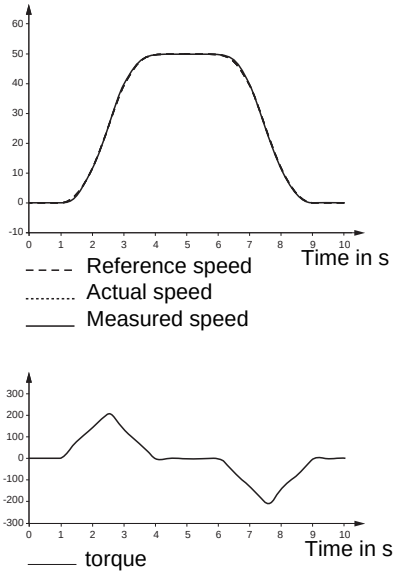
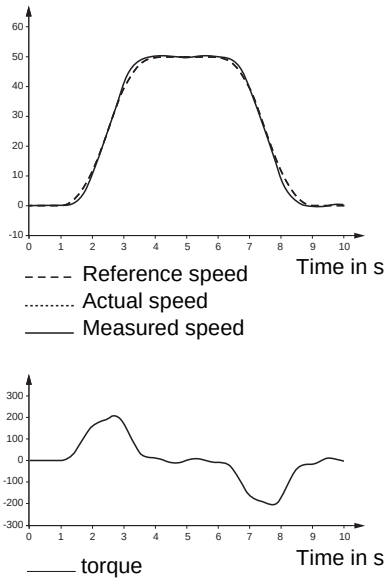
E.g.



Let's consider that the mechanical system is causing a resonance at the speed used. Even if the speed is followed correctly, the torque oscillations show discomfort.



By increasing STA to 100%, the system is dampened further. This reduces the oscillations.



By reducing FLG the little oscillations reduce, giving way to larger oscillations which are felt less in the car.

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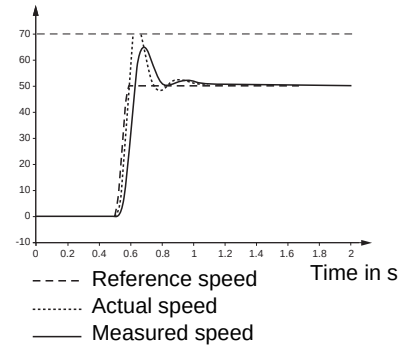
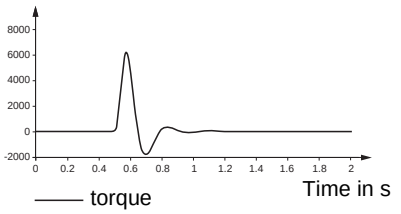
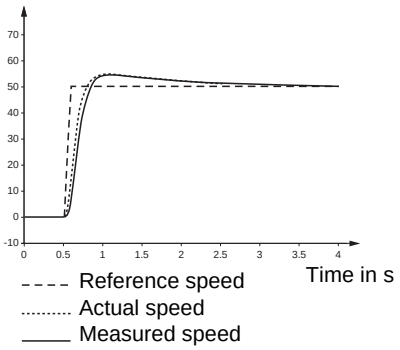
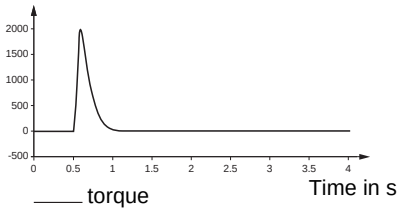
Another example of the advantage of the slacker system is when you need to use a very large filter on the speed measurement (also see section on [Encoder filter value] (FFr)):





Very short ACC ramp (0.1 s), very long FFR (40 ms).





By reducing the passband FLG the speed oscillations are eliminated. A normal response is regained with a PI regulator (SFC = 100).

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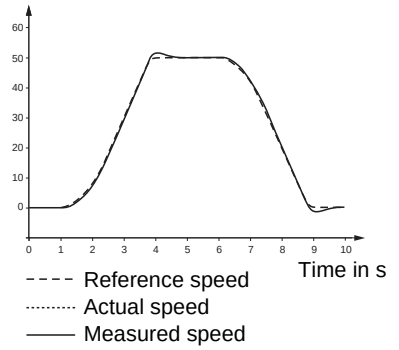
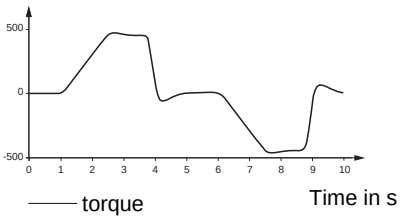
Influence of the [K speed loop filter] parameter (SFC)

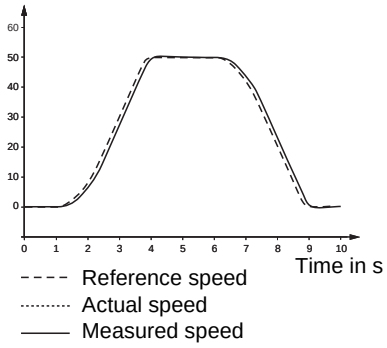
The filter on the speed reference converts the PI regulator (SFC = 100%) to an IP regulator (SFC = 0%).
An IP regulator never has an overshoot. The price to be paid is a delay in the actual speed compared to the reference speed.
In the great majority of lift applications it should be left at the default value: 100% for synchronous motors, 65% for asynchronous motors.

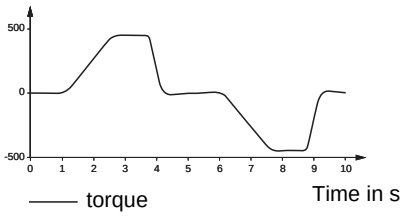
It can be useful when using steep ramp profiles. However, it could be said that in this case it hides an incorrect definition of the ramp rounds.
Nonetheless, it can be seen as another degree of freedom for increasing comfort.



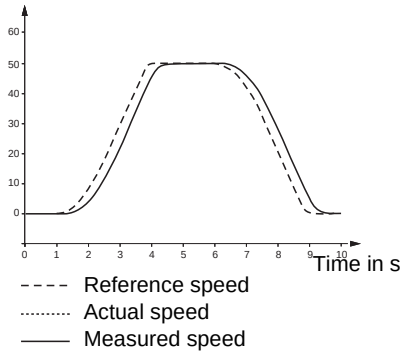


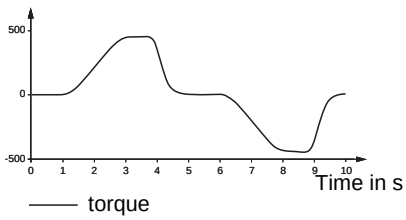
Inertia underestimated (ratio 3), rounding of end of ramp 10%, SFC = 100%





If SFC = 65%, a good compromise between the speed overshoot and the delay on the command is obtained.





If SFC = 0%, the speed overshoot is eliminated and comfortable jerks are obtained.

We should also point out that the reduction in [K speed loop filter] (SFC) also improves behavior in the event of mechanical resonance.
In this case, it can be used even together with the increase in [Fr.Loop.Stab] (StA) and/or the reduction in [Freq Loop Gain] (FLG).

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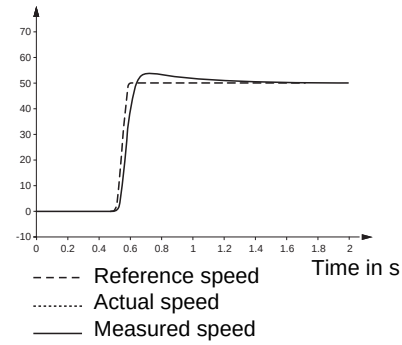
Influence of the [Encoder filter value] (FFr) parameter

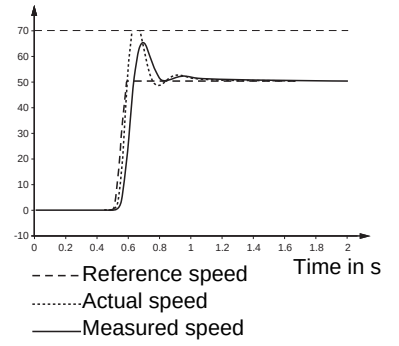
The [Encoder filter value] (FFR) filter is pre-positioned in the case of the lift to a value that depends on the actual encoder resolution and the rated motor torque. It can be modified as follows:

- **The FFR value is increased** to reduce the acoustic noise or background (high frequency) vibration in the cables; this vibration is usually due to the measurement noise (quality of the encoder cables, EMC interference, length of cable etc.).
- **FFR is reduced** to be able to increase (with the other dynamic gains) the dynamics of the response

For a better understanding of the filter's influence on the measured speed, we will also look at the example of a short ramp (the influence of this parameter for the usual lift application ramps is much less pronounced):
Example with PI structure 100%



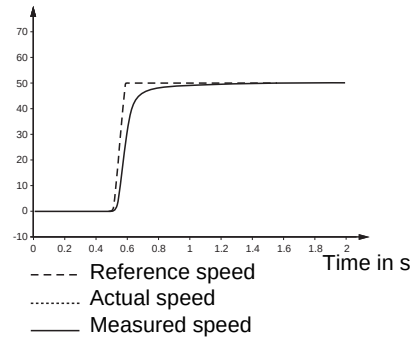
Default loop settings, Jvar = J real, ACC = 0.1 s, FFR = 3 ms



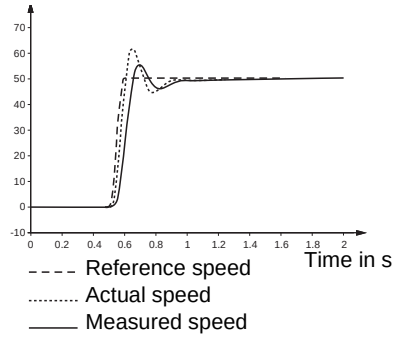
Very long FFR (40 ms).

Remember that the speed oscillations that appear in this latter case can be reduced by decreasing [FreqLoopGain] (FLG) (see section on the advantages of [FreqLoopGain] (FLG) and [Fr.Loop.Stab] (StA)), page 71).

Example with an intermediate PI/IP structure (SFC = 80%):



SFC = 80%, FFR = 3 ms



SFC = 80%, FFR = 40 ms: A system without overshoot can be converted into a system with overshoot and a little oscillation due to too much filtering on the speed feedback.

In this case too, [FreqLoopGain] (FLG) must be reduced to reduce oscillations (and overshoots).
You should be aware that too large a filtering constant reduces the performance of the rollback function, since the rollback gains will be applied to the filtered speed.
The FFR setting will therefore be a compromise between the noise and oscillations in normal operation and rejection of interference by the rollback.

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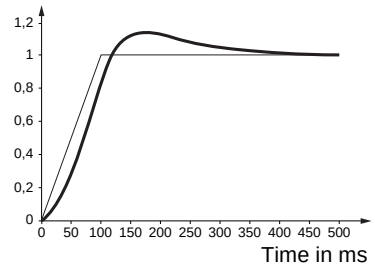
Use of [Feed forward] (FFP) and [Bandwidth feedfor.] (FFU)

In the case of lifts, such as applications with fairly slow dynamics (ramps 3 s, significant rounding, high inertia), this term is not essential.

[Feed forward] (FFP) is used to adjust the level of dynamic torque feedforward required for accelerating and decelerating the inertia.
The effect of this parameter on ramp following is illustrated below. Increasing the value of FFP allows the ramp to be followed more closely. However, if the value is too high, overspeed occurs. The optimum setting is obtained when the speed follows the ramp precisely;
this depends on the accuracy of the [Application Inertia] (JAPL) parameter, page 81, and the [Encoder filter value] (FFr) parameter setting, page 181.

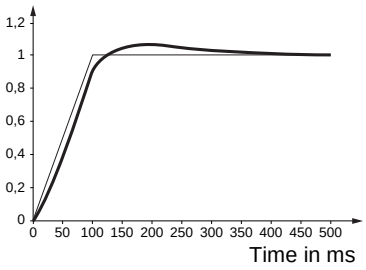
Initial response with FFP = 0

Reference division



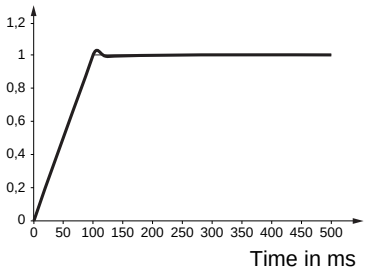
Increase in FFP

Reference division



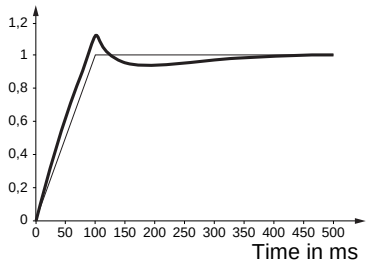
Increase in FFP

Reference division



Increase in FFP

Reference division



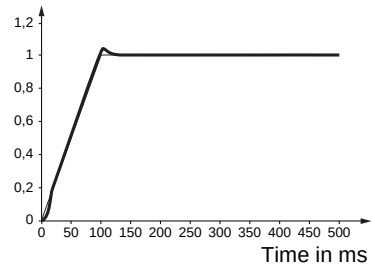
As we have shown in the "Robustness of basic operation" paragraph, page 74, [Feed forward] (FFP) can be useful to hide inertia estimation errors.

[Feed forward] (FFP) can also be used to separate the effect of the Kp and Ki speed regulator gains, on acceleration/deceleration and during steady state operation (because it must be said that this term only acts on a change of speed reference, therefore only in transient operation).
The [Feed forward] (FFP) parameter serves no purpose during rollback, since there is no acceleration of the reference (speed reference 0 Hz).

[Bandwidth feedfor.] (FFU) is used to adjust the bandwidth of the dynamic torque feedforward term. The effect of this parameter on ramp following is illustrated below. Decreasing the value of FFU reduces the effect of noise on the speed reference (torque ripple). However, too great a decrease in relation to the ramp settings (on short ramps) causes a delay, and ramp following is adversely affected. Increasing the value of FFU allows the ramp to be followed more closely, but also heightens noise sensitivity. The optimum setting is obtained by reaching the best compromise between ramp following and the existing noise sensitivity.

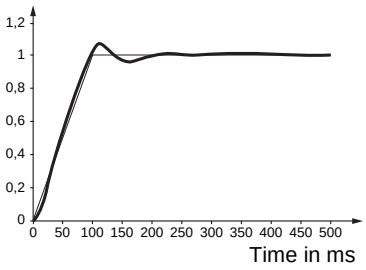
Initial response with FFU = 100%

Reference division



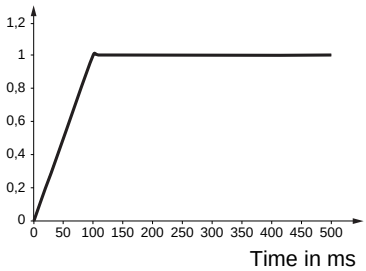
Reduction in FFU

Reference division



Increase in FFU

Reference division



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Code	Name/Description	Adjustment range	Factory setting
LOP-	**[LIFT OPTIMISATION]** continued		
SPL-	**[SPEED LOOP]**		
JCAL	❏ **[Estim. motor inertia]** This parameter is read-only. The parameter JCAL shows the estimated motor inertia. See below [Application Inertia] (JAPL).	0.01 to 655.35 kgm^2	-
JMOt	❏ **[Real motor inertia]**	[Estimated] (AUtO) to 655.35 kgm^2	[Estimated] (AUtO)
AUtO	☐ **[Estimated] (AUtO)** The parameter JMOt allows to adjust the motor inertia. See below [Application Inertia] (JAPL). The following formula allows to calculate the [Real motor Inertia] (JMOt) from the flywheel effet (GD²): JMOt = (GD² / 4).		
JAPL	❏ **[Application Inertia]** **This parameter is only readable.** It is updated Iwhen the [Car weight] (CMA) parameter is modified. The total inertia is: - [Real motor Inertia] (JMOt) + [Application Inertia] (JAPL) when [Real motor Inertia] (JMOt) is different from [Estimated] (AUtO). - [Estim. motor inertia] (JCAL) + [Application Inertia] (JAPL) when [Real motor Inertia] (JMOt) is equal to [Estimated] (AUtO). **⚠ DANGER** **UNINTENDED EQUIPMENT OPERATION** If the value of [Application Inertia] (JAPL) parameter is incorrect, it can cause speed instability and loss of motor control, which could lead to a sudden drop. The inertia may vary significantly according to the application; in general, it is very high for lifts. As such, the default value does not guarantee correct operation. **Failure to follow these instructions will result in death or serious injury.**		
StA	❏ **[Fr.Loop.Stab]** Stability: Used to adapt the return to steady state after a speed transient, according to the dynamics of the machine. Gradually increase the stability to increase control loop attenuation and thus reduce any overspeed.	0 to 100 %	20 %
FLG	❏ **[FreqLoopGain]** Frequency loop gain: Used to adapt the pace of the machine speed transients according to the dynamics. For machines with high resistive torque, high inertia or fast cycles, increase the gain gradually. [FreqLoopGain] (FLG) is set to 20% when [Motor control type] (Ctt) is set to [Sync. mot.] (SYn) or [Sync.CL] (FSY).	0 to 100 %	6 %

( ) Parameter that can be modified during operation or when stopped.

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Code	Name/Description	Adjustment range	Factory setting
LOP-	**[LIFT OPTIMISATION]** continued		
SPL-	**[SPEED LOOP]** continued		
SFC ()	❏ **[K speed loop filter]** Speed loop filter coefficient. See page 68 for more details of the effect of this parameter.	0 to 100 %	According to [Motor control type] (Ctt)
FFA nO YES	❏ **[Encoder filter activ.]** This parameter can be accessed if **[ACCESS LEVEL]** = **[Expert]** Activation of encoder feedback filter. ☐ **[No]** (no): Filter deactivated ☐ **[Yes]** (YES): Filter activated		[No] (nO)
FFr ()	❏ **[Encoder filter value]** This parameter can be accessed if **[ACCESS LEVEL]** = **[Expert]** and if [Encoder filter activ.] (FFA) = [Yes] (YES). Encoder feedback filter time constant in milliseconds.	0 to 50 ms	Acc. to encoder type
FFP	❏ **[Feed forward]** This parameter can be accessed if **[ACCESS LEVEL]** = **[Expert]** Percentage of the high-performance regulator feedforward term. 100% corresponds to the term calculated using the value of [Application Inertia] (JAPL) page 81.	0 to 200 %	0 %
FFU	❏ **[Bandwidth feedfor.]** This parameter can be accessed if **[ACCESS LEVEL]** = **[Expert]** Bandwidth of the high-performance speed loop feedforward term, as a percentage of the predefined value.	20 to 500 %	100 %

Parameter can also be accessed in the [1.3 SETTINGS] (SEt-) menu and [1.4 MOTOR CONTROL] (drC-).

() Parameter that can be modified during operation or when stopped.

Notch filter

Vibrations naturally exist in lift systems and have disturbing consequences as noises and/or vibrations in the car.

These vibrations can come from mechanical roots as
- the elastic ropes resonance,
- impacts at guide rail joint,
- conjunction between guide rail and guide shoe,
- high ratios between the inertia of the application and of the motor (typicalli in direct drive application with no gear box),

and also electric noise coming from the motor.

To insure improved comfort the ATV LIFT drive provides 2 optional notch filters to reject effects of the mechanical resonance and consequently improve the speed behaviour.
The notch filter attenuates a band of frequencies around its central frequency within it bandwidth and with maximum attenuation defined by its depth :
- NFFx : Filter central frequency,
- NFBx : Bandwidth of the attenuation that will be applied by the filter (with of the notch),
- NFDx : Depth of the attenuation that will be applied by the filter.

When vibrations are rejected significant improvement of overall travel comfort is achievable. In particular:
- Speed loop setting is easier and less dependant on the system parameter variation (load, lift car position etc.).
- Speed loop damping is improved and lift car vibrations eliminated.
- Increased speed loop gains can be used for better speed ramp tracking and more accurate level positioning.
- Increased gains of the roll back controller are achievable without incurring vibrations in the car.

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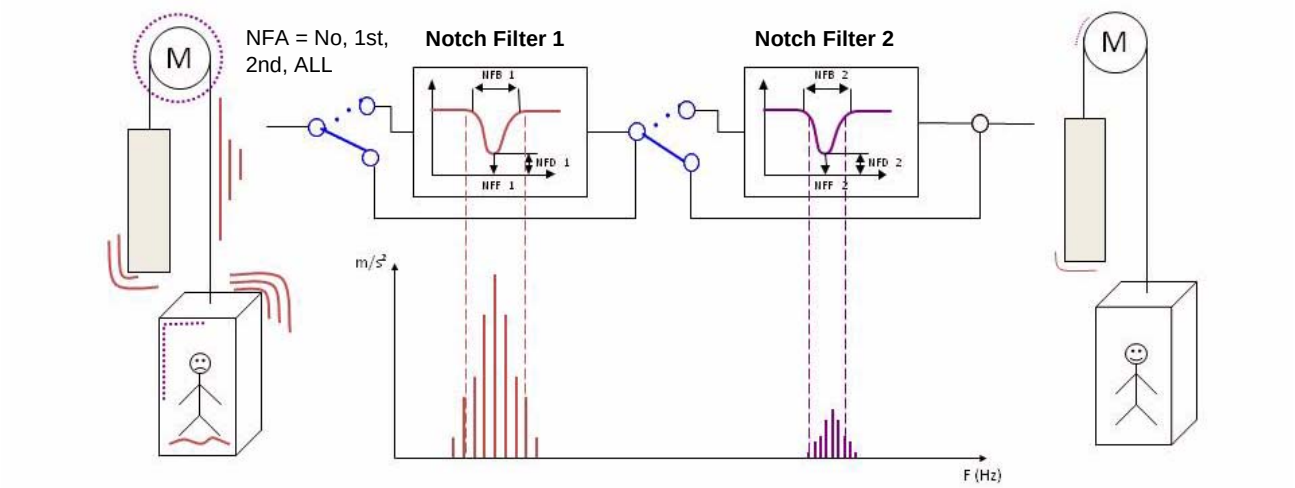
The ATV LIFT provides 2 identical cascaded notch filters that can be configured and enabled independently.
By default, notch filter 1 is set to provide compensation of the typical lift mechanical resonant mode which is can be usually found in 15 Hz..25 Hz range.
The default settings of notch filter 2 are selected to provide additional attenuation at higher frequencies if the notch filter 1 can not be set to provide sufficiently attenuation in the frequency range required in a particular lift installation (typically with very high load/motor inertia mismatch).

Usually, using only notch filter 1 with its default settings is sufficient to remove vibrations that are felt in the car.

The ATV LIFT provides 2 different notch filters that can be configured and enable independently: the default setting of notch filter 1 concerned mechanical vibrations while default setting of notch filter 2 concerned electrical vibrations.
Usually, using only notch filter 1 with its default values is sufficient to remove vibrations that are felt in the car.

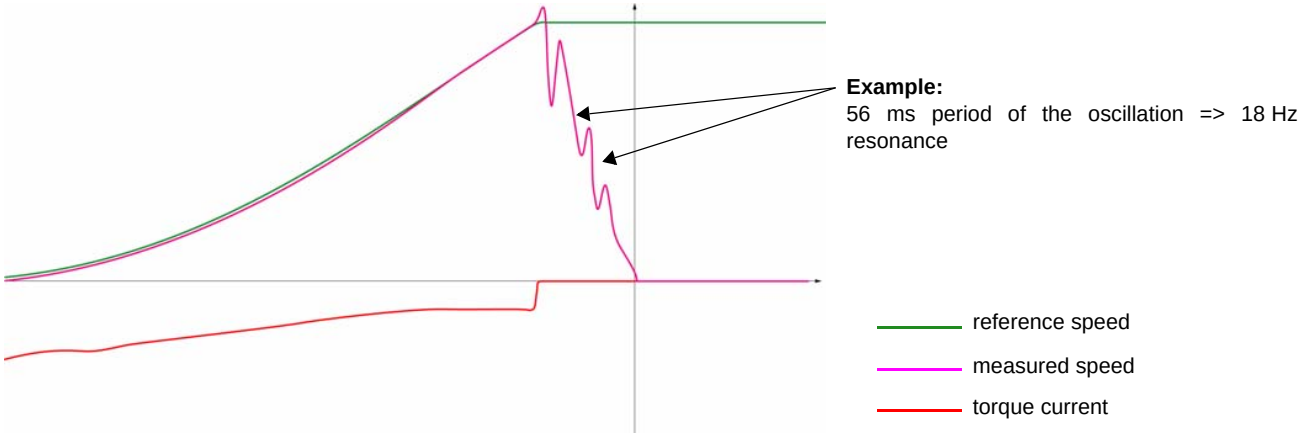


Commissioning

Activation of the notch filter should be typically considered in direct drive applications (no gear boxes) where load to motor inertia ratio is high. The notch filter central frequency should be set at or slightly higher than to the mechanical resonant frequency. The mechanical natural resonant frequency can be detected if the mechanical system is excited by sudden torque variations. So the main task is to identify as close as possible the resonant frequency.
To commission properly the notch filter 1 and in order to be sure that the origin of these vibrations is mechanical resonance, a simple test may be done:

- remove roll-back management,
- start in inspection,
- stop.

During stop during down movement with empty car at mid in **freewheel**, the measured speed will contain exactly the resonant frequencies of the application. The speed may be observed with an external equipment (tacho meter for example).



If it is impossible to measure the speed, we should consider that usual mechanical resonances are between 15 and 25 Hz.

Remark: Possible speed vibrations seen during drive run normally appear at frequencies higher than the mechanical resonant frequency depending on the settings of the speed loop, speed-back filter and motor parameters. Thus it is important to identify real natural resonance frequency (above explained observation during free wheeling is one possibility).

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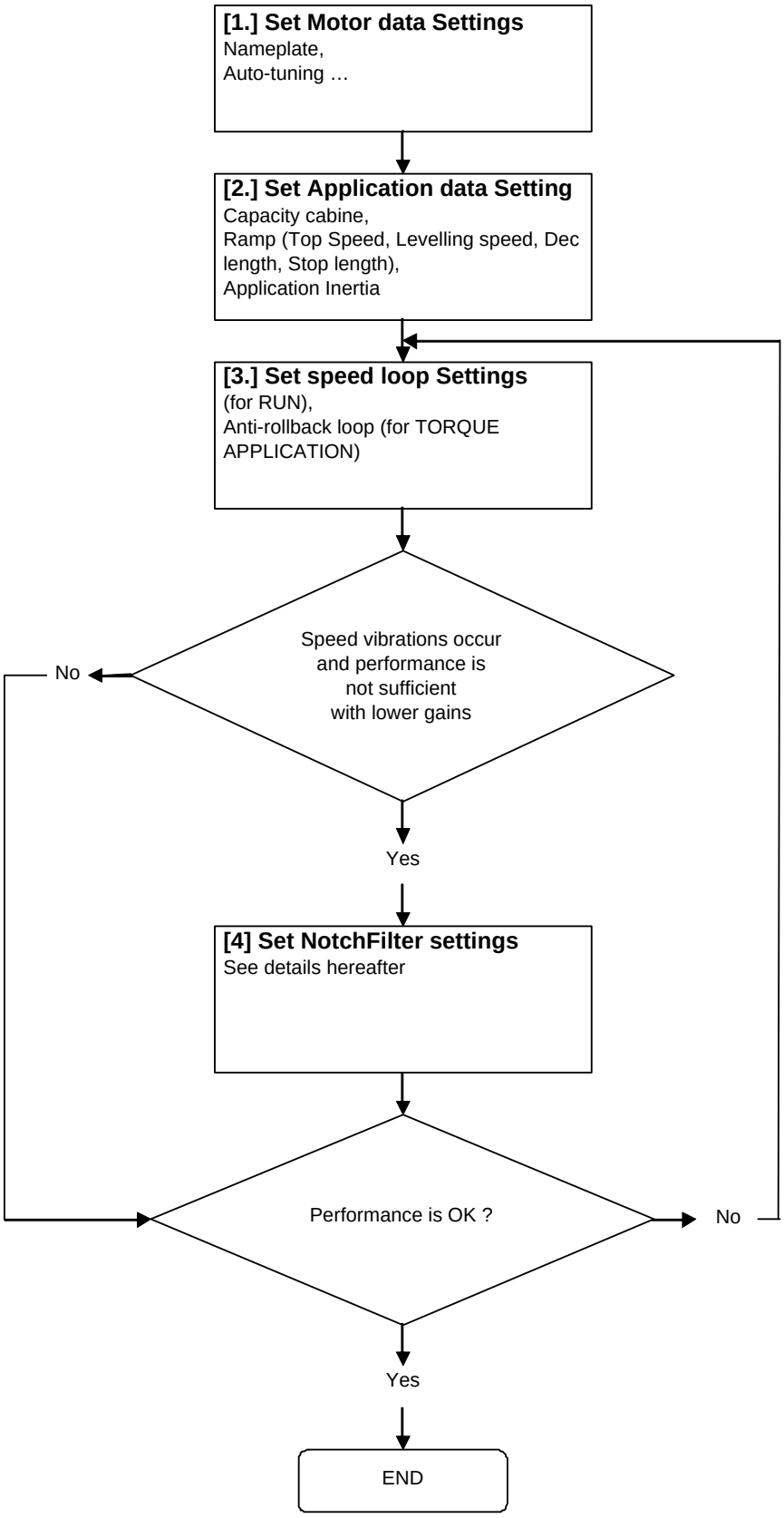

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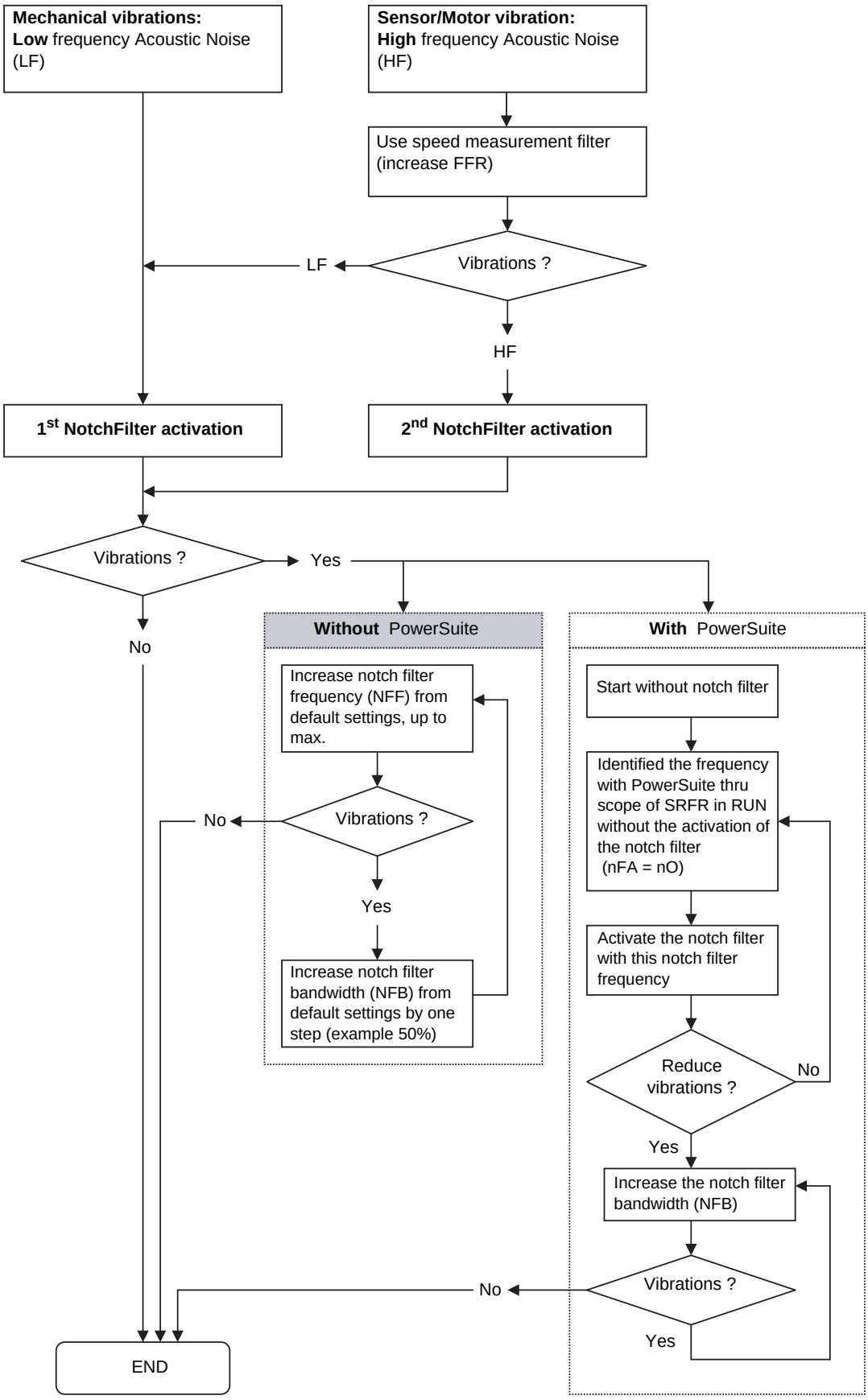
[4] Set NotchFilter settings



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Code	Name/Description	Factory setting
LOP-	**[LIFT OPTIMISATION]** continued	
SPL-	**[SPEED LOOP]** continued	
nFA	❏ **[Notch Filter Activ.]**	[No] (nO)
	This parameter activates the notch filter function. 2 independent notch filters can be configured.	
1St	☐ **[First]** (1St): notch filter 1 enabled	
2nd	☐ **[2nd]** (2nd): notch filter 2 enabled	
ALL	☐ **[All]** (ALL): notch filters 1 and 2 enabled	
nO	☐ **[No]** (nO): no notch filter enabled	

Parameters that can be accessed in [Expert] mode

Code	Name/Description	Adjustment range	Factory setting
SSL-	**[SPEED LOOP]** (continued)		
nFF1	❏ **[Notch Filter Freq 1]**	10..150 Hz	15
	Notch filter 1 central frequency. Parameter accessible only if [Notch Filter Activ.] (nFA) = [First] (1St) or [All] (ALL).		
nFb1	❏ **[Notch Filter Bdw 1]**	10..400%	100
	Notch filter 1 bandwidth. Parameter accessible only if [Notch Filter Activ.] (nFA) = [First] (1St) or [All] (ALL). This parameter defines the bandwidth of the notch filter 1. Filter with higher bandwidth will provide better stability margin when the load resonant frequency changes (with car position or load). Note: rising the bandwidth can interfere with the expect drive dynamic (reducing the dynamic of the speed loop).		
nFd1	❏ **[Notch Filter Activ.]**	0..100%	10
	Notch filter 1 gain. Parameter accessible only if [Notch Filter Activ.] (nFA) = [First] (1St) or [All] (ALL). This parameter defines the gain of the notch filter 1 at the central frequency. When NFD1=100%, no filter is applied		
nFF2	❏ **[Notch Filter Freq 2]**	10..150 Hz	85
	Notch filter 2 central frequency. Parameter accessible only if [Notch Filter Activ.] (nFA) = [2nd] (2nd) or [All] (ALL).		
nFb2	❏ **[Notch Filter Bdw 2]**	10..400%	100
	Notch filter 2 bandwidth. Parameter accessible only if [Notch Filter Activ.] (nFA) = [2nd] (2nd) or [All] (ALL). This parameter defines the bandwidth of the notch filter 2. Filter with higher bandwidth will provide better stability margin when the load resonant frequency changes (with car position or load). Note: rising the bandwidth can interfere with the expect drive dynamic (reducing the dynamic of the speed loop).		
nFd2	❏ **[Notch Filter Activ.]**	0..100%	25
	Notch filter 2 gain. Parameter accessible only if [Notch Filter Activ.] (nFA) = [2nd] (2nd) or [All] (ALL). This parameter defines the gain of the notch filter 1 at the central frequency. When NFD1=100%, no filter is applied.		

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Code	Name/Description	Adjustment range	Factory setting
LOP-	**[LIFT OPTIMISATION]** continued		
StA-	**[START ADJUSTMENT]**		
brS-	**[BRAKE START]** **Note:** This menu is visible if [Brake assignment] (bLC) is not [No] (nO)		
brt	❑ **[Brake Release time]** Brake release time delay	0.00 to 5.00 s	0.50 s
blr	❑ **[Brake release freq]** This parameter can be accessed if [Motor control type] (Ctt) page 137 is not [FVC] (FUC) or [Sync.CL] (FSY) and if [Movement type] (bSt) page 233 is [Hoisting] (UEr). Brake release frequency threshold (initialization of acceleration ramp). AUtO: ☐ [Auto] (AUtO): The drive takes a value equal to the nominal motor slip, calculated using the drive parameters. -: ☐ 0 to 10 Hz: Manual setting	[Auto] (AUtO) to 10.0 Hz	[Auto] (AUtO)
Ibr	❑ **[Brake release I FW]** (1) This parameter can be accessed if [Weight sensor ass.] (PES) = [No] (nO) (see page 239). Brake release current threshold for Ascending or Forward movement.	-1.32 In to 1.32 In	0 A
bIP	❑ **[Brake impulse]** This parameter can be accessed if [Motor control type] (Ctt) page 137 is not [FVC] (FUC) or [Sync.CL] (FSY) and if [Movement type] (bSt) page 233 is [Hoisting] (UEr). nO: ☐ [No] (nO): The motor torque is given in the required operating direction, at current Ibr. YES: ☐ [Yes] (YES): The motor torque is always Forward (check that this direction corresponds to ascending), at current Ibr. 2 Ibr: ☐ [2 IBR] (2Ibr): The torque is in the required direction, at current Ibr for Forward and Ird for Reverse, for certain specific applications.		[Yes] (YES)

(1) In corresponds to the rated drive current indicated in the Installation Manual or on the drive nameplate.

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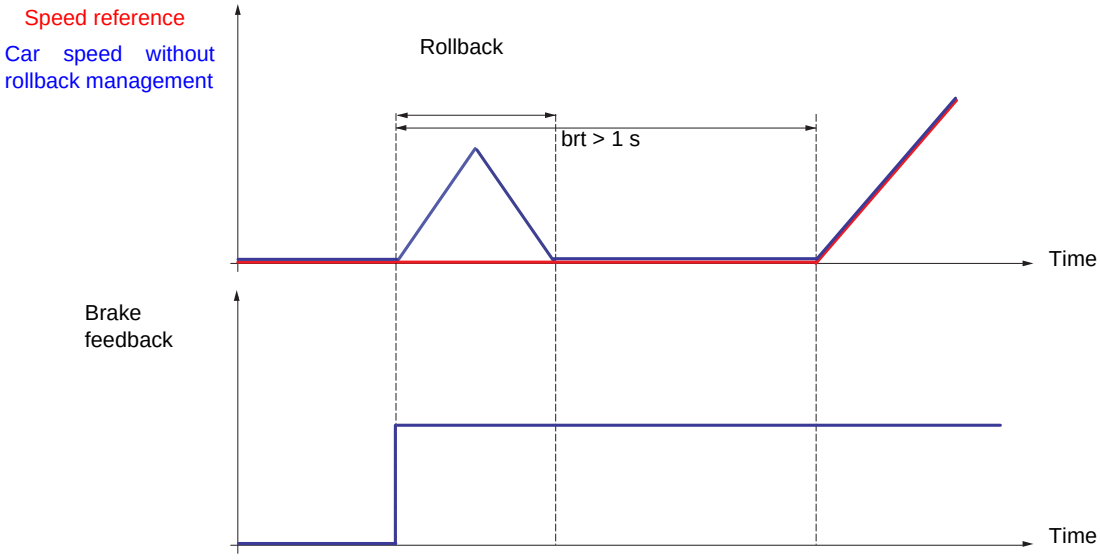
Rollback management

In some lift applications (gearless with high inertia), a jolt can be felt in the car at the start of any movement when the brake is released. At this moment (since there is no external weight sensor), the torque applied by the motor is not yet at the level needed to hold the car. A slight movement (up or down, depending on the general equilibrium) occurs. This movement is known as a "rollback".

The [Rollback MGT] (rbM) function, page 89 can only be accessed in closed-loop mode ([Motor control type] (Ctt) , page 137 = [Sync.CL] (FSY) or [FVC] (FUC)). It increases the drive's rigidity control during release of the mechanical brake to cancel any movement during the brake release time ([Brake Release time] (brt) , page 87).



The [Rollback MGT] (rbM) function can be used to avoid the effects of rollback once the following parameters have been set:

- The speed loop parameters must be set and must not be modified after the [Rollback MGT] (rbM) function has been activated.
- The [Encoder filter value] parameter (FFr) page 47 must be configured with an appropriate value and must not be modified after the[Rollback MGT] (rbM) function has been activated.
- The current parameter [Brake release I FW] (Ibr) page 87 can be adjusted to apply a current level corresponding to the most common load scenario (approximately 25% of the total load).
- The brake release sequence must be configured with an appropriate brake release time [Brake Release time] (brt) (typically brt > 1 second).

Recommended settings:

- It is essential to set the speed loop correctly in order to have satisfactory rollback management (correct ramp following and well damped response). Initial optimisation of the initial speed loop must be performed using the [Rollback MGT] (rbM) function = [No] (nO) (deactivated).
- We recommend gradually increasing the [Rbk Compensation] (rbC) gain from 0 until the rollback movement is reduced to the desired level.
- If vibrations occur while the [Rbk Compensation] (rbC) gain is being increased, it must be reduced until these stop. It is possible to increase damping with the [Rbk Damping] (rbd) parameter, this allows the [Rbk Compensation] (rbC) gain to be increased again.
- **Note:** A high setting of the [Rbk Damping] (rbd) parameter can amplify the encoder noise. It is therefore advisable to keep the value as low as possible.
- The performance of the rollback compensation function will be limited by the system resonance frequencies and the encoder feedback resolution. Encoders with a low resolution do not necessarily offer the desired rollback management.
- **Note:** You should allow adequate time after the brake is released and prioritize starting of the speed ramp to control the rollback in order to stabilize the lift position.

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Code	Name/Description	Adjustment range	Factory setting
LOP-	**[LIFT OPTIMISATION]** continued		
StA-	**[START ADJUSTMENT]** continued		
rbM-	**[ROLLBACK MGT]** Menu accessible: - If [Motor control type] (Ctt) page 137 = [Sync.CL] (FSY) or [FVC] (FUC), - If brake logic control [Brake assignment] (bLC) page 233 has been assigned.		
rbM nO YES	❏ **[Rollback MGT]** Activation of Rollback MGT function ☐ [No] (nO) ☐ [Yes] (YES)		[No] (nO)
rbC	❏ **[Rbk Compensation]** This parameter can be accessed if [Rollback MGT] (rbM) = [Yes] (YES) Rollback compensation gain.	0 to 1,000 %	100 %
rbd	❏ **[Rbk Damping]** This parameter can only be accessed when [ACCESS LEVEL] = [Expert] and if [Rollback MGT] (rbM) = [Yes] (YES). Rollback coefficient damping.	0 to 1,000 %	50 %

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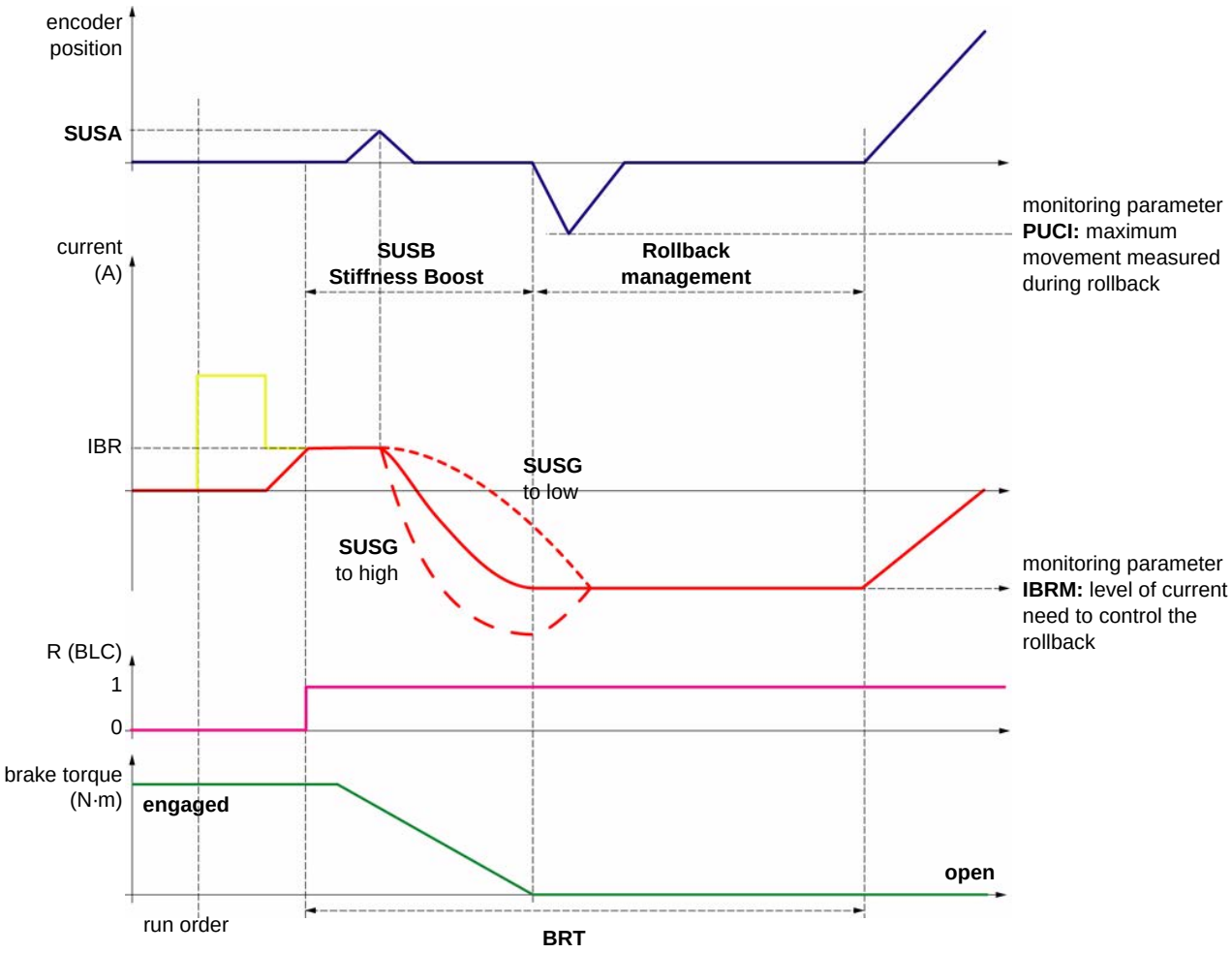
Start-up stiffnes boost

The Start-up stiffness boost adapts the IBR current level according to the encoder feedback while the brake is opening.
The Start-up stiffness boost operates during the first part after the Run order: when the load torque becomes predominant and when the breaking torque due to the mechanical brake progressively reduces.
As a consequence, at the end of the braking operation, the resulting opening current level set in the parameter IBR is internally re-adjusted according the response of the system.



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Code	Name/Description	Adjustment range	Factory setting
LOP-	**[LIFT OPTIMISATION]** continued		
StA-	**[START ADJUSTMENT]** continued		
rbM-	**[ROLLBACK MGT]** continued Menu accessible: - If [Motor control type] (Ctt) page 137 = [Sync.CL] (FSY) or [FVC] (FUC), - If brake logic control [Brake assignment] (bLC) page 233 has been assigned.		
SUSb	❏ **[Start Stiffnes Boost]** Activation of start-up stiffness boost function. **Note:** This function is compliant with the rollback management function [Rollback MGT] (rbM). For best result, it is recommended to activate both. ☐ [No] (nO) ☐ [Yes] (YES)		[No] (nO)
nO YES			

Parameters that can be accessed in [Expert] mode

Code	Name/Description	Adjustment range	Factory setting
LOP-	**[LIFT OPTIMISATION]** continued		
StA-	**[START ADJUSTMENT]** continued		
SUSA	❏ **[Activation Angle]** This parameter defines the angular movement threshold at which the start-up stiffness boost is activated to modify the current level applied during (brt) [Brake Release time]. It defines an angular variation. A same angular variation could contain deferent numbers of encoder lines according the encoder resolution. As usual, high resolution provides good behaviour. **Note:** too low settings can provide bad regulation because of the encoder noise.	0..10	2
SUSG	❏ **[Stiffness gain]** This parameter defines the gain apply on the current regulation when the (SUSA) [Activation Angle] is reached.	0..1000 %	100 %

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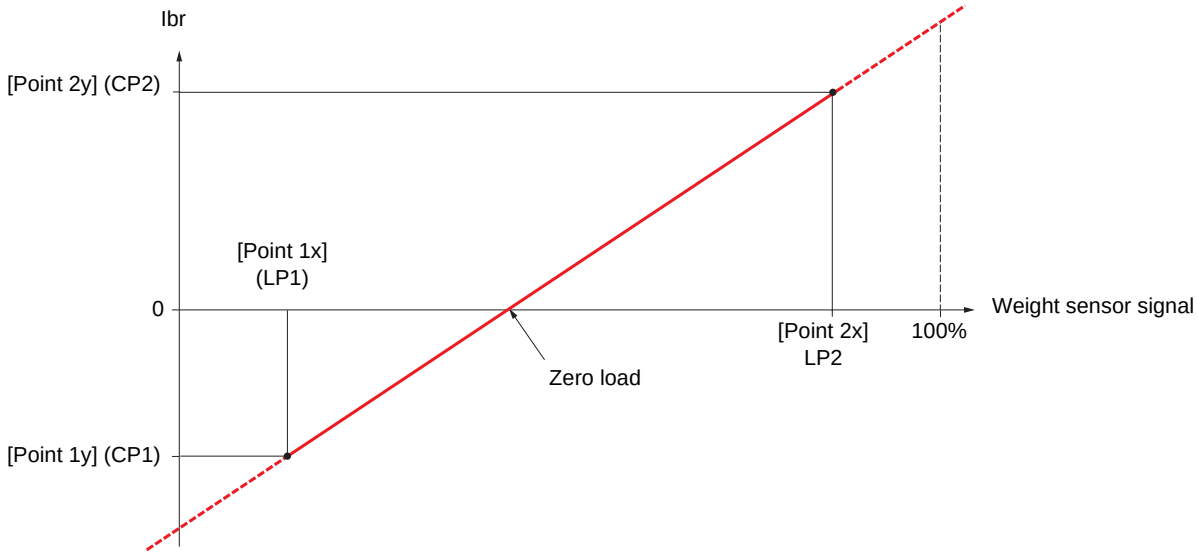
External weight measurement

This function uses the information supplied by a weight sensor to adapt the current [Brake release I FW] (Ibr) of the [BRAKE LOGIC CONTROL] (bLC-) function. The signal from the weight sensor can be assigned to an analog input (usually a 4 - 20 mA signal), to the pulse-in input or to the encoder input, according to the type of weight sensor.

Examples include

- Measurement of the total weight of a hoisting winch and its load.
- Measurement of the total weight of an elevator winch, the cabin and counterweight.

The current [Brake release I FW] (Ibr) is adapted in accordance with the curve below.



This curve can represent a weight sensor on an elevator winch, where zero load on the motor occurs when the load in the cabin is not zero.

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Code	Name/Description	Adjustment range	Factory setting
LOP-	**[LIFT OPTIMISATION]** continued		
StA-	**[START ADJUSTMENT]** continued		
ELn-	**[EXTERNAL WEIGHT MEAS.]**		
PES	❏ **[Weight sensor ass.]**		[No] (nO)
	This function can be accessed if brake logic control has been assigned (see page 233). If [Weight sensor ass.] (PES) is not [No] (nO), [Movement type] (bSt) page 233 is forced to [Hoisting] (UEr). ☐ nO: [No] (nO): Function inactive ☐ AI1: [AI1] (AI1): Analog input ☐ AI2: [AI2] (AI2): Analog input ☐ AI3: [AI3] (AI3): Analog input, if VW3A3202 extension card has been inserted ☐ AI4: [AI4] (AI4): Analog input, if VW3A3202 extension card has been inserted ☐ PI: [RP] (PI): Frequency input, if VW3A3202 extension card has been inserted ☐ PG: [Encoder] (PG): Encoder input, if encoder card has been inserted ☐ AIU1: [Network AI] (AIU1): Virtual input via communication bus, to be configured via [AI net. channel] (AIC1) page 175.		
	⚠ WARNING **UNINTENDED EQUIPMENT OPERATION** If the equipment switches to forced local mode (see page 286), the virtual input remains frozen at the last value transmitted. Do not use the virtual input and forced local mode in the same configuration. **Failure to follow this instruction can result in death or serious injury.**		
LP1	❏ **[Point 1 X]**	0 to 99.99 %	0
	0 to 99.99% of signal on the assigned input. [Point 1x] (LP1) must be less than [Point 2x] (LP2). This parameter can be accessed if [Weight sensor ass.] (PES) has been assigned.		
CP1	❏ **[Point 1Y]**	-1.36 to +1.36 In (1)	- In
	Current corresponding to the load [Point 1 X] (LP1), in A. This parameter can be accessed if [Weight sensor ass.] (PES) has been assigned.		
LP2	❏ **[Point 2X]**	0.01 to 100 %	50 %
	0.01 to 100 % of signal on the assigned input. [Point 2x] (LP2) must be greater than [Point 1x] (LP1). This parameter can be accessed if [Weight sensor ass.] (PES) has been assigned.		
CP2	❏ **[Point 2Y]**	-1.36 to +1.36 In (1)	0
	Current corresponding to the load [Point 2x] (LP2), in A. This parameter can be accessed if [Weight sensor ass.] (PES) has been assigned.		
IbrA	❏ **[Ibr 4-20 mA loss]**	0 to 1.36 In (1)	0
	Brake release current in the event of the loss of the weight sensor information. This parameter can be accessed if the weight sensor has been assigned to an analog current input and the 4-20 mA loss fault is deactivated. Recommended settings: - 0 for lifts - Rated motor current for a hoisting application		

(1) In corresponds to the rated drive current indicated in the Installation Manual or on the drive nameplate.

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Code	Name/Description	Adjustment range	Factory setting
LOP-	**[LIFT OPTIMISATION]** continued		
StO-	**[STOP ADJUSTMENT]** **Note:** This menu is visible if [Brake assignment] (bLC) is not [No] (nO)		
bEn AUtO -	❏ **[Brake engage freq]** Brake engage frequency threshold This parameter can be accessed if [Motor control type] (Ctt) page 137 is not [FVC] (FUC) or [Sync.CL] (FSY). ☐ **[Auto]** (AUtO): The drive takes a value equal to the nominal motor slip, calculated using the drive parameters. ☐ **0 to 10 Hz**: Manual setting	(1)	[Auto] (AUtO)
bEt	❏ **[Brake engage time]** Brake engage time (brake response time).	0.00 to 5.00 s (1)	0.30 s
tbE	❏ **[Brake engage delay]** Time delay before request to engage brake. To delay brake engagement, if you wish the brake to be engaged when the drive comes to a complete stop.	0.00 to 5.00 s (1)	0 s

(1) Parameter can also be accessed in the [1.3 SETTINGS] (SEt-) menu and in the [1.7 APPLICATION FUNCT.] (FUN-) menu.

Parameter that can be modified during operation or when stopped.

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Inspection

It can only be accessed if the [Brake assignment] (bLC) page 233 function have already been assigned.

It is used for operation at a fixed preset speed that is independent of all other references and over which it takes priority. The whole trajectory of the elevator can thus be covered and the necessary checks performed.

This function requires:
- A logic input to control the "inspection" mode.
- An appropriate frequency reference (inspection speed).

When the assigned logic input is at active state, inspection mode is activated:
- When a run command is given, the motor starts up normally, with output contactor command and brake logic control, until it reaches the inspection speed.
- When the run command is disabled, the motor changes to freewheel stop and brake logic control and output contactor command functions are triggered immediately.

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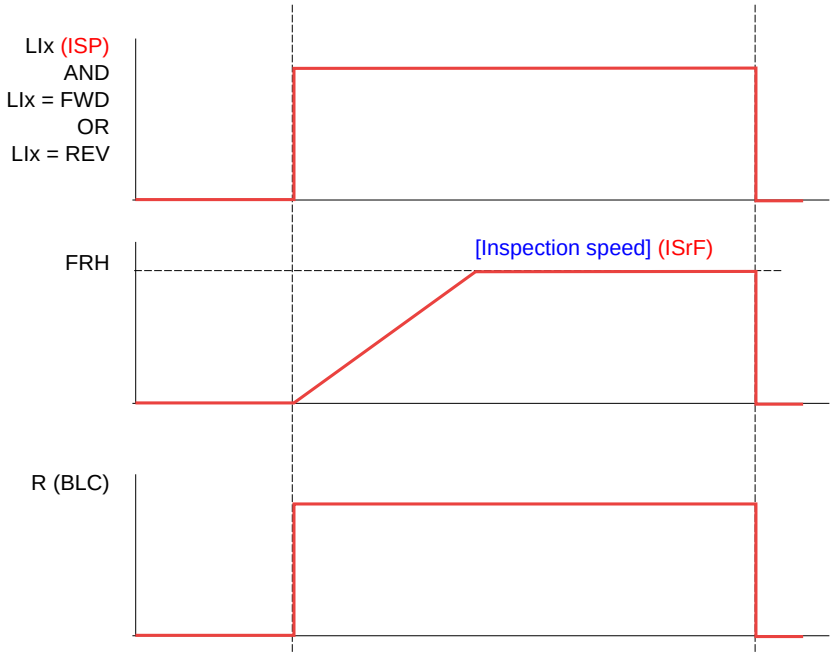
Inspection mode



Reference (1)	**LI** (Fwd) **or LI** (Rev)	[Lift Speed Mgt] (LSM)	[Inspection] (ISP)
STOP	0	1 or 0	1 or 0
[Lift top speed] (LtS)	1	1	0
[Lift leveling speed] (LLS)	1	0	0
[Inspection] (ISP)	1	1 or 0	1

(1) Note: This table is applicable to 2-wire control only.

Code	Name/Description	Adjustment range	Factory setting
LFn-	**[LIFT FUNCTIONS]**		
ISP-	**[INSPECTION MODE]**		
ACC	❏ **[Acceleration]**	0.1 to 6000.0 s (2)	3.0 s
	Time to accelerate from 0 to the [Rated motor freq.] (FrS) page 143 for an asynchronous motor or [Nominal freq sync.] (FrSS) page 149 for a synchronous motor. Make sure that this value is compatible with the inertia being driven.		
ISP	❏ **[Inspection]**		[LI5] (LI5)
	☐ This parameter can be accessed if brake logic control **[Brake assignment] (bLC)** page 233 has been assigned. ☐ **[No] (nO)**: Function not assigned. ☐ **[LI1] (LI1)** to **[LI6] (LI6)** ☐ **[LI7] (LI7)** to **[LI10] (LI10)**: If VW3A3201 logic I/O card has been inserted. ☐ **[LI11] (LI11)** to **[LI12] (LI12)**: If VW3A3203 ESIM card has been inserted. ☐ **[LI11] (LI11)** to **[LI14] (LI14)**: If VW3A3202 extended I/O card has been inserted. Inspection mode is activated when the assigned input changes to active state.		
nO LI1 - - LI14			
ISrF	❏ **[Inspection speed]**	0 à 25 Hz	According to drive rating
	Value of the "inspection" mode frequency reference. This parameter can be accessed if [Inspection] (ISP) is not [No] (nO).		

(2) Range 0.01 to 99.99 s or 0.1 to 999.9 s or 1 to 6000 s according to [Ramp increment] (Inr).

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Evacuation function

When a lift is stuck between 2 floors due to a power outage, it must be possible to evacuate its occupants within a reasonable period of time. This function requires an emergency power supply to be connected to the drive.
This power supply is at a reduced voltage, and only allows a derated operating mode, at reduced speed, but with full torque.

This function requires:
- One logic input to control "evacuation" operation
- Reduction of the voltage monitoring threshold
- An appropriate low speed reference

Following a power outage, the drive can restart without going into [Undervoltage] (USF) fault mode if the corresponding logic input is at active state at the same time.

CAUTION

- This input must not be at active state when the drive is powered from the line supply. To ensure this and also avoid any short-circuits, supply changeover contactors must be used.
- Set this input to 0 before connecting the emergency power supply to the line supply.

Failure to follow these instructions can result in equipment damage.

Code	Name/Description	Adjustment range	Factory setting
LFn-	**[LIFT FUNCTIONS]** continued		
rFt-	**[EVACUATION]**		
rFt nO LI1 - - LI14	❏ **[Evacuation assign.]** ☐ **[No]** (nO): Function not assigned. ☐ **[LI1]** (LI1) to **[LI6]** (LI6) ☐ **[LI7]** (LI7) to **[LI10]** (LI10): If VW3A3201 logic I/O card has been inserted. ☐ **[LI11]** (LI11) to **[LI12]** (LI12): If VW3A3203 ESIM card has been inserted. ☐ **[LI11]** (LI11) to **[LI14]** (LI14): If VW3A3202 extended I/O card has been inserted. Evacuation is activated when the assigned input is at active state, if the drive is stationary. Evacuation is activated when the assigned input is at inactive state, as soon as the drive stops.		[No] (nO)
rSU	❏ **[Evacuation Input V.]** Minimum permissible AC voltage value of the emergency power supply. This parameter can be accessed if [Evacuation assign.] (rFt) is not [No] (nO).	220 to 320 V	220 V
rSP ()	❏ **[Evacuation freq.]** Value of the "evacuation" mode frequency reference. This parameter can be accessed if [Evacuation assign.] (rFt) is not [No] (nO). The adjustment range is determined by the [Low speed] (LSP) (page 126), [Rated motor freq.] (FrS) page 143 for an asynchronous motor or [Nominal freq sync.] (FrSS) page 149 for a synchronous motor and [Rated motor volt.] (UnS) (page 143) parameters and by [Evacuation Input V.] (rSU) above. Example with an asynchronous motor: • If LSP < (FrS x rSU/UnS): rSP min. = LSP, rSP max. = (Frs x rSU/UnS) • If LSP ⩾ (FrS x rSU/UnS): rSP = (Frs x rSU/UnS) With a synchronous motor: Same formula using FrSS in place of FrS and 400 V in place of UnS.		5 Hz

() Parameter that can be modified during operation or when stopped

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Code	Name/Description	Adjustment range	Factory setting
LFn-	**[LIFT FUNCTIONS]** continued		
OCC-	**[OUTPUT CONTACTOR CMD]**		
OCC	❏ **[Out. contactor ass.]** Logic output or control relay nO **[No]** (nO): Function not assigned (in this case, none of the function's parameters can be accessed) LO1 **[LO1]** (LO1) - LO4 to **[LO4]** (LO4): Logic output (if one or two I/O cards have been inserted, LO1 to LO2 or LO4 can be selected) r2 **[R2]** (r2) - r5 to **[R5]** (r5): Relay (selection of R2 extended to R3, R4 or R5 if I/O or ESIM cards have been inserted) dO1 **[dO1]** (dO1): Analog output AO1 functioning as a logic output. Selection can be made if [AO1 assignment] (AO1) page 191 = [No] (nO).		[dO1] (dO1)
rCA	❏ **[Output contact. fdbk]** nO **[No]** (nO): Function inactive. LI1 **[LI1]** (LI1) - : - : **[...]** (...): See the assignment conditions on page 204. The motor starts up when the assigned input or bit changes to inactive state.		[No] (nO)
dbS	❏ **[Delay to motor run]** Time delay for: • Motor control following the sending of a run command • Output contactor fault monitoring, if the feedback has been assigned. If the contactor fails to close at the end of the set time, the drive will lock in FCF2 fault mode. This parameter can be accessed if [Out. contactor ass.] (OCC) has been assigned or if [Output contact. fdbk] (rCA) has been assigned. The time delay must be greater than the closing time of the output contactor.	0.05 to 60.00 s	0.15 s
dAS	❏ **[Delay to open cont.]** Time delay for output contactor opening command following motor stop. This parameter can be accessed if [Output contact. fdbk] (rCA) has been assigned. The time delay must be greater than the opening time of the output contactor. If it is set to 0, the fault will not be monitored. If the contactor fails to open at the end of the set time, the drive will lock in FCF1 fault mode.	0.00 to 5.00 s	0.10 s

Parameter that can be modified during operation or when stopped.

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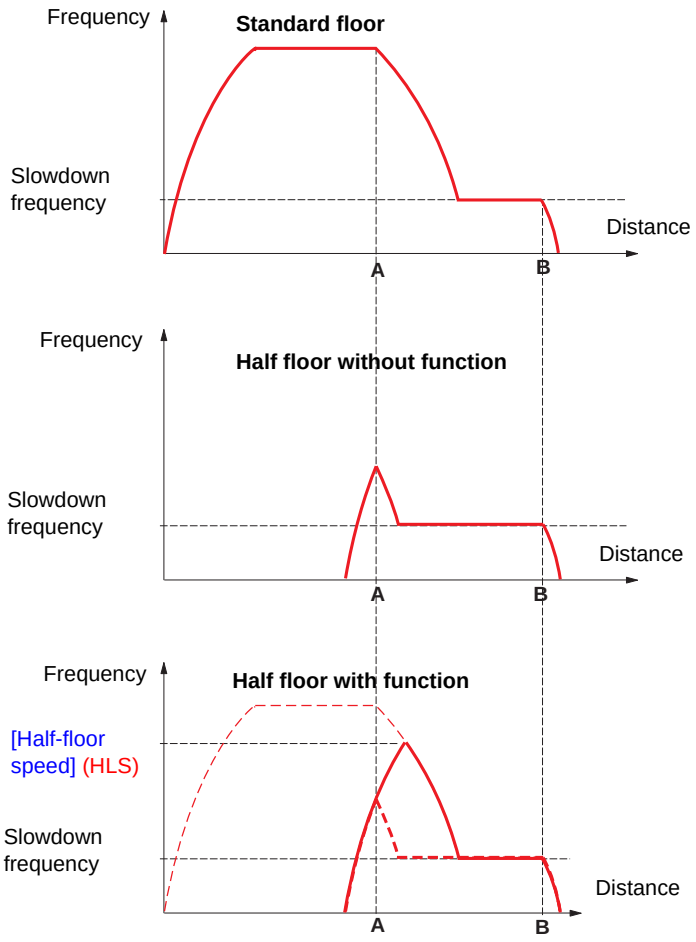
Half floor

When a lift sets off from floors and half floors, the cycle time for half floors can be too long, as the elevator does not have time to reach full speed before crossing the slowdown limit switch. As a result, the slowdown time is unnecessarily long. The "half floor" function can be used to compensate this phenomenon.

When the former ramp is used
The "half floor" function can be used to compensate this by not triggering slowdown until the speed reaches a preset threshold [Half-floor speed] (HLS) in order that the final part of the path will be the same as for a standard floor.
When the new ramp is used
If the [Lift speed mgt.] (LSM) function is assigned, the "half-floor" function is automatically:
- activated if the high speed reference is lost before the lift has reached its [Lift top speed] (LtS)
- configured according to the distance still to be covered [Deceleration length] (dEL) when the high speed reference is lost.

If the [Lift Speed Mgt] (LSM) function is not assigned, the "half-floor" function must then be configured with the target speed to be reached by the lift before it starts to decelerate.

The graphs below show the various types of operation with an without the function for using the former rampe:



A: Slowdown limit switch reached
B: Stop limit switch reached

The function is only activated if, when the slowdown limit switch is tripped, the motor frequency is less than [Half-floor speed] (HLS). Acceleration is then maintained up to this value prior to slowing down.
The final part of the path is identical to that of the standard floor.

Code	Name/Description	Adjustment range	Factory setting
LFn-	**[LIFT FUNCTIONS]** continued		
HFF-	**[HALF FLOOR]**		
HLS nO	❏ **[Half-floor speed]** Activation and adjustment of the "half floor" function. This function has priority over all speed reference functions (preset speeds, for example) with the exception of those generated via fault monitoring (fallback speed, for example). ☐ **[No]** (nO): Function inactive. ☐ **0.1 Hz to 500.0 Hz**: Activation of the function by adjusting the motor frequency to be reached prior to slowing down.		[No] (nO)

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542 291 58 92 - 0 242 335 40 42

Code	Name/Description	Adjustment range	Factory setting
LFn-	**[LIFT FUNCTIONS]** continued		
Ftd-	**[FREQ. THRESHOLD]**		
Ftd	❑ **[Freq. threshold]**	0.0 to 1,600 Hz	[High speed] (HSP)
	Frequency threshold for [Freq.Th.att.] (FtA) function assigned to a relay or a logic output (see page 182), or used by the [PARAM. SET SWITCHING] (MLP-) function, page 252.		
F2d	❑ **[Freq. threshold 2]**	0.0 to 1,600 Hz	[High speed] (HSP)
	Frequency threshold for [Freq. Th. 2 attain.] (F2A) function assigned to a relay or a logic output (see page 182), or used by the [PARAM. SET SWITCHING] (MLP-) function, page 252.		

(1) Parameter can also be accessed in the [1.3 SETTINGS] (SEt-) menu.

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542 291 58 92 - 0 242 335 40 42

Deferred stop on thermal alarm

This function prevents the lift stopping between two floors if the drive or motor overheats, by authorizing operation until the next stop. At the next stop, the drive is locked until the thermal state falls back to a value, which undershoots the set threshold by 20%. E.g. A trip threshold set at 80% enables reactivation at 60%.
One thermal state threshold must be defined for the drive, and one thermal state threshold for the motor(s), which will trip the deferred stop.

Code	Name/Description	Adjustment range	Factory setting
LFn-	**[LIFT FUNCTIONS]** continued		
SAt-	**[THERMAL ALARM STOP]**		
SAt nO YES	❑ **[Thermal alarm stop]** ☐ **[No]** (nO): Function inactive (in this case, the following parameters cannot be accessed) ☐ **[Yes]** (YES): Defered stop on thermal alarm **CAUTION** **The drive and motor are no longer protected in the event of thermal alarm stops.** **This invalidates the warranty.** Check that the possible consequences do not present any risk. **Failure to follow this instruction can result in equipment damage.**		[No] (nO)
tHA ( )	❑ **[Drv therm. state al]** Thermal state threshold of the drive tripping the deferred stop.	0 to 118 %	100 %
ttd ( )	❑ **[Motor therm. level]** Thermal state threshold of the motor tripping the deferred stop.	0 to 118 %	100 %
ttd2 ( )	❑ **[Motor2 therm. level]** Thermal state threshold of the motor 2 tripping the deferred stop.	0 to 118 %	100 %
ttd3 ( )	❑ **[Motor3 therm. level]** Thermal state threshold of the motor 3 tripping the deferred stop.	0 to 118 %	100 %

( ) Parameter that can be modified during operation or when stopped.

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542 291 58 92 - 0 242 335 40 42

Code	Name/Description	Adjustment range	Factory setting
LFn-	**[LIFT FUNCTIONS]** continued		
OPL-	**[OUTPUT PHASE LOSS]**		
OPL nO YES OAC	❏ **[Output Phase Loss]** ☐ **[No]** (nO): Function inactive. ☐ **[Yes]** (YES): Tripping on OPF fault with freewheel stop. ☐ **[Output cut]** (OAC): No fault triggered, but management of the output voltage in order to avoid an overcurrent when the link with the motor is re-established. **Note:** [Output Phase Loss] (OPL) is forced to [No] (nO) if [Motor control type] (Ctt) page 137 = [Sync. mot.] (SYn) or [Sync.CL] (FSY).		[Yes] (YES)
Odt ↻	❏ **[OutPh time detect]** Time delay for taking the [Output Phase Loss] (OPL) fault into account.	0.5 to 10.0 s	0.5 s

↻ Parameter that can be modified during operation or when stopped.

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542 291 58 92 - 0 242 335 40 42

Parameter set switching [PARAM. SET SWITCHING]

A set of 1 to 15 parameters from the [1.3 SETTINGS] (SEt-) menu on page 124 can be selected and 2 or 3 different values assigned. These 2 or 3 sets of values can then be switched using 1 or 2 logic inputs or control word bits. This switching can be performed during operation (motor running).
It can also be controlled on the basis of one or two frequency thresholds, whereby each threshold acts as a logic input (0 = threshold not attained, 1 = threshold attained).

	Values 1	Values 2	Values 3
	Parameter 1 Parameter 2 Parameter 3 Parameter 4 Parameter 5 Parameter 6 Parameter 7 Parameter 8 Parameter 9 Parameter 10 Parameter 11 Parameter 12 Parameter 13 Parameter 14 Parameter 15	Parameter 1 Parameter 2 Parameter 3 Parameter 4 Parameter 5 Parameter 6 Parameter 7 Parameter 8 Parameter 9 Parameter 10 Parameter 11 Parameter 12 Parameter 13 Parameter 14 Parameter 15	Parameter 1 Parameter 2 Parameter 3 Parameter 4 Parameter 5 Parameter 6 Parameter 7 Parameter 8 Parameter 9 Parameter 10 Parameter 11 Parameter 12 Parameter 13 Parameter 14 Parameter 15
Input LI or bit or frequency threshold 2 values	0	1	0 or 1
Input LI or bit or frequency threshold 3 values	0	0	1

Note: Do not modify the parameters in the [1.3 SETTINGS] (SEt-) menu, because any modifications made in this menu [1.3 SETTINGS] (SEt-) will be lost on the next power-up. The parameters can be adjusted during operation in the [PARAM. SET SWITCHING] (MLP-) menu, on the active configuration.

Note: Parameter set switching cannot be configured from the integrated display terminal.
Parameters can only be adjusted on the integrated display terminal if the function has been configured previously via the graphic display terminal, by PowerSuite or via the bus or communication network. If the function has not been configured, the **MLP-** menu and the **PS1-**, **PS2-**, **PS3-** submenus will not appear.

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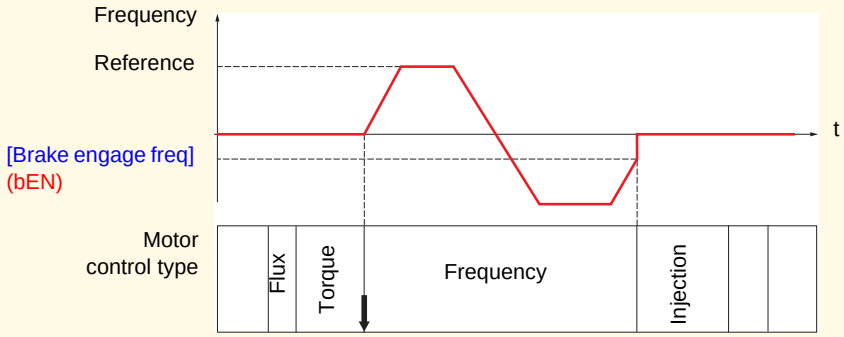
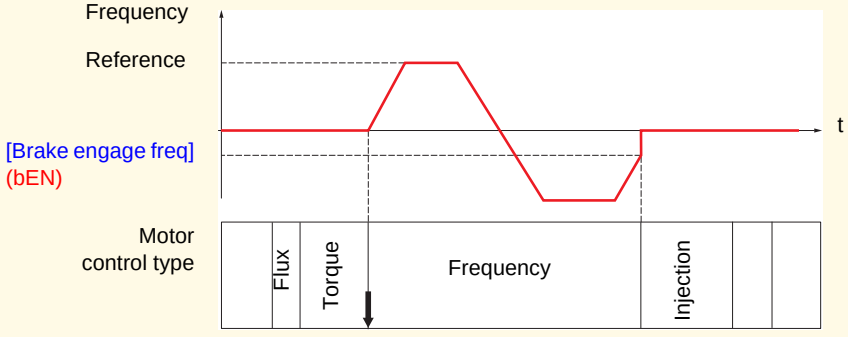
542 291 58 92 - 0 242 335 40 42

Code	Name/Description	Adjustment range	Factory setting
LFn-	**[LIFT FUNCTIONS]** continued		
nLP-	**[PARAM. SET SWITCHING]**		
CHA1	❏ **[2 Parameter sets]**		[No] (nO)
nO	☐ **[No]** (nO): Function inactive		
FtA	☐ **[Freq.Th.att.]** (FtA): Switching via [Freq. threshold] (Ftd) page 135.		
F2A	☐ **[Freq. Th. 2 attain.]** (F2A): Switching via [Freq. threshold 2] (F2d) page 135.		
tAP	☐ **[Ramp Mode]** (tAP): Switching during the brake sequence. This new assignment can be used, for example, to set high gains on brake release before starting the ramp (useful in lift applications).		
			
LI1	☐ **[LI1]** (LI1)		
-	:		
-	:		
-	☐ **[...]** (...): See the assignment conditions on page 204.		
	Switching 2 parameter sets		
CHA2	❏ **[3 Parameter sets]**		[No] (nO)
nO	☐ **[No]** (nO): Function inactive		
FtA	☐ **[Freq.Th.att.]** (FtA): Switching via [Freq. threshold] (Ftd) page 135.		
F2A	☐ **[Freq. Th. 2 attain.]** (F2A): Switching via [Freq. threshold 2] (F2d) page 135.		
tAP	☐ **[Ramp Mode]** (tAP): Switching during the brake sequence. This new assignment can be used, for example, to set high gains on brake release before starting the ramp (useful in lift applications).		
			
LI1	☐ **[LI1]** (LI1)		
-	:		
-	:		
-	☐ **[...]** (...): See the assignment conditions on page 204.		
	Switching 3 parameter sets **Note:** In order to obtain 3 parameter sets, [2 parameter sets] must also be configured.		

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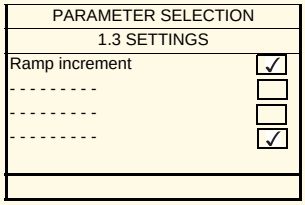
542 291 58 92 - 0 242 335 40 42

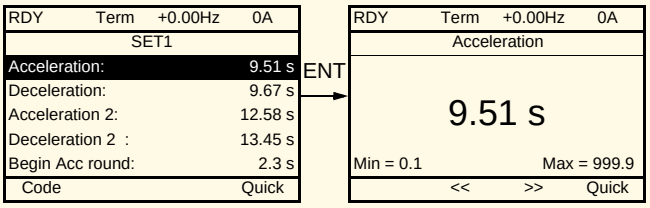
Code	Name/Description	Adjustment range	Factory setting
LFn-	**[LIFT FUNCTIONS]** continued		
nLP-	**[PARAM. SET SWITCHING]** continued		
SPS	❑ **[PARAMETER SELECTION]**	0.5 to 10.0 s	0.5 s

This parameter can only be accessed on the graphic display terminal if [2 parameter sets] is not [No].
Making an entry in this parameter opens a window containing all the adjustment parameters that can be accessed.
Select 1 to 15 parameters using ENT (a tick then appears next to the parameter). Parameter(s) can also be deselected using ENT.
E.g.



❑ [SET 1] (PS1-)

This parameter can be accessed if at least 1 parameter has been selected in [PARAMETER SELECTION].
Making an entry in this parameter opens a settings window containing the selected parameters **in the order in which they were selected**.
With the graphic display terminal: :



With the integrated display terminal:
Proceed as in the Settings menu using the parameters that appear.

❑ [SET 2] (PS2-)

This parameter can be accessed if at least 1 parameter has been selected in [PARAMETER SELECTION].
Procedure identical to [SET 1] (PS1-).

❑ [SET 3] (PS3-)

This parameter can be accessed if [3 parameter sets] is not [No] and if at least 1 parameter has been selected in [PARAMETER SELECTION].
Procedure identical to [SET 1] (PS1-).

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542 291 58 92 - 0 242 335 40 42

Code	Name/Description	Adjustment range	Factory setting
LFn-	**[LIFT FUNCTIONS]** continued		
nOI-	**[NOISE LEVEL]**		
SFr	❏ **[Switching freq.]** (1)	According to rating	According to rating

Switching frequency setting.
Adjustment range: This can vary between 2.5 and 16 kHz, but the minimum and maximum values, as well as the factory setting, can be limited in accordance with the rating and the configuration of the [Sinus filter] (OFI) and [Motor surge limit] (SUL) parameters, page 161.

Adjustment with drive running:
If the initial value is greater than or equal to 2.5 kHz, a minimum of 2.5 kHz must be maintained while running.
Adjustment with the drive stopped: No restrictions.

☞ **Note:** In the event of excessive temperature rise, the drive will automatically reduce the switching frequency and reset it once the temperature returns to normal.

CAUTION

On ATV71LD10N4 drives, if the RFI filters are disconnected (operation on an IT system), the drive's switching frequency must not exceed 4 kHz.
Failure to follow these instructions can result in equipment damage.

nrd	❏ **[Noise reduction]**	[Yes] (YES)

- nO — ☐ **[No]** (nO): Fixed frequency.
- YES — ☐ **[Yes]** (YES): Frequency with random modulation.
  Random frequency modulation prevents any resonance, which may occur at a fixed frequency.

(1) Parameter can also be accessed in the [1.3 SETTINGS] (SEt-) menu and [1.4 MOTOR CONTROL] (drC-) menu.

Parameter that can be modified during operation or when stopped.

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542 291 58 92 - 0 242 335 40 42

Preset speeds

The preset speeds have no effect if the new lift ramp is used.

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

Note: **You must configure 2 and 4 speeds in order to obtain 4 speeds.**
You must configure 2, 4 and 8 speeds in order to obtain 8 speeds.
You must configure 2, 4, 8, and 16 speeds in order to obtain 16 speeds.

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

(1) See the diagram on page 198: Reference 1 = (SP1).

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542 291 58 92 - 0 242 335 40 42

Code	Name/Description	Adjustment range	Factory setting
PSS-	**[PRESET SPEEDS]** **Note:** This function cannot be used with certain other functions. Follow the instructions on page 210.		
PS2 nO LI1 - - -	❏ **[2 preset speeds]** ☐ **[No]** (nO): Function inactive ☐ **[LI1]** (LI1) : : ☐ **[...]** (...): See the assignment conditions on page 204.		[No] (nO)
PS4 nO LI1 - - -	❏ **[4 preset speeds]** ☐ **[No]** (nO): Function inactive ☐ **[LI1]** (LI1) : : ☐ **[...]** (...): See the assignment conditions on page 204. To obtain 4 speeds you must also configure 2 speeds.		[No] (nO)
PS8 nO LI1 - - -	❏ **[8 preset speeds]** ☐ **[No]** (nO): Function inactive ☐ **[LI1]** (LI1) : : ☐ **[...]** (...): See the assignment conditions on page 204. To obtain 8 speeds you must also configure 2 and 4 speeds.		[No] (nO)
PS16 nO LI1 - - -	❏ **[16 preset speeds]** ☐ **[No]** (nO): Function inactive ☐ **[LI1]** (LI1) : : ☐ **[...]** (...): See the assignment conditions on page 204. To obtain 16 speeds you must also configure 2, 4 and 8 speeds.		[No] (nO)

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542 291 58 92 - 0 242 335 40 42

Code	Name/Description		Adjustment range	Factory setting
	[PRESET SPEEDS] (continued)			
SP2 ( )	❑ [Preset speed 2]	(1)	0 to 1600 Hz	10 Hz
SP3 ( )	❑ [Preset speed 3]	(1)		15 Hz
SP4 ( )	❑ [Preset speed 4]	(1)		20 Hz
SP5 ( )	❑ [Preset speed 5]	(1)		25 Hz
SP6 ( )	❑ [Preset speed 6]	(1)		30 Hz
SP7 ( )	❑ [Preset speed 7]	(1)		35 Hz
SP8 ( )	❑ [Preset speed 8]	(1)		40 Hz
SP9 ( )	❑ [Preset speed 9]	(1)		45 Hz
SP10 ( )	❑ [Preset speed 10]	(1)		50 Hz
SP11 ( )	❑ [Preset speed 11]	(1)		55 Hz
SP12 ( )	❑ [Preset speed 12]	(1)		60 Hz
SP13 ( )	❑ [Preset speed 13]	(1)		70 Hz
SP14 ( )	❑ [Preset speed 14]	(1)		80 Hz
SP15 ( )	❑ [Preset speed 15]	(1)		90 Hz
SP16 ( )	❑ [Preset speed 16]	(1)		100 Hz
	The appearance of these [Preset speed x] (SPx) parameters is determined by the number of speeds configured.			

(1) Parameter can also be accessed in the [1.3 SETTINGS] (SEt-) menu.

( ) Parameter that can be modified during operation or when stopped.

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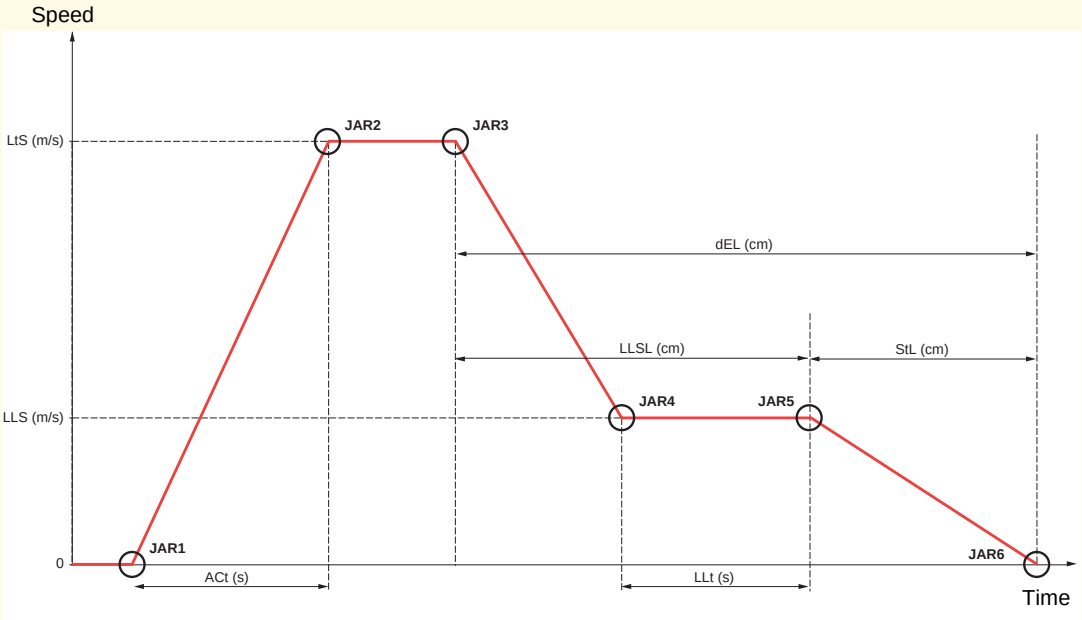
542 291 58 92 - 0 242 335 40 42

[1.1 LIFT] (LIF-)

The parameters in this menu are read-only.

Code	Name/Description
LMO-	**[MONITORING]**
dOt	❑ **[Travel distance]** km
ESP	❑ **[Lift Speed]** m/s
rFr	❑ **[Output frequency]** Hz
LCr	❑ **[Motor current]** A
nOt	❑ **[Number of travels]** In thousands
LLSL	❑ **[Lenght in LLS]** Measure in cm of the distance crossed with a speed reference [Lift leveling speed] (LLS). 
brN	❑ **[Pre-Torque Current]** Level of current needed during the last brake opening, in Amps.
PUCI	❑ **[Rlbk angl. variation]** level of rollback measured during last brake opening.
EnJ	❑ **[IGBT alarm number]**

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542 291 58 92 - 0 242 335 40 42

Encoder selection guide

Introduction

An encoder must be used with a synchronous motor for nominal operation.

The encoder is generally selected by the motor manufacturer. However, the ATV LIFT allows the following encoders to be used:

- Incremental
- SinCos
- SinCos Hiperface
- SinCos EnDat
- SSI
- Resolver
- Absolute SinCos

With an asynchronous motor, the use of an encoder is not essential. Everything depends on the performance required by the lift manufacturer.

The use of an encoder is recommended for

- High car speeds (more than 1.5 m/s)
- Highly reversible machines
- Systems where precise stopping is critical
- Greater comfort when the brake is released and applied

Selection criteria

Where the drive is concerned, the selection criteria for the encoder are

Immunity to EMC interference

- Analog transmission encoders (resolver, SinCos, incremental, SinCos Hiperface) are sensitive to EMC interference.
- Digital transmission encoders (SSI, EnDat) are more robust.

Absolute/relative

An absolute encoder has an image of the position of the rotor, whereas a relative encoder only has information on the rotor speed.
The only consequences for the drive are that, with a synchronous motor, an angle test has to be performed on each power-up with the relative encoder, whereas an absolute encoder requires only one angle test on the first power-up.

Resolution

Depending on the encoder technology, the drive can "interpolate" the encoder signals to obtain a better speed resolution than that indicated by the encoder.

Examples include

- With a 4096 line (2^12) incremental encoder, the drive can have a resolution 4 times more accurate, in other words 16384 points (2^14).
- With a SinCos encoder having the same resolution (4096 lines, (2^12)), the drive can have a resolution 1000 times more accurate, in other words 4,194,304 points (2^22).

The encoder resolution has a direct effect on rollback management. Depending on the desired comfort level, an encoder with more or less precision can be used.

The following data are given for guidance. Comfort depends on many parameters (type of block and tackle, mechanism, nominal speed, reversibility of the machine, type of brake, use of an external weight sensor, etc.).

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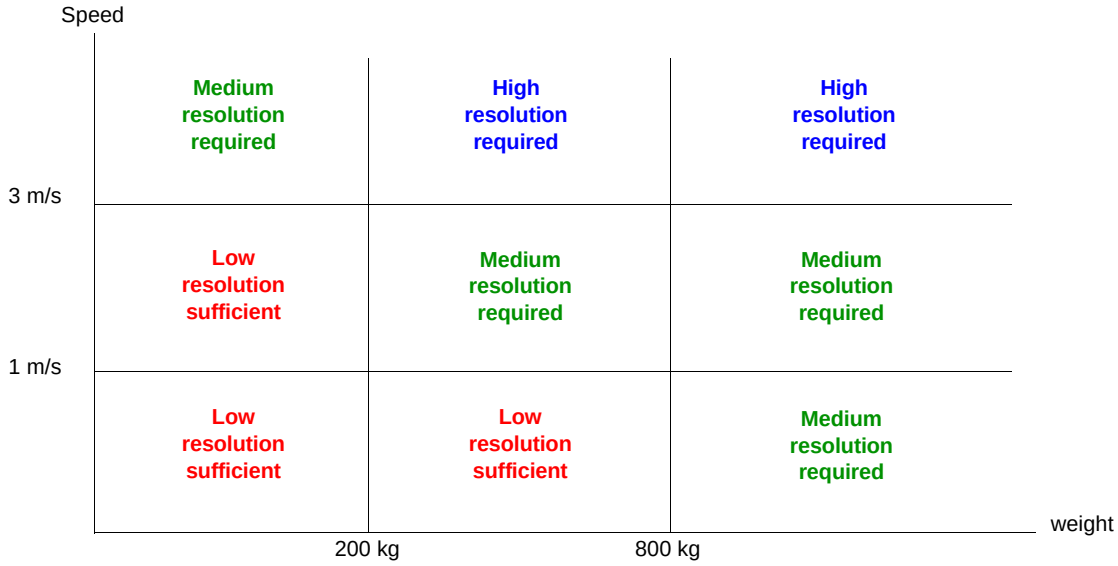
542 291 58 92 - 0 242 335 40 42

Encoder selection guide (continued)

However, it is considered that at least 16 bits of useful resolution for the drive (the green range) are necessary for an acceptable comfort level in all loading conditions without using an external weight sensor. Below this value, discomfort may be felt.



	Encoder resolution		Resolution used by the ATV LIFT for different encoder technologies						
			EnDat SSI		**SinCos SinCos Hiperface SinCos EnDat Absolute SinCos**		**Incremental**		**Resolveur (number of poles)**
	No. of bits	No. of lines	No. of bits	Points used	No. of bits	Points used	No. of bits		
low resolution	1	2			11	2048			
low resolution	2	4			12	4096			
low resolution	3	8			13	8192			
low resolution	4	16			14	16384			
low resolution	5	32			15	32768			
low resolution	6	64			16	65536			
low resolution	7	128			17	131072			
low resolution	8	256			18	262144	10	1024	
low resolution	9	512			19	524288	11	2048	
low resolution	10	1024			20	1048576	12	4096	
low resolution	11	2048			21	2097152	13	8192	
low resolution	12	4096			22	4194304	14	16384	
low resolution	13	8192	13	8192	22	4194304	15	32768	13 (2 poles; 1pp)
medium resol.	14	16384	14	16384	22	4194304	16	65536	14 (4 or 6 poles; 2 or 3 pp)
medium resol.	15	32768	15	32768	22	4194304	16	65536	15 (8 poles; 4 pp)
medium resol.	16	65536	16	65536	22	4194304	16	65536	
high resolution	17	131072	17	131072	22	4194304	16	65536	
high resolution	18	262144	18	262144	22	4194304	16	65536	
high resolution	19	524288	19	524288	22	4194304	16	65536	
high resolution	20	1048576	20	1048576	22	4194304	16	65536	
high resolution	21	2097152	21	2097152	22	4194304	16	65536	
high resolution	22	4194304	22	4194304	22	4194304	16	65536	

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542 291 58 92 - 0 242 335 40 42

Encoder selection guide (continued)

Summary

The table below summarizes the main criteria for the selection of an encoder:

Encoder	Transmission type	Absolute/relative	Typical resolution
Incremental	Analog	Relative	8192 units
Resolver	Analog	Absolute	8 poles
SinCos / Absolute SinCos	Analog	Relative	2048 lines
SinCos Hiperface	Analog + digital on power-up	Absolute	Not available on the lift market
EnDat	Digital	Absolute	Endat 13 bit with SinCos 1024 line
SSI	Digital	Absolute	Not available on the lift market

Operation without an encoder

The ATV LIFT provides for open-loop operation with a synchronous motor, which can be used in degraded mode.

This configuration can be used for:

- Performing the encoder test
- Evacuating persons if the encoder is faulty

However, the brake sequence is not compatible with open-loop operation with a synchronous motor. Stopping is therefore carried out in freewheel mode, as in the inspection mode (safety operation).

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542 291 58 92 - 0 242 335 40 42

Diagnostics and troubleshooting

Problem	Probable cause	Remedy
Stop length incorrect	• The [Nominal car speed] (CSP) is incorrect	• Using a tachometer, measure the actual speed of the car cable when the motor rotates at its nominal speed (NSP or NSPS) • Check that the [Nominal car speed] (CSP) is correct for the sheave radius (in metres) and the nominal motor speed: - Ratio 1:1 CSP [m/s] = 6.28 x Sheave radius [m] x NSPS [rpm]/60 - Ratio 1:2 CSP [m/s] = 3.14 x Sheave radius [m] x NSPS [rpm]/60
	• The [Stop length] (StL) is incorrect	• Adjust StL to the value measured in the lift shaft • Reposition stop flags in the lift shaft at the stop length StL
Vibration during travel	• Inertia estimated incorrectly	• Check that the payload [Capacity of lift] (LCA) page 56 is entered correctly • Check that the lift is properly balanced (at half load, the current when ascending should be the same as the current when descending). • Manually re-enter the following values: - Weight of counterweight [Counterweight] (CtM) - Weight of empty car [Car weight] (CMA)
	• Special application (special winch, belt type cable, etc.)	• Re-enter FLG and StA (see speed loop optimization, page 68)
The lift leveling time is not as configured in LLt	• The slowdown indicator is not positioned at the distance configured in [Deceleration length] (dEL).	• Adjust [Deceleration length] (dEL), page 60, to the value measured in the lift shaft • Reposition the slowdown indicators in the lift shaft at the [Deceleration length] (dEL).
Drive in tNF state	• It has not been possible to perform tUN correctly.	• Consider forcing the motor contactors if the installation requires it.
The car jerks when the brake is released		• Activate the rollback function. See page 88. • Deactivate the motor phase loss detection
[DB unit sh. circuit]	• Short-circuit output from braking unit • Braking unit not connected	• Check the wiring of the braking unit and the resistor • Check the braking resistor
[Precharge]	• Precharge relay control fault or damaged precharge resistor	• Turn the drive off and then back on again. • Check the internal connections. • Inspect/repair the drive.
[Thyr. soft charge]	• DC bus charging fault (thyristors)	
[Encoder coupling]	• Break in encoder's mechanical coupling	• Check the encoder's mechanical coupling.
In close loop, during the first run order, the drive stays in [Current Limitation] (CLI) and stays to 0 Hz	• encoder signal reversed	• Reverse the direction of rotation of the encoder with the parameter [Coder rotation inv.] (EnRI) • Do an encoder check. See page 141.
The drive is locked in (nSt) or (nLP).	• when an encoder board VW3A3409 is used.	• Complete the encoder board settings.

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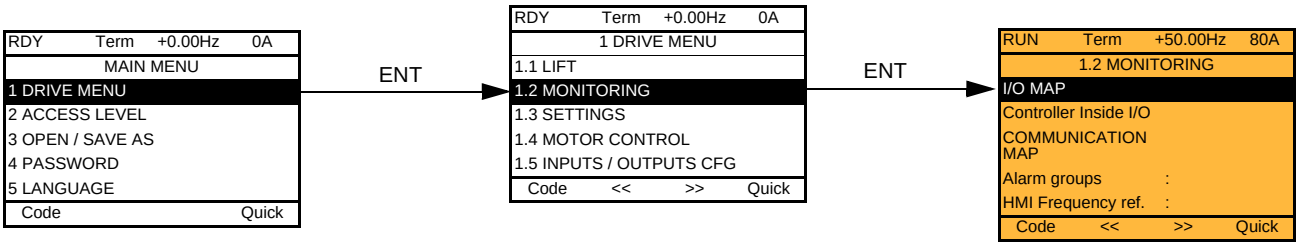
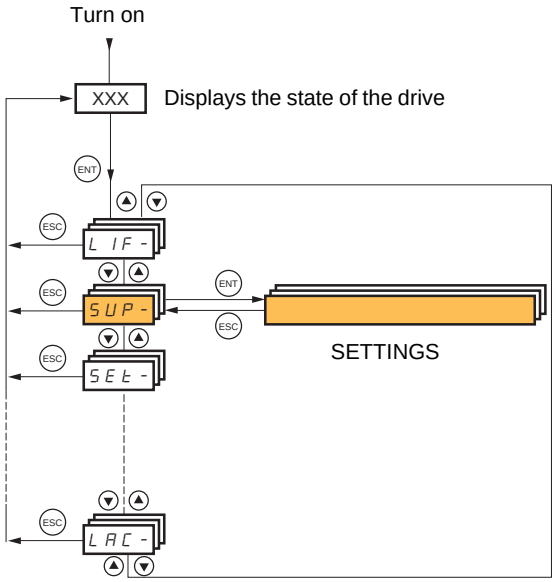
[1.2 MONITORING] (SUP-)

With graphic display terminal:



With integrated display terminal:



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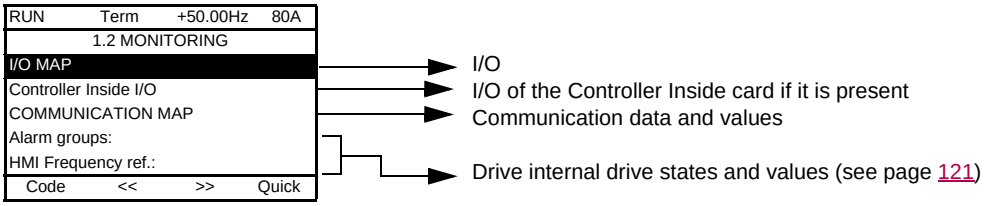
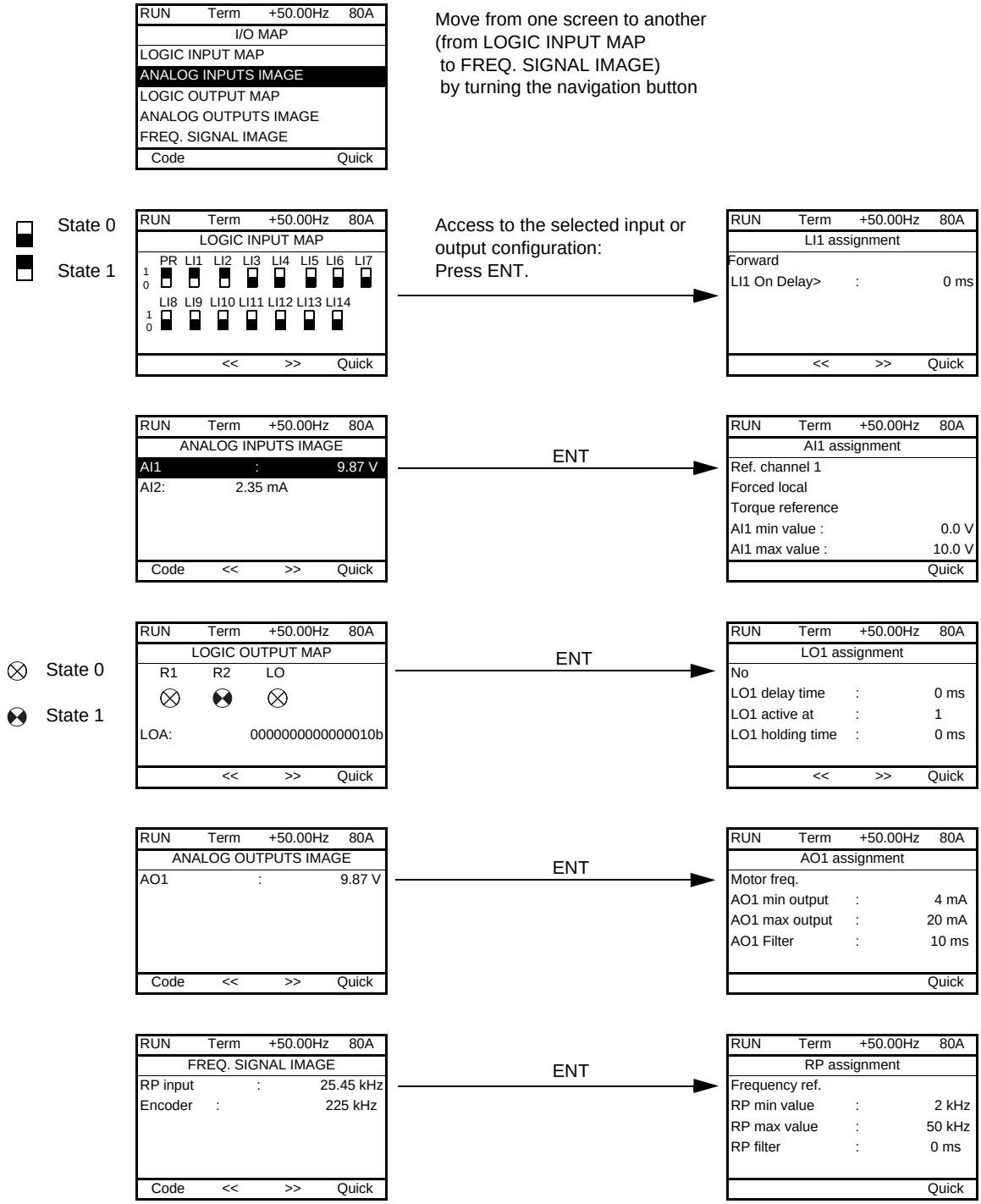
[1.2 MONITORING] (SUP-)

With graphic display terminal

This menu can be used to display the inputs/outputs, the drive internal states and values, and the communication data and values.



I/O



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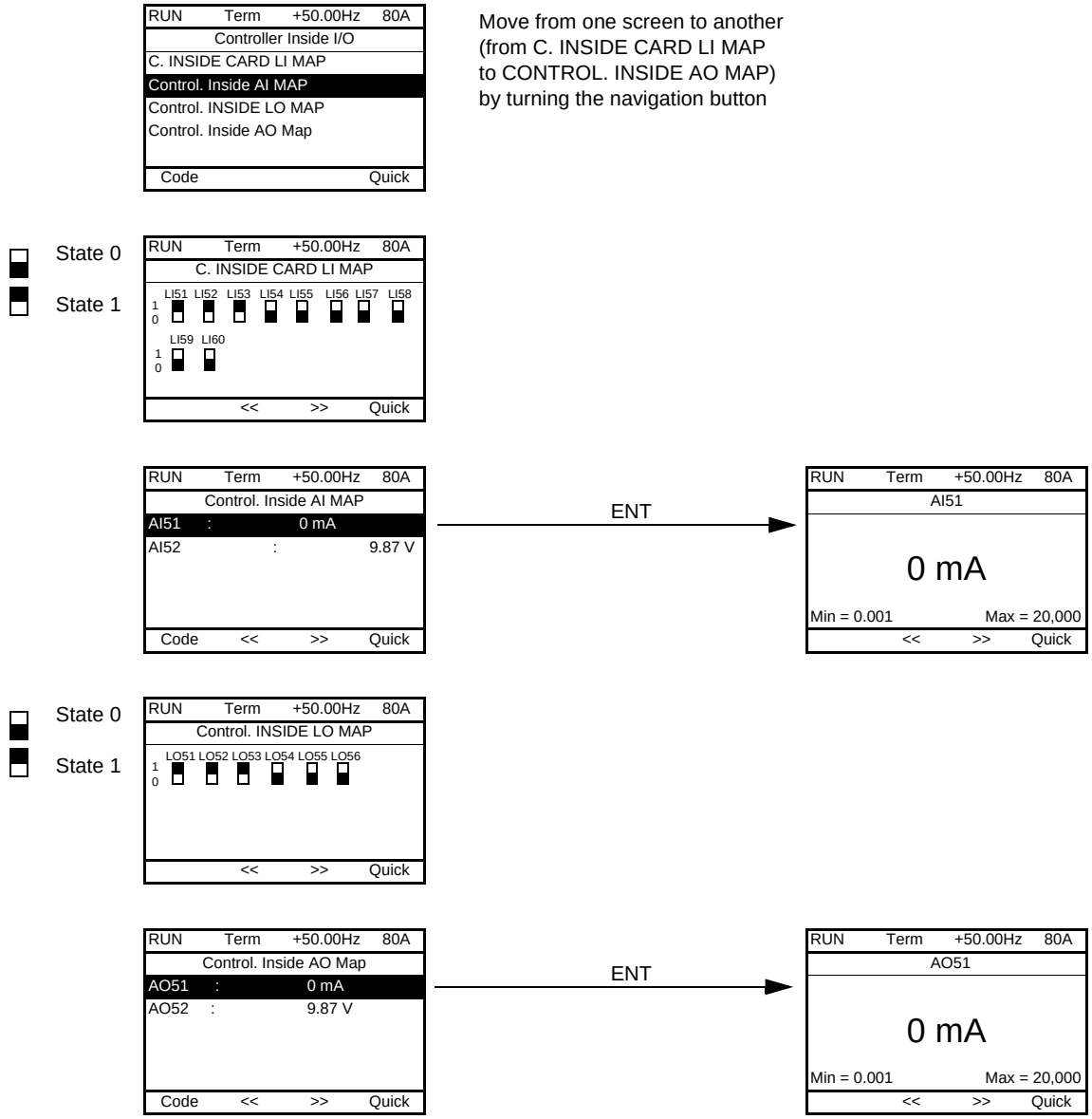
With graphic display terminal

Controller Inside card I/O



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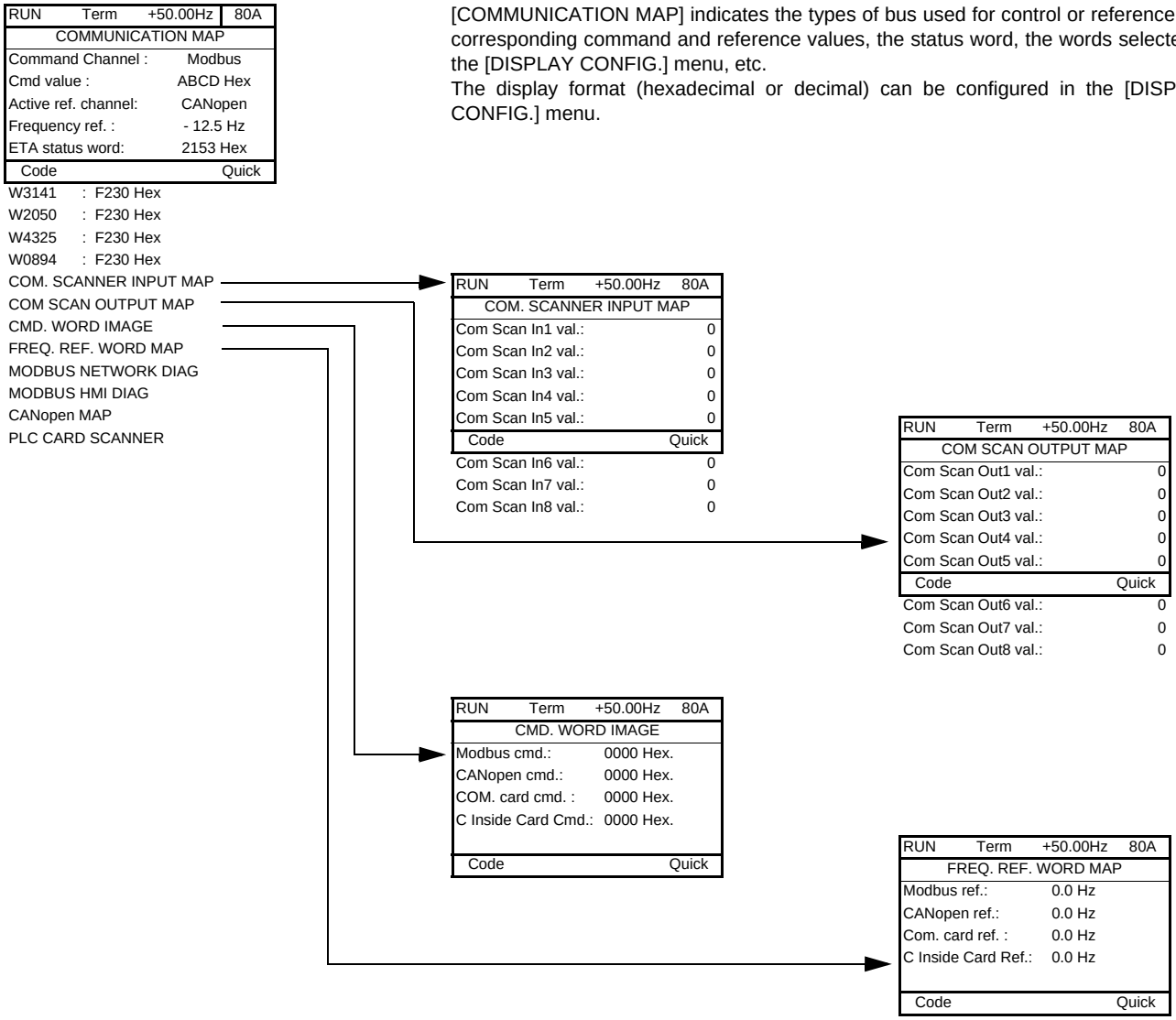
[1.2 MONITORING] (SUP-)

With graphic display terminal

Communication



[COMMUNICATION MAP] indicates the types of bus used for control or reference, the corresponding command and reference values, the status word, the words selected in the [DISPLAY CONFIG.] menu, etc.
The display format (hexadecimal or decimal) can be configured in the [DISPLAY CONFIG.] menu.

[COM. SCANNER INPUT MAP] and [COM SCAN OUTPUT MAP]:
Visualization of registers exchanged periodically (8 input and 8 output) for integrated Modbus and for fieldbus cards.

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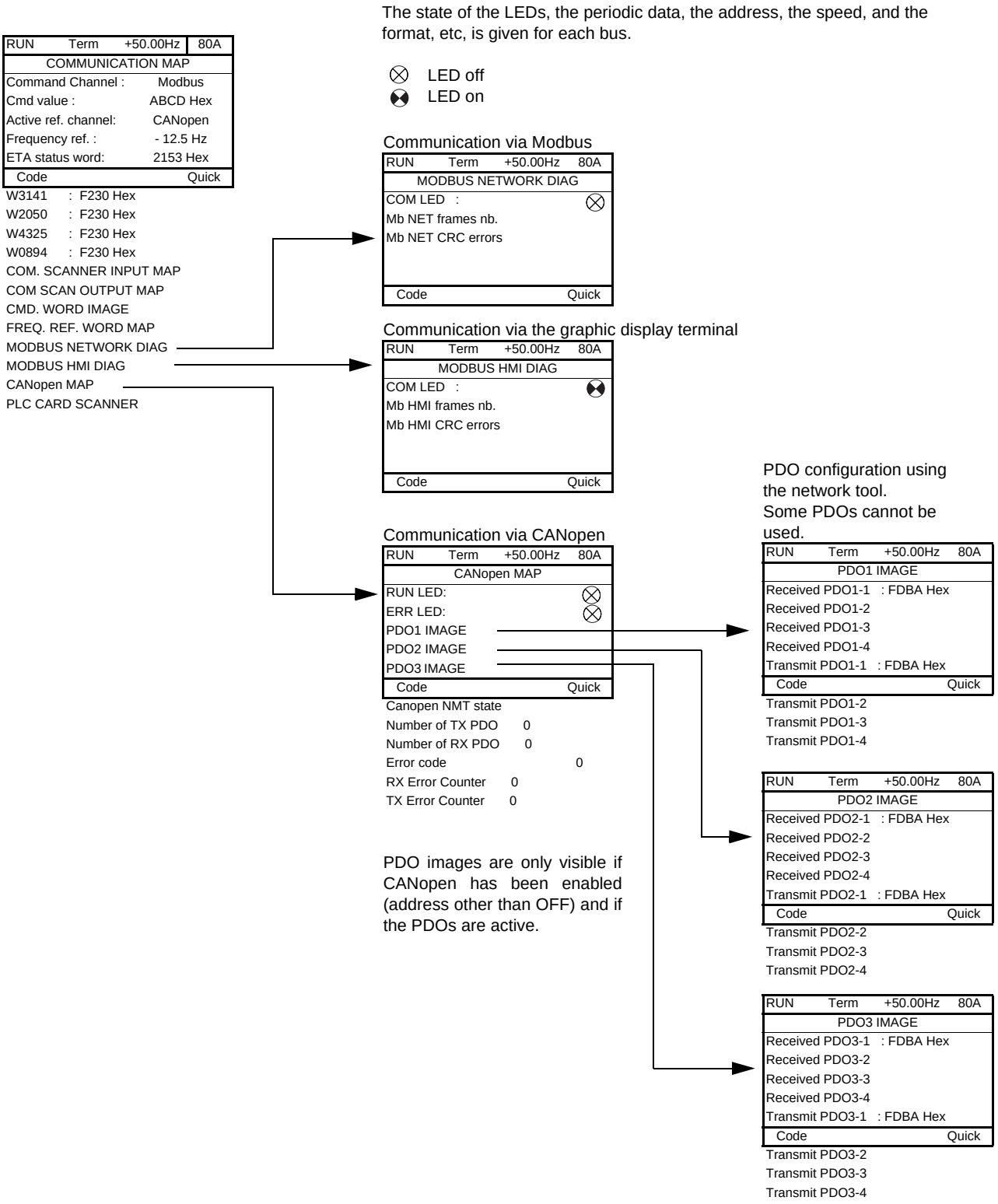
With graphic display terminal

Communication (continued)



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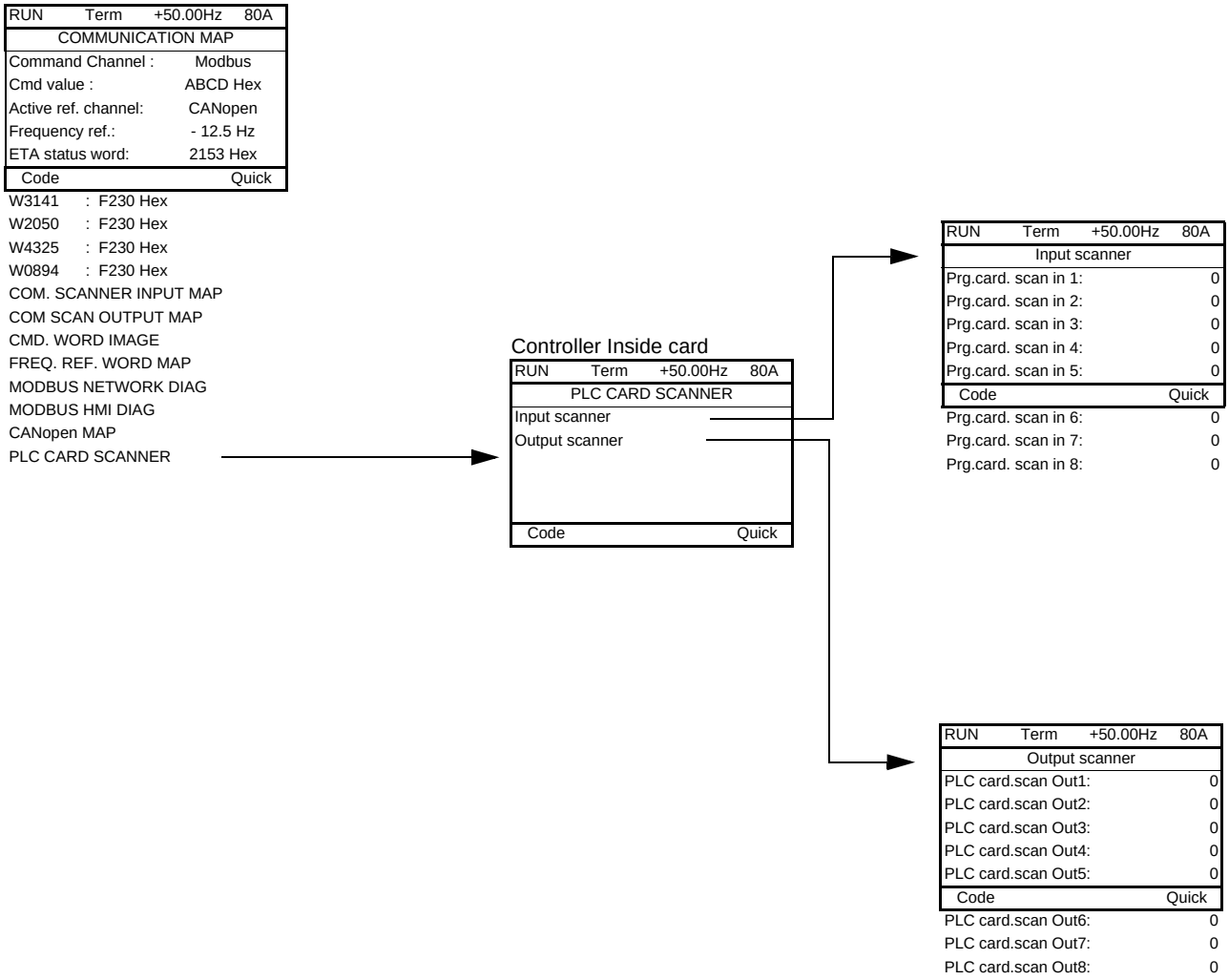
With graphic display terminal

Communication (continued)



[Input scanner] and [Output scanner]:
Visualization of registers exchanged periodically (8 input and 8 output).

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[1.2 MONITORING] (SUP-)

With graphic display terminal: Drive internal states and values

Name/Description	
[Alarm groups] (ALGr)	Current alarm group numbers
[HMI Frequency ref.] (LFr)	in Hz. Frequency reference via the graphic display terminal (can be accessed if the function has been configured).
[HMI torque ref.] (Ltr)	as a % of the rated torque. Torque reference via graphic display terminal.
[Multiplying coeff.] (MFr)	as a % (can be accessed if [Multiplier ref. -] (MA2,MA3) page 216 has been assigned)
[Frequency ref.] (FrH)	in Hz
[Torque reference] (trr)	as a % of the rated torque (can be accessed if the function has been configured)
[Output frequency] (rFr)	in Hz
[Measured output fr.] (MMF)	in Hz: The measured motor speed is displayed if an encoder card has been inserted, otherwise 0 appears.
[Pulse in. work. freq.] (FqS)	in Hz: Frequency of the "Pulse input" input used by the [FREQUENCY METER] (FqF-) function, page 279.
[Motor current] (LCr)	in A
[ENA avg speed] (AUS)	in Hz: The parameter can be accessed if [ENA system] (EnA) = [Yes] (YES) (see page 159)
[Lift speed] (ESP)	in m/s
[Motor speed] (SPd)	in rpm
[Motor voltage] (UOP)	in V
[Motor power] (OPr)	as a % of the rated power
[Motor torque] (Otr)	as a % of the rated torque
[Mains voltage] (ULn)	in V. Line voltage from the point of view of the DC bus, motor running or stopped.
[Travel distance] (dOt)	in km
[Number of travels] (nOt)	Number of travels in thousands
[Motor thermal state] (tHr)	as a %
[Drv.thermal state] (tHd)	as a %
[DBR thermal state] (tHb)	as a % (can only be accessed on high rating drives)
[Consumption] (APH)	in Wh, kWh or MWh (accumulated consumption)
[Run time] (rtH)	in seconds, minutes or hours (length of time the motor has been switched on)
[Power on time] (PtH)	in seconds, minutes or hours (length of time the drive has been switched on)
[IGBT alarm counter] (tAC)	in seconds (length of time the "IGBT temperature" alarm has been active)
[Date/Time] (CLO)	Current date and time generated by the Controller Inside card (can be accessed if the card has been inserted)
[- - - -] (o02) to [- - - -] (o06)	Words generated by the Controller Inside card (can be accessed if the card has been inserted)
[Config. active] (CnFS)	Active configuration [Config. n°0, 1 or 2]
[Utilised param. set] (CFPS)	[Set n°1, 2 or 3] (can be accessed if parameter switching has been enabled, see page 252)
[ALARMS] (ALr-)	List of current alarms. If an alarm is present, a ✓ appears.
[OTHER STATE] (SSt-)	List of secondary states: - [In motor fluxing] (FLX): In motor fluxing - [PTC1 alarm] (PtC1): Probe alarm 1 - [PTC2 alarm] (PtC2): Probe alarm 2 - [LI6=PTC alarm] (PtC3): LI6 = PTC probe alarm - [Fast stop in prog.] (FSt): Fast stop in progress - [Current Th. attained] (CtA): Current threshold attained ([Current threshold] (Ctd) page 134) - [Freq. Th. attained] (FtA): Frequency threshold attained ([Freq. threshold] (Ftd) page 135) - [Freq. Th. 2 attained] (F2A): 2nd frequency threshold attained ([Freq. threshold 2] (F2d) page 135) - [Frequency ref. att.] (SrA): Frequency reference attained - [Motor th. state att.] (tSA): Motor 1 thermal state attained - [External fault alarm] (EtF): External fault alarm - [Auto restart] (AUtO): Automatic restart in progress - [Remote] (FtL): Line mode control - [Auto-tuning] (tUn): Performing auto-tuning - [Undervoltage] (USA): Undervoltage alarm - [Cnfg.1 act.] (CnF1): Configuration 1 active - [Cnfg.2 act.] (CnF2): Configuration 2 active - [HSP attained] (FLA): High speed attained - [Load slipping] (AnA): Slipping alarm - [Set 1 active] (CFP1): Parameter set 1 active - [Set 2 active] (CFP2): Parameter set 2 active - [Set 3 active] (CFP3): Parameter set 3 active - [In braking] (brS): Drive braking - [DC bus loading] (dbL): DC bus charging - [Forward] (MFrd): Motor running forward - [Reverse] (MrrS): Motor running in reverse - [High torque alarm] (ttHA): Motor torque higher than high threshold [High torque thd.] (ttH) page 134. - [Low torque alarm] (ttLA): Motor torque less than low threshold [Low torque thd.] (ttL) page 134. - [Freq. meter Alarm] (FqLA): Measured speed threshold attained: [Pulse warning thd.] (FqL) page 135.

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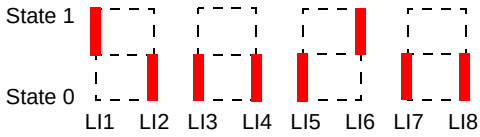
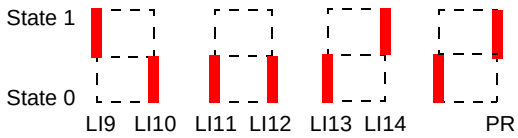
With integrated display terminal

This menu can be used to display the drive inputs, states and internal values.

Code	Name/Description	Adjustment range	Factory setting
IOM-	**I/O MAP**		
LIA-	**Logic input functions**		
LIA to LI4A	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.		
LIS1	**State of logic inputs LI1 to LI8**		
	Can be used to visualize the state of logic inputs LI1 to LI8 (display segment assignment: high = 1, low = 0)  Example above: LI1 and LI6 are at 1; LI2 to LI5, LI7 and LI8 are at 0.		
LIS2	**State of logic inputs LI9 to LI14 and Power Removal**		
	Can be used to visualize the state of logic inputs LI9 to LI14 and PR (Power Removal) (display segment assignment: high = 1, low = 0)  Example above: LI9 and LI14 are at 1, LI10 to LI13 are at 0 and PR (Power Removal) is at 1.		
AIA-	**Analog input functions**		
AI1A AI2A AI3A AI4A	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.		

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[1.2 MONITORING] (SUP-)

With integrated display terminal: Drive internal states and values

Code	Name/Description	Unit
ALGr	**Alarm groups:** Current alarm group numbers	
MFr	**Multiplication coefficient** (can be accessed if **[Multiplier ref. -] (MA2,MA3)** page 216 has been assigned)	%
FrH	**Frequency ref.**	Hz
trr	**Torque reference:** Can be accessed if the function has been configured	%.
rFr	**Output frequency**	Hz
MMF	**The measured motor speed is displayed** if an encoder card has been inserted, otherwise 0 appears.	Hz
FqS	**Frequency of the "Pulse input"** used by the **[FREQUENCY METER] (FqF-)** function, page 279.	Hz
LCr	**Motor current**	A
AUS	**ENA avg SPEED:** This parameter can be accessed if EnA = YES (see page 159)	Hz
ESP	**Lift speed**	m/s
SPd	**Motor speed**	rpm
UOP	**Motor voltage**	V
OPr	**Motor power**	%
Otr	**Motor torque**	%
ULn	**Line voltage:** Line voltage from the point of view of the DC bus, motor running or stopped.	V
dOt	**Travel distance**	km
nOt	**Number of travels**	10^3
tHr	**Motor thermal state**	%
tHd	**Drv thermal state**	%
tHb	**DBR thermal state:** Can be accessed on high rating drives only.	%
APH	**Consumption**	Wh, kWh or MWh
rtH	**Run time:** Length of time the motor has been turned on	seconds, minutes or hours
PtH	**Power on time:** Length of time the drive has been turned on	
tAC	**IGBT alarm counter:** Length of time the "IGBT temperature" alarm has been active	seconds
CLO-	**tIME, dAY:** Current date and time generated by the Controller Inside card (can be accessed if the card has been inserted)	
o02	Word generated by the Controller Inside card (can be accessed if the card has been inserted)	
o03	Word generated by the Controller Inside card (can be accessed if the card has been inserted)	
o04	Word generated by the Controller Inside card (can be accessed if the card has been inserted)	
o05	Word generated by the Controller Inside card (can be accessed if the card has been inserted)	
o06	Word generated by the Controller Inside card (can be accessed if the card has been inserted)	
CnFS	**Config. active:** CnF0, 1 or 2 (can be accessed if motor or configuration switching has been enabled, see page 256)	
CFPS	**Utilised param. set:** CFP1, 2 or 3 (can be accessed if parameter switching has been enabled, see page 252)	

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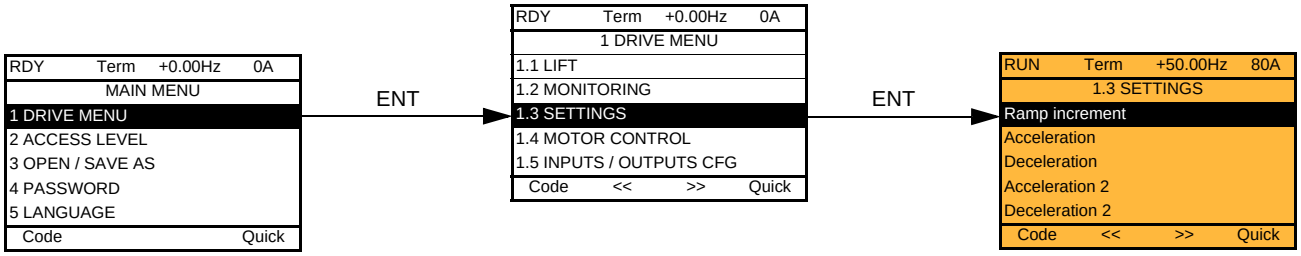
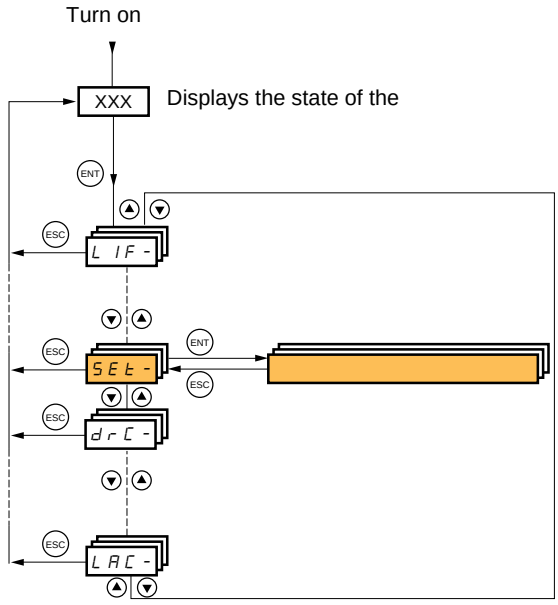
[1.3 SETTINGS] (SEt-)

With graphic display terminal:



With integrated display terminal:



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[1.3 SETTINGS] (SEt-)

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

⚠ DANGER

UNINTENDED EQUIPMENT OPERATION

- Check that changes made to the settings during operation do not present any danger.
- We recommend stopping the drive before making any changes.

Failure to follow these instructions will result in death or serious injury.

Code	Name/Description	Adjustment range	Factory setting
Inr 0.01 0.1 1	❏ **[Ramp increment]** ☐ **[0.01]**: Ramp up to 99.99 seconds ☐ **[0.1]**: Ramp up to 999.9 seconds ☐ **[1]**: Ramp up to 6000 seconds This parameter is valid for [Acceleration] (ACC), [Deceleration] (dEC), [Acceleration 2] (AC2) and [Deceleration 2] (dE2).	0.01 - 0.1 - 1	0.1
ACC	❏ **[Acceleration]** Time to accelerate from 0 to the [Rated motor freq.] (FrS) (page 143). Make sure that this value is compatible with the inertia being driven.	0.01 to 6000 s (1)	3.0 s
dEC	❏ **[Deceleration]** Time to decelerate from the [Rated motor freq.] (FrS) (page 143) to 0. Make sure that this value is compatible with the inertia being driven.	0.01 to 6000 s (1)	3.0 s
AC2 ★	❏ **[Acceleration 2]** See page 219 Time to accelerate from 0 to the [Rated motor freq.] (FrS). Make sure that this value is compatible with the inertia being driven.	0.01 to 6000 s (1)	5.0 s
dE2 ★	❏ **[Deceleration 2]** See page 219 Time to decelerate from the [Rated motor freq.] (FrS) to 0. Make sure that this value is compatible with the inertia being driven.	0.01 to 6000 s (1)	5.0 s
tA1 ★	❏ **[Begin Acc round]** See page 218 Rounding of start of acceleration ramp as a % of the [Acceleration] (ACC) or [Acceleration 2] (AC2) ramp time.	0 to 100 %	50 %
tA2 ★	❏ **[End Acc round]** See page 218 - Rounding of end of acceleration ramp as a % of the [Acceleration] (ACC) or [Acceleration 2] (AC2) ramp time. - Can be set between 0 and (100% - [Begin Acc round] (tA1))		50 %
tA3 ★	❏ **[Begin Dec round]** See page 218 Rounding of start of deceleration ramp as a % of the [Deceleration] (dEC) or [Deceleration 2] (dE2) ramp time.	0 to 100 %	40 %

(1) Range 0.01 to 99.99 s or 0.1 to 999.9 s or 1 to 6000 s according to [Ramp increment] (Inr).

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

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Code	Name/Description	Adjustment range	Factory setting
tA4 ★	❑ [End Dec round] See page 218 - Rounding of end of deceleration ramp as a % of the [Deceleration] (dEC) or [Deceleration 2] (dE2) ramp time. - Can be set between 0 and (100% - [Begin Dec round] (tA3)).		60 %
LSP	❑ [Low speed] Motor frequency at minimum reference, can be set between 0 and [High speed] (HSP).		0 Hz
HSP	❑ [High speed] Motor frequency at maximum reference, can be set between [Low speed] (LSP) and [Max frequency] (tFr). The factory setting changes to 60 Hz if [Standard mot. freq] (bFr) = [60Hz NEMA] (60). **CAUTION** For permanent magnet synchronous motors, the maximum permissible speed must not be exceeded, otherwise demagnetization may occur. The maximum speed permitted by the motor, drive chain or application must not be exceeded at any time. **Failure to follow this instruction can result in equipment damage.**		50 Hz
ItH	❑ [Mot. therm. current] Motor thermal protection current, to be set to the rated current indicated on the nameplate.	0.2 to 1.5 In (1)	According to drive rating
SFC ↻	❑ [K speed loop filter] Speed loop filter coefficient. See page 68 for more details of the effect of this parameter.	0 to 100	According to [Motor control type] (Ctt)
StA ↻	❑ [Fr.Loop.Stab] Stability: Used to adapt the return to steady state after a speed transient, according to the dynamics of the machine. Gradually increase the stability to increase control loop attenuation and thus reduce any overspeed. See page 68 for more details of the effect of this parameter.	0 to 100 %	20 %
FLG ↻	❑ [FreqLoopGain] Frequency loop gain: Used to adapt the pace of the machine speed transients according to the dynamics. Gradually increase the gain to increase the control loop passband. See page 68 for more details of the effect of this parameter. [FreqLoopGain] (FLG) is set to 20% when [Motor control type] (Ctt) is set to [Sync. mot.] (SYn) or (FSY).	0 to 100 %	6 %

(1) In corresponds to the rated drive current indicated in the Installation Manual or on the drive nameplate.

↻ Parameter that can be modified during operation or when stopped.

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Code	Name/Description	Adjustment range	Factory setting
GPE ★	❑ [ENA prop.gain] See page 159	1 to 9999	250
GIE ★	❑ [ENA integral gain] See page 159	0 to 9999	100
UFr ★	❑ [IR compensation] See page 160	25 to 200 %	100 %
SLP ★	❑ [Slip compensation] See page 145	0 to 300 %	100 %
dCF ★	❑ [Ramp divider] See page 221	0 to 10	4
IdC ★	❑ [DC inject. level 1] See page 222 Level of DC injection braking current activated via logic input or selected as stop mode. **CAUTION** Check that the motor will withstand this current without overheating. **Failure to follow this instruction can result in equipment damage.**	0.1 to 1.41 In (1)	0.64 In (1)
tdI ★	❑ [DC injection time 1] See page 222 Maximum current injection time [DC inject. level 1] (IdC). After this time the injection current becomes [DC inject. level 2] (IdC2).	0.1 to 30 s	0.5 s
IdC2 ★	❑ [DC inject. level 2] See page 222 Injection current activated by logic input or selected as stop mode, once period of time [DC injection time 1] (tdI) has elapsed. **CAUTION** Check that the motor will withstand this current without overheating. **Failure to follow this instruction can result in equipment damage.**	0.1 In (2) to [DC inject. level 1] (IdC)	0.5 In (1)
tdC ★	❑ [DC injection time 2] See page 222 Maximum injection time [DC inject. level 2] (IdC2) for injection selected as stop mode only.	0.1 to 30 s	0.5 s

(1) In corresponds to the rated drive current indicated in the Installation Manual or on the drive nameplate.

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

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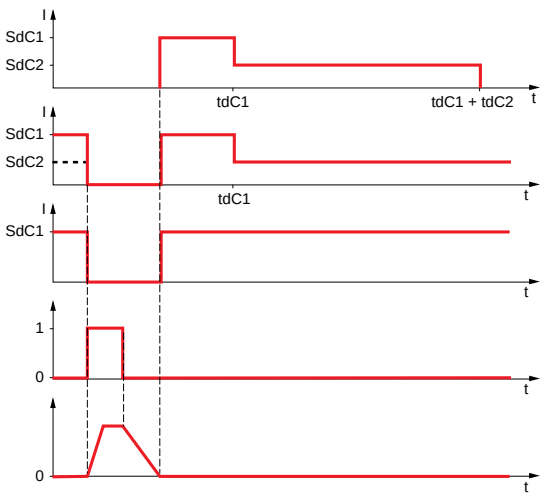
Code	Name/Description	Adjustment range	Factory setting
SdC1 ★	❑ **[Auto DC inj. level 1]** Level of standstill DC injection current. This parameter can be accessed if [Auto DC injection] (AdC) page 223 is not [No] (nO). This parameter is forced to 0 if [Motor control type] (Ctt) page 137 = [Sync. mot.] (SYn) or [Sync.CL] (FSY). **CAUTION** Check that the motor will withstand this current without overheating. **Failure to follow this instruction can result in equipment damage.**	0 to 1.2 In (1)	0.7 In (1)
tdC1 ★	❑ **[Auto DC inj. time 1]** Standstill injection time. This parameter can be accessed if [Auto DC injection] (AdC) page 223 is not [No] (nO) If [Motor control type] (Ctt) page 137 = [FVC] (FUC) or [Sync. mot.] (SYn) or [Sync.CL] (FSY) this time corresponds to the zero speed maintenance time.	0.1 to 30 s	0.5 s
SdC2 ★	❑ **[Auto DC inj. level 2]** 2nd level of standstill DC injection current. This parameter can be accessed if [Auto DC injection] (AdC) page 223 is not [No] (nO). This parameter is forced to 0 if [Motor control type] (Ctt) page 137 = [Sync. mot.] (SYn) or [Sync.CL] (FSY). **CAUTION** Check that the motor will withstand this current without overheating. **Failure to follow this instruction can result in equipment damage.**	0 to 1.2 In (1)	0.5 In (1)
tdC2 ★	❑ **[Auto DC inj. time 2]** 2nd standstill injection time. This parameter can be accessed if [Auto DC injection] (AdC) page 223 = [Yes] (YES).	0 to 30 s	0 s

AdC	SdC2	Operation
YES	x	
Ct	≠ 0	
Ct	= 0	
Run command		
speed		

Note: When [Motor control type] (Ctt) page 137 = [FVC] (FUC) or [Sync.CL] (FSY): [Auto DC inj. level 1] (SdC1), [Auto DC inj. level 2] (SdC2) and [Auto DC inj. time 2] (tdC2) are not accessible. Only [Auto DC inj. time 1] (tdC1) can be accessed. This then corresponds to a zero speed maintenance time.

(1) In corresponds to the rated drive current indicated in the Installation Manual or on the drive nameplate.

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542 291 58 92 - 0 242 335 40 42

Code	Name/Description	Adjustment range	Factory setting
SFr ()	❑ [Switching freq.] (2) See page 106.	According to rating	According to rating
CLI ()	❑ [Current Limitation] See page 52.	0 to 1.36 In (1)	1.36 In (1)
CL2 ★	❑ [I Limit. 2 value] See page 246 ☞ **Note:** If the setting is less than 0.25 In, the drive may lock in [Output Phase Loss] (OPF) fault mode if this has been enabled (see page 268). If it is less than the no-load motor current, the limitation no longer has any effect. m **CAUTION** Check that the motor will withstand this current, particularly in the case of permanent magnet synchronous motors, which are susceptible to demagnetization. **Failure to follow this instruction can result in equipment damage.**	0 to 1.36 In (1)	1.36 In (1)

(1) In corresponds to the rated drive current indicated in the Installation Manual or on the drive nameplate.
(2) Parameter can also be accessed in the [1.4 MOTOR CONTROL] (drC-) menu and [1.1 LIFT] (LIF-) menu.
I

() Parameter that can be modified during operation or when stopped.

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

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Code	Name/Description	Adjustment range	Factory setting
FLU	❏ **[Motor fluxing]**		[No] (FnO)

☐ **[Not cont.]** (FnC): Non-continuous mode
☐ **[Continuous]** (FCt): Continuous mode. This option is not possible if [Angle setting type] (ASt) pages 151 is [With load] (brC) or if [Auto DC injection] (AdC) page 223 is [Yes] (YES) or if [Type of stop] (Stt) page 221 is [Freewheel] (nSt).
☐ **[No]** (FnO): Function inactive. This option is not possible if [Motor control type] (Ctt) page 137 = [SVCI] (CUC) or [FVC] (FUC).

If [Motor control type] (Ctt) page 137 = [SVCI] (CUC), [FVC] (FUC) or [Sync. mot.] (SYn), the factory setting is replaced by [Not Cont.] (FnC).
If [Motor control type] (Ctt) page 137 = [Sync.CL] (FSY), [Motor fluxing] (FLU) is forced to [No] (FnO).

In order to obtain rapid high torque on startup, magnetic flux needs to already have been established in the motor.
- In [Continuous] (FCt) mode, the drive automatically builds up flux when it is powered up.
- In [Not cont.] (FnC) mode, fluxing occurs when the motor starts up.

The flux current is greater than nCr (configured rated motor current) when the flux is established and is then adjusted to the motor magnetizing current.

CAUTION

Check that the motor will withstand this current without overheating.
Failure to follow this instruction can result in equipment damage.

If [Motor control type] (Ctt) page 137 = [Sync. mot.] (SYn), the [Motor fluxing] (FLU) **parameter must be active** ([No] (FnO) is not permitted): this parameter causes rotor angle detection or alignment (according to the configuration of [Angle setting type] (ASt) page 151) and not fluxing.
- If [Brake assignment] (bLC) page 233 is not [No] (nO), the [Motor fluxing] (FLU) parameter has no effect.

Note: If [Angle setting type] (ASt) = [W/o load] (nLd), the motor may rotate one full revolution during measurement.

tLS	❏ **[Low speed time out]**	0 to 999.9 s	0 s

Maximum operating time at [Low speed] (LSP) (see page 126)
Following operation at LSP for a defined period, a motor stop is requested automatically. The motor will restart if the reference is greater than LSP and if a run command is still present.
Note: A value of 0 indicates an unlimited period of time.

Note: If [Low speed time out] (tLS) is not 0, [Type of stop] (Stt) page 221 is forced to [Ramp stop] (rMP) (only if a ramp stop can be configured). The [Low speed time out] (tLS) has no effect it the lift ramp is used

(1) In corresponds to the rated drive current indicated in the Installation Manual or on the drive nameplate.

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

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Code	Name/Description	Adjustment range	Factory setting
SP2 ★	❑ [Preset speed 2] See page 226 Preset speed 2	0 to 1,600 Hz	10 Hz
SP3 ★	❑ [Preset speed 3] See page 226 Preset speed 3	0 to 1,600 Hz	15 Hz
SP4 ★	❑ [Preset speed 4] See page 226 Preset speed 4	0 to 1,600 Hz	20 Hz
SP5 ★	❑ [Preset speed 5] See page 226 Preset speed 5	0 to 1,600 Hz	25 Hz
SP6 ★	❑ [Preset speed 6] See page 226 Preset speed 6	0 to 1,600 Hz	30 Hz
SP7 ★	❑ [Preset speed 7] See page 226 Preset speed 7	0 to 1,600 Hz	35 Hz
SP8 ★	❑ [Preset speed 8] See page 226 Preset speed 8	0 to 1,600 Hz	40 Hz
SP9 ★	❑ [Preset speed 9] See page 226 Preset speed 9	0 to 1,600 Hz	45 Hz
SP10 ★	❑ [Preset speed 10] See page 226 Preset speed 10	0 to 1,600 Hz	50 Hz
SP11 ★	❑ [Preset speed 11] See page 226 Preset speed 11	0 to 1,600 Hz	55 Hz
SP12 ★	❑ [Preset speed 12] See page 226 Preset speed 12	0 to 1,600 Hz	60 Hz
SP13 ★	❑ [Preset speed 13] See page 226 Preset speed 13	0 to 1,600 Hz	70 Hz
SP14 ★	❑ [Preset speed 14] See page 226 Preset speed 14	0 to 1,600 Hz	80 Hz

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

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Code	Name/Description	Adjustment range	Factory setting
SP 15 ★	❏ **[Preset speed 15]** See page 226 Preset speed 15	0 to 1,600 Hz	90 Hz
SP 16 ★	❏ **[Preset speed 16]** See page 226 Preset speed 16	0 to 1,600 Hz	100 Hz
MFr	❏ **[Multiplying coeff.]** Multiplying coefficient, can be accessed if [Multiplier ref.-] (MA2,MA3) page 216 has been assigned to the graphic terminal	0 to 100 %	100 %

(1) If a graphic display terminal is not in use, values greater than 9999 will be displayed on the 4-digit display with a period mark after the thousand digit, e.g., 15.65 for 15650.

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

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Code	Name/Description	Adjustment range	Factory setting
lbr ★	❏ **[Brake release I FW]** See page 233 Brake release current threshold for lifting or forward movement	-1.32 In to 1.32 In (2)	0
lrd ★	❏ **[Brake release I Rev]** See page 233 Brake release current threshold for lowering or reverse movement	0 to 1.32 In (2)	0
brt ★	❏ **[Brake Release time]** See page 234 Brake release time delay	0.00 to 5.00 s	0.50 s
blr ★	❏ **[Brake release freq]** See page 234 Brake release frequency threshold	[Auto] (AUtO) 0 to 10 Hz	[Auto] (AUtO)
bEn ★	❏ **[Brake engage freq]** See page 234 Brake engage frequency threshold	[Auto] (AUtO) 0 to 10 Hz	[Auto] (AUtO)
tbE ★	❏ **[Brake engage delay]** See page 234 Time delay before request to engage brake. To delay the engaging of the brake, for horizontal movement only, if you wish the brake to engage when the drive comes to a complete stop.	0 to 5.00 s	0 s

(1) If a graphic display terminal is not in use, values greater than 9999 will be displayed on the 4-digit display with a period mark after the thousand digit, e.g., 15.65 for 15650.
(2) In corresponds to the rated drive current indicated in the Installation Manual or on the drive nameplate.

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

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[1.3 SETTINGS] (SEt-)

Code	Name/Description	Adjustment range	Factory setting
bEt ★	❑ **[Brake engage time]** See page 234 Brake engage time (brake response time)	0.00 to 5.00 s	0.30 s
JdC ★	❑ **[Jump at reversal]** See page 235	[Auto] (AUtO) 0 to 10 Hz	[Auto] (AUtO)
ttr ★	❑ **[Time to restart]** See page 235 Time between the end of a brake engage sequence and the start of a brake release sequence.	0 to 5.00 s	0 s
tLIM ★	❑ **[Motoring torque lim]** See page 244 Torque limitation in generator mode, as a whole % or in 0.1% increments of the rated torque in accordance with the [Torque increment] (IntP) parameter, page 244.	0 to 300 %	100 %
tLIG ★	❑ **[Gen. torque lim]** See page 244 Torque limitation in generator mode, as a whole % or in 0.1% increments of the rated torque in accordance with the [Torque increment] (IntP) parameter, page 244.	0 to 300 %	100 %
Ctd	❑ **[Current threshold]** Current threshold for [I attained] (CtA) function assigned to a relay or a logic output (see page 182).	0 to 1.36 In (1)	In (1)
ttH	❑ **[High torque thd.]** High current threshold for [High tq. att.] (ttHA) function assigned to a relay or a logic output (see page 182), as a % of the rated motor torque.	-300% to +300%	100 %
ttL	❑ **[Low torque thd.]** Low current threshold for [Low tq. att.] (ttLA) function assigned to a relay or a logic output (see page 182), as a % of the rated motor torque.	-300% to +300%	50 %

(1) In corresponds to the rated drive current indicated in the Installation Manual or on the drive nameplate.

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

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[1.3 SETTINGS] (SEt-)

Code	Name/Description	Adjustment range	Factory setting
F 9 L ★	❑ **[Pulse warning thd.]** Speed threshold measured by the [FREQUENCY METER] (FqF-) function, page 279, assigned to a relay or a logic output (see page 182).	0 Hz at 30.00 kHz	0 Hz
F t d	❑ **[Freq. threshold]** Frequency threshold for [Freq.Th.att.] (FtA) function assigned to a relay or a logic output (see page 182), or used by the [PARAM. SET SWITCHING] (MLP-) function, page 252.	0.0 to 1,600 Hz	[High speed] (HSP)
F 2 d	❑ **[Freq. threshold 2]** Frequency threshold for [Freq. Th. 2 attain.] (F2A) function assigned to a relay or a logic output (see page 182), or used by the [PARAM. SET SWITCHING] (MLP-) function, page 252.	0.0 to 1,600 Hz	[High speed] (HSP)
F F t ★	❑ **[Freewheel stop Thd]** See page 221 This parameter supports switching from a ramp stop or a fast stop to a freewheel stop below a low speed threshold. It can be accessed if [Type of stop] (Stt) = [Fast stop] (FSt) or [Ramp stop] (rMP). ☐ 0.0: Does not switch to freewheel stop. ☐ 0.1 to 1,600 Hz: Speed threshold below which the motor will switch to freewheel stop.	0.0 to 1,600 Hz	0.0
t t d ★	❑ **[Motor therm. level]** See page 267 Trip threshold for motor thermal alarm (logic output or relay).	0 to 118 %	100 %
L b C ★	❑ **[Load correction]** See page 162 Rated correction in Hz.	0 to 1,000 Hz	0

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

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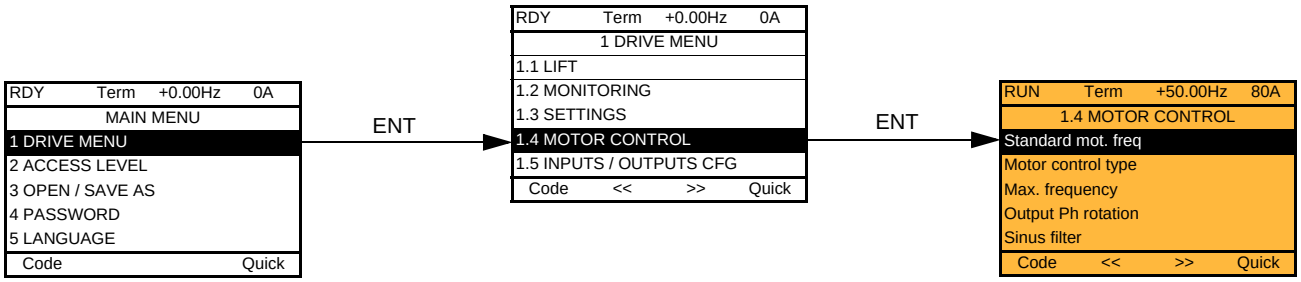
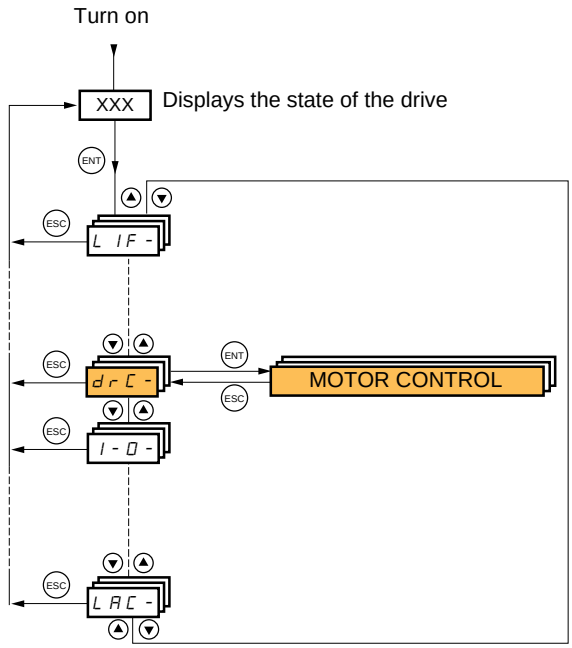
[1.4 MOTOR CONTROL] (drC-)

With graphic display terminal:



With integrated display terminal:



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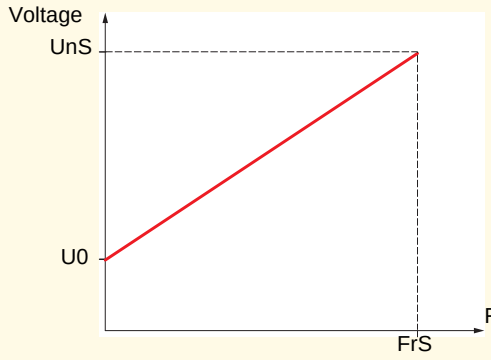
[1.4 MOTOR CONTROL] (drC-)

The parameters in the [1.4 MOTOR CONTROL] (drC-) menu can only be modified when the drive is stopped and no run command is present, with the following exceptions:

- [Auto tuning] (tUn) page 154 and [Angle auto-test] (ASA) page 151, which can cause the motor to start up.
- Parameters containing the sign ( ) in the code column, which can be modified with the drive running or stopped.

Code	Name/Description	Adjustment range	Factory setting
bFr	**[Standard mot. freq]**		
50	☐ **[50Hz IEC]** (50): IEC		
60	☐ **[60Hz NEMA]** (60): NEMA This parameter modifies the presets of the following parameters: [High speed] (HSP) page 126, [Freq. threshold] (Ftd) page 135, [Rated motor volt.] (UnS) page 143, [Rated motor freq.] (FrS) page 143 and [Max frequency] (tFr) page 138.		
Ctt	**[Motor control type]**		[SVC V] (UUC)
UUC	☐ **[SVC V]** (UUC): Open-loop voltage flux vector control with automatic slip compensation according to the load. This type of control is recommended when replacing an ATV58. It supports operation with a number of motors connected in parallel on the same drive (if the motors are identical).		
CUC	☐ **[SVC I]** (CUC): Open-loop current flux vector control. This type of control is recommended when replacing an ATV58F used in an open-loop configuration. It does not support operation with a number of motors connected in parallel on the same drive.		
FUC	☐ **[FVC]** (FUC): Closed-loop current flux vector control for motor with encoder. This selection is only possible if an encoder card has been inserted. This type of operation is not possible, however, when using an incremental encoder that generates signal "A" only. This type of control is recommended when replacing an ATV58F used in a closed-loop configuration. It provides better performance in terms of speed and torque accuracy and enables torque to be obtained at zero speed. It does not support operation with a number of motors connected in parallel on the same drive.		
UF2	☐ **[V/F 2pts]** (UF2): Simple V/F profile without slip compensation. It supports operation with: - Special motors (wound rotor, tapered rotor, etc.) - A number of motors in parallel on the same drive. - High-speed motors. - Motors with a low power rating in comparison to that of the drive.  The profile is defined by the values of parameters UnS, FrS and U0.		

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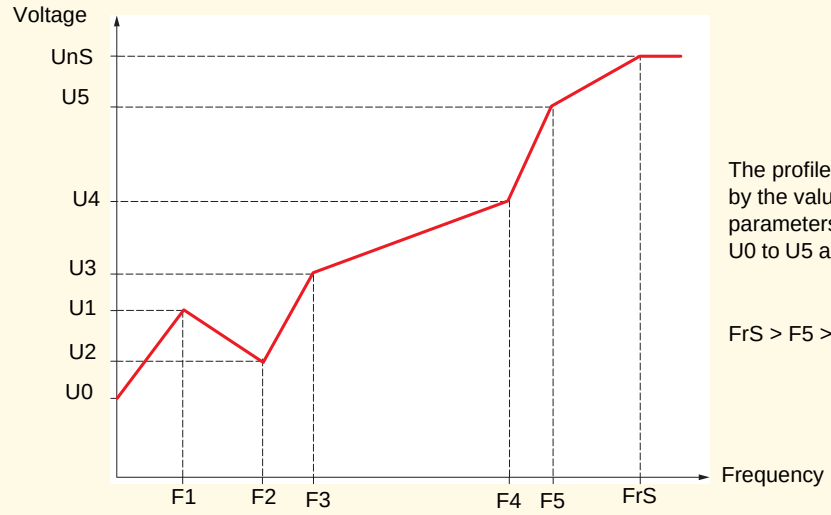
Code	Name/Description	Adjustment range	Factory setting

Ctt

❑ [Motor control type] (continued)

UF5

☐ **[V/F 5pts]** (UF5): 5-segment V/F profile: Similar to V/F 2 pts profile but also supports the avoidance of resonance phenomena (saturation).



The profile is defined by the values of parameters UnS, FrS, U0 to U5 and F0 to F5.

FrS > F5 > F4 > F3 > F2 > F1

SYn

☐ **[Sync. mot.]** (SYn): For permanent magnet synchronous motors with sinusoidal electromotive force (EMF) only. This selection makes the asynchronous motor parameters inaccessible, and the synchronous motor parameters accessible.

FSY

☐ **[Sync.CL]** (FSY): Closed-loop synchronous motor. For permanent magnet synchronous motors with sinusoidal electromotive force (EMF) only, with encoder. This selection is only possible if an encoder card has been inserted. It makes the asynchronous motor parameters inaccessible, and the synchronous motor parameters accessible.
This function is not possible, however, when using an incremental encoder that generates signal "A" only.

☞ **It is essential that the encoder check detailed on page 141 is performed successfully before selecting [Sync.CL] (FSY).**

tFr

❑ [Max frequency]

10 to 1,600 Hz

The factory setting is 60 Hz, or preset to 72 Hz if [Standard mot. freq] (bFr) is set to 60 Hz.
The maximum value is limited by the following conditions:

- It must not exceed 10 times the value of [Rated motor freq.] (FrS) page 143 for an asynchronous motor or [Nominal freq sync.] (FrSS) page 149 for a synchronous motor.
- It must not exceed 500 Hz if [Motor control type] (Ctt) (page 137) is not V/F
  Values between 500 Hz and 1600 Hz are only possible in V/F control. In this case, configure [Motor control type] (Ctt) before [Max frequency] (tFr).

PHr

❑ [Output Ph rotation]

[ABC] (AbC)

AbC

☐ **[ABC]** (AbC): Forward

ACb

☐ **[ACB]** (ACb): Reverse

This parameter can be used to reverse the direction of rotation of the motor without reversing the wiring.

☞ **Do not modify the [Output Ph rotation] (PHr) parameter when [Motor control type] (Ctt) page 137 = [FVC] (FUC) or [Sync.CL] (FSY).** The direction of rotation must be modified, if required, before or during the encoder check procedure detailed on page 141, when [Motor control type] (Ctt) is not [FVC] (FUC) or [Sync.CL] (FSY). Otherwise, checking and measuring procedures must be performed again ([Angle auto-test] (ASA) and [Angle offset value] (ASU) return to [No] (nO)).

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[1.4 MOTOR CONTROL] (drC-)

Code	Name/Description	Adjustment range	Factory setting
OFI nO YES	❑ **[Sinus filter]** ☐ **[No]** (nO): No sinus filter ☐ **[Yes]** (YES): Use of a sinus filter, to limit overvoltages on the motor and reduce the ground fault leakage current. **CAUTION** If [Sinus filter] (OFI) = [Yes] (YES), [Max frequency] (tFr) page 138 **must not exceed 100 Hz**. **Failure to follow this instruction can result in equipment damage.**		[No] (nO)
SFr ( )	❑ **[Switching freq.]** (1) See page 106.	According to rating	According to rating

(1) Parameter can also be accessed in the [1.3 SETTINGS] (SEt-) menu and [1.1 LIFT] (LIF-) menu.

I

( ) Parameter that can be modified during operation or when stopped.

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542 291 58 92 - 0 242 335 40 42

[1.4 MOTOR CONTROL] (drC-)

Code	Name/Description	Adjustment range	Factory setting
CLI	❏ **[Current Limitation]** (1) Used to limit the motor current. ☞ **Note:** If the setting is less than 0.25 In, the drive may lock in Output Phase Loss (OPF) fault mode if this has been enabled (see page 268). If it is less than the no-load motor current, the limitation no longer has any effect. **CAUTION** Check that the motor will withstand this current, particularly in the case of permanent magnet synchronous motors, which are susceptible to demagnetization. **Failure to follow this instruction can result in equipment damage.**	0 to 1.36 In (2)	1.36 In (2)

(1) Parameter can also be accessed in the [1.3 SETTINGS] (SEt-) menu.
(2) In corresponds to the rated drive current indicated in the Installation Manual and on the drive nameplate.

Parameter that can be modified during operation or when stopped.

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542 291 58 92 - 0 242 335 40 42

[1.4 MOTOR CONTROL] (drC-)

Selecting the encoder

Follow the recommendations in the catalog and the Installation Manual.

Note 1: When an encoder is used with a VW3 A3 408 or VW3 A3 409 card, it is only possible to configure the "encoder" input for speed feedback. Functions can only be configured as references or inputs with a VW3 A3 401 to 407 and VW3 A3 411 card.
Note 2: When an encoder is used with a VW3 A3 409 card, the drive remains locked in stop mode (and displays nSt or nLp) if the encoder is not fully configured.

Encoder check procedure

This procedure applies to all types of encoder.

1. Configure the parameters of the encoder used, pages 178 to 181.

2. Set [Motor control type] (Ctt) to a value other than [FVC] (FUC) and [Sync.CL] (FSY), even if it is the required configuration. For example, use [SVC V] (UUC) for an asynchronous motor and [Sync. mot.] (SYn) for a synchronous motor.

3. Configure the motor parameters in accordance with the specifications on the rating plate.
   - Asynchronous motor (see page 143): [Rated motor power] (nPr), [Rated motor volt.] (UnS), [Rated mot. current] (nCr), [Rated motor freq.] (FrS), [Rated motor speed] (nSP).
   - Synchronous motor (see page 148): [Nominal I sync] (nCrS), [Nom motor spdsync] (nSPS), [Pole pairs.] (PPnS), [Syn. EMF constant] (PHS), [Autotune L d-axis] (LdS), [IAutotune L q-axis] (LqS), [Cust. stator R syn] (rSAS). [Current limitation] (CLI) must not exceed the maximum motor current, **otherwise demagnetization may occur**.

4. Set [Encoder usage] (EnU) = [No] (nO).

5. Perform auto-tuning.

6. Set [Encoder check] (EnC) = [Yes] (YES).

7. Check that the rotation of the motor is safe.

8. Set the motor rotating at stabilized speed ≈ 15% of the rated speed for at least 3 seconds, and use the [1.2-MONITORING] (SUP-) menu to monitor its behavior.

9. If it trips on an [Encoder fault] (EnF), [Encoder check] (EnC) returns to [No] (nO).
   - Check the parameter settings and perform auto-tuning again (see steps 1 to 5 above).
   - Check that the mechanical and electrical operation of the encoder, its power supply and connections are all OK.
   - Reverse the direction of rotation of the motor ([Output Ph rotation] (PHr) parameter page 138) or the encoder signals.

10. Repeat the operations from step 6 onwards until [Encoder check] (EnC) changes to [Done] (dOnE).

11. If necessary, change [Motor control type] (Ctt) to [FVC] (FUC) or [Sync.CL] (FSY). In the case of [Sync.CL] (FSY), go on to perform the "Procedure for measuring the phase-shift angle between the motor and the encoder" page 150.

www.eforsan.com.tr
542 291 58 92 - 0 242 335 40 42

[1.4 MOTOR CONTROL] (drC-)

Code	Name/Description	Adjustment range	Factory setting
EnS-	**[ENCODER FEEDBACK]** Can only be accessed if an encoder card has been inserted.		
EnC	❏ **[Encoder check]** Check encoder feedback. See procedure on previous page. This parameter can be accessed if an encoder card has been inserted (1). nO ☐ **[Not done]** (nO): Check not performed. YES ☐ **[Yes]** (YES): Activates monitoring of the encoder. dOnE ☐ **[Done]** (dOnE): Check performed successfully. The check procedure checks: - The direction of rotation of the encoder/motor - The presence of signals (wiring continuity) - The number of pulses/revolution If a fault is detected, the drive locks in [Encoder fault] (EnF) fault mode.		[Not done] (nO)
EnU	❏ **[Encoder usage]** This parameter can be accessed if an encoder card has been inserted (1). nO ☐ **[No]** (nO): Function inactive. SEC ☐ **[Fdbk monit.]** (SEC): The encoder provides speed feedback for monitoring only. rEG ☐ **[Spd fdk reg.]** (rEG): The encoder provides speed feedback for regulation and monitoring. This configuration is automatic if the drive is configured for closed-loop operation ([Motor control type] (Ctt) = [FVC] (FUC) or [Sync.CL] (FSY). If [Motor control type] (Ctt) = [SVC V] (UUC) the encoder operates in speed feedback mode and enables static correction of the speed to be performed. This configuration is not accessible for other [Motor control type] (Ctt) values. PGr ☐ **[Speed ref.]** (PGr): The encoder provides a reference. Can only be selected with an incremental encoder card.		[No] (nO)

(1) The encoder parameters can only be accessed if the encoder card has been inserted, and the available selections will depend on the type of encoder card used. The encoder configuration can also be accessed in the [1.5 - INPUTS / OUTPUTS CFG] (I/O) menu.

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542 291 58 92 - 0 242 335 40 42

[1.4 MOTOR CONTROL] (drC-)

Asynchronous motor parameters:

These parameters can be accessed if [Motor control type] (Ctt) page 137 = [SVC V] (UUC), [SVC I] (CUC), [FVC] (FUC), [V/F 2pts] (UF2) or [V/F 5pts] (UF5). In this case, the synchronous motor parameters cannot be accessed.

Code	Name/Description	Adjustment range
ASY-	**[ASYNC. MOTOR]** Can only be accessed if [Motor control type] (Ctt) page 137 = [SVC V] (UUC), [SVC I] (CUC), [FVC] (FUC), [V/F 2pts] (UF2), or [V/F 5pts] (UF5).	
nPr	❑ **[Rated motor power]** Rated motor power given on the nameplate, in kW if [Standard mot. freq] (bFr) = [50Hz IEC] (50), in HP if [Standard mot. freq] (bFr) = [60Hz NEMA] (60).	Acc. to drive rating
UnS	❑ **[Rated motor volt.]** Rated motor voltage given on the nameplate. ATV71L●●●M3XZ: 100 to 240 V, ATV71L●●●N4Z: 200 to 480 V	Acc. to drive rating
nCr	❑ **[Rated mot. current]** Rated motor current given on the nameplate.	0.25 to 1.5 In (1)
FrS	❑ **[Rated motor freq.]** Rated motor frequency given on the nameplate. The factory setting is 50 Hz, or preset to 60 Hz if [Standard mot. freq] (bFr) is set to 60 Hz. The maximum value is limited to 500 Hz if [Motor control type] (Ctt) (page 137) is not V/F. Values between 500 Hz and 1,600 Hz are only possible in V/F control. In this case, configure [Motor control type] (Ctt) before [Rated motor freq.] (FrS).	10 to 1,600 Hz
InSP 1 10	❑ **[rpm increment]** Increment of parameter [Rated motor speed] (nSP). ☐ **[x1 rpm]** (1): Increment of 1 rpm, to be used if [Rated motor speed] (nSP) does not exceed 65535 rpm. ☐ **[x10 rpm]** (10): Increment of 10 rpm, to be used if [Rated motor speed] (nSP) exceeds 65535 rpm. ☞ **Note:** Changing [rpm increment] (InSP) will restore [Rated motor speed] (nSP) to its factory setting.	
nSP	❑ **[Rated motor speed]** Rated motor speed given on the nameplate. Adjustable between 0 and 65535 rpm if [rpm increment] (InSP) = [x1 rpm] (1) or between 0.00 and 96.00 krpm if [rpm increment] (InSP) = [x10 rpm] (10). 0 to 9999 rpm then 10.00 to 65.53 or 96.00 krpm on the integrated display terminal. If, rather than the rated speed, the nameplate indicates the synchronous speed and the slip in Hz or as a %, calculate the rated speed as follows: • Rated speed = Synchronous speed x $\frac{100 - \text{slip as a \%}}{100}$ or • Rated speed = Synchronous speed x $\frac{50 - \text{slip in Hz}}{50}$ (50 Hz motors) or • Rated speed = Synchronous speed x $\frac{60 - \text{slip in Hz}}{60}$ (60 Hz motors)	0 to 96000 rpm

(1) In corresponds to the rated drive current indicated in the Installation Manual and on the drive nameplate.

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Code	Name/Description	Adjustment range	Factory setting
ASY-	**[ASYNC. MOTOR]** (continued)		
U0	❑ **[U0]**	0 to 600 or 1000 V according to rating	0
	V/F profile setting. This parameter can be accessed if [Motor control type] (Ctt) = [V/F 2pts] (UF2) or [V/F 5pts] (UF5)		
U1	❑ **[U1]**	0 to 600 or 1000 V according to rating	0
	V/F profile setting. This parameter can be accessed if [Motor control type] (Ctt) = [V/F 5pts] (UF5)		
F1	❑ **[F1]**	0 to 1,600 Hz	0
	V/F profile setting. This parameter can be accessed if [Motor control type] (Ctt) = [V/F 5pts] (UF5)		
U2	❑ **[U2]**	0 to 600 or 1000 V according to rating	0
	V/F profile setting. This parameter can be accessed if [Motor control type] (Ctt) = [V/F 5pts] (UF5)		
F2	❑ **[F2]**	0 to 1,600 Hz	0
	V/F profile setting. This parameter can be accessed if [Motor control type] (Ctt) = [V/F 5pts] (UF5)		
U3	❑ **[U3]**	0 to 600 or 1000 V according to rating	0
	V/F profile setting. This parameter can be accessed if [Motor control type] (Ctt) = [V/F 5pts] (UF5)		
F3	❑ **[F3]**	0 to 1,600 Hz	0
	V/F profile setting. This parameter can be accessed if [Motor control type] (Ctt) = [V/F 5pts] (UF5)		
U4	❑ **[U4]**	0 to 600 or 1000 V according to rating	0
	V/F profile setting. This parameter can be accessed if [Motor control type] (Ctt) = [V/F 5pts] (UF5)		
F4	❑ **[F4]**	0 to 1,600 Hz	0
	V/F profile setting. This parameter can be accessed if [Motor control type] (Ctt) = [V/F 5pts] (UF5)		
U5	❑ **[U5]**	0 to 600 or 1000 V according to rating	0
	V/F profile setting. This parameter can be accessed if [Motor control type] (Ctt) = [V/F 5pts] (UF5)		
F5	❑ **[F5]**	0 to 1,600 Hz	0
	V/F profile setting. This parameter can be accessed if [Motor control type] (Ctt) = [V/F 5pts] (UF5)		

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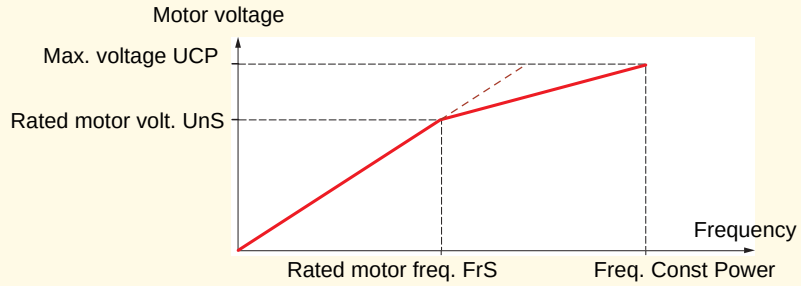
542 291 58 92 - 0 242 335 40 42

Code	Name/Description	Adjustment range	Factory setting
ASY-	**[ASYNC. MOTOR]** (continued)		
UC2 nO YES	❏ **[Vector Control 2pt]** ☐ **[No]** (nO): Function inactive. ☐ **[Yes]** (YES): Function active. Used in applications in which the motor rated speed and frequency need to be exceeded in order to optimize operation at constant power, or when the maximum voltage of the motor needs to be limited to a value below the line voltage. The voltage/frequency profile must then be adapted in accordance with the motor's capabilities to operate at maximum voltage UCP and maximum frequency FCP.  		[No] (nO)
UCP	❏ **[V. constant power]** This parameter can be accessed if [Vector Control 2pt] (UC2) = [Yes] (YES)	According to drive rating	According to drive rating and [Standard mot. freq] (bFr)
FCP	❏ **[Freq. Const Power]** This parameter can be accessed if [Vector Control 2pt] (UC2) = [Yes] (YES)	According to drive rating and [Rated motor freq.] (FrS)	= [Standard mot. freq] (bFr)
SLP ↻	❏ **[Slip compensation]** (1) This parameter can be accessed if [Motor control type] (Ctt) is not [V/F 2pts] (UF2) or [V/F 5pts] (UF5). Adjusts the slip compensation around the value set by the rated motor speed. The speeds given on motor nameplates are not necessarily exact. • If slip setting < actual slip: the motor is not rotating at the correct speed in steady state, but at a speed lower than the reference. • If slip setting > actual slip: The motor is overcompensated and the speed is unstable.	0 to 300%	100%

(1) Parameter can also be accessed in the [1.3 SETTINGS] (SEt-) menu.

↻ Parameter that can be modified during operation or when stopped.

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542 291 58 92 - 0 242 335 40 42

[1.4 MOTOR CONTROL] (drC-)

Asynchronous motor parameters that can be accessed in [Expert] mode

These include:

- Special parameters.
- Parameters calculated by the drive during auto-tuning, in read-only mode. For example, [Stator R measured](rSM), calculated cold stator resistance.
- The possibility of replacing some of these calculated parameters with other values, if necessary. For example, [Cust stator resist.](rSA), measured cold stator resistance.

When a parameter is modified by the user, the drive uses it in place of the calculated parameter.

If auto-tuning is performed or if one of the motor parameters on which auto-tuning depends is modified ([Rated motor volt.] (UnS), [Rated motor freq.] (FrS), [Rated mot. current] (nCr), [Rated motor speed] (nSP), [Rated motor power] (nPr)), the modified parameters return to their factory setting.

Code	Name/Description	Adjustment range	Factory setting
ASY-	**[ASYNC. MOTOR]** (continued)		
rSM	❑ **[Stator R measured]** Cold stator resistance, calculated by the drive, in read-only mode. Value in milliohms (mΩ) up to 75 kW (100 HP), and in hundredths of milliohms (mΩ/100) above 75 kW (100 HP).		
IdM	❑ **[Idr]** Magnetizing current in A, calculated by the drive, in read-only mode.		
LFM	❑ **[Lfr]** Leakage inductance in mH, calculated by the drive, in read-only mode.		
trM	❑ **[T2r]** Rotor time constant in mS, calculated by the drive, in read-only mode.		
nSL	❑ **[Nominal motor slip]** Nominal slip in Hz, calculated by the drive, in read-only mode. To modify the nominal slip, modify the [Rated motor speed] (nSP) (page 143).		
PPn	❑ **[Poles pair number]** Number of pairs of poles, calculated by the drive, in read-only mode.		

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542 291 58 92 - 0 242 335 40 42

[1.4 MOTOR CONTROL] (drC-)

Asynchronous motor parameters that can be accessed in [Expert] mode, continued

Code	Name/Description
ASY-	**[ASYNC. MOTOR]** (continued)
rSA	❑ **[Cust stator resist.]** Cold state stator resistance (per winding), modifiable value. In milliohms (mΩ) up to 75 kW (100 HP), and in hundredths of milliohms (mΩ/100) above 75 kW (100 HP). On the integrated display unit: 0 to 9999 then 10.00 to 65.53 (10000 to 65536).
IdA	❑ **[Idw]** Magnetizing current in A, modifiable value.
LFA	❑ **[Lfw]** Leakage inductance in mH, modifiable value.
trA	❑ **[Cust. rotor t const.]** Rotor time constant in mS, modifiable value.

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542 291 58 92 - 0 242 335 40 42

[1.4 MOTOR CONTROL] (drC-)

Synchronous motor parameters:

These parameters can be accessed if [Motor control type] (Ctt) page 137 = [Sync. mot.] (SYn) or [Sync.CL] (FSY). In this case, the asynchronous motor parameters cannot be accessed.

☞ **Important:** For synchronous motors, it is crucial to set the current limit. See [Current Limitation] (CLI) page 140.

CAUTION

Check that the motor will withstand this current, particularly in the case of permanent magnet synchronous motors, which are susceptible to demagnetization.
Failure to follow this instruction can result in equipment damage.

Code	Name/Description	Adjustment range	Factory setting
SYn-	**[SYNCHRONOUS MOTOR]** Can only be accessed if [Motor control type] (Ctt) page 137 = [Sync.CL] (FSY) or [Sync. mot.] (SYn).		
nCrS	❏ **[Nominal I sync.]** Rated synchronous motor current given on the nameplate.	0.25 to 1.5 In (1)	According to drive rating
nSPS	❏ **[Nom motor spdsync]** Rated synchronous motor speed given on the nameplate. On the integrated display unit: 0 to 9999 rpm then 10.00 to 60.00 krpm.	0 to 60000 rpm	According to drive rating
PPnS	❏ **[Pole pairs]** Number of pairs of poles on the synchronous motor.	1 to 50	According to drive rating
IPHS	❏ **[Increment EMF]** Increment for the [Syn. EMF constant] (PHS) parameter. ☐ **[0.1 mV/rpm]** (0.1): 0.1mV per rpm ☐ **[1 mV/rpm]** (1): 1mV per rpm		[0.1mV/rpm] (0.1)
PHS	❏ **[Syn. EMF constant]** Synchronous motor EMF constant, in 0.1 mV per rpm or 1 mV per rpm (peak voltage per phase), according to the value of [Increment EMF] (IPHS). On the integrated display unit: 0 to 9999 then 10.00 to 65.53 (10000 to 65536).	0 to 65535	According to drive rating
LdS	❏ **[Autotune L d-axis]** Axis "d" stator inductance in mH (per phase). On motors with smooth poles [Autotune L d-axis] (LdS) = [Autotune L q-axis] (LqS) = Stator inductance L.	0 to 655.3	According to drive rating
LqS	❏ **[Autotune L q-axis]** Axis "q" stator inductance in mH (per phase). On motors with smooth poles [Autotune L d-axis] (LdS) = [Autotune L q-axis] (LqS) = Stator inductance L.	0 to 655.3	According to drive rating
rSAS	❏ **[Cust. stator R syn]** Cold state stator resistance (per winding) The factory setting is replaced by the result of the auto-tuning operation, if it has been performed. The value can be entered by the user, if he knows it. Value in milliohms (mΩ) up to 75 kW (100 HP), and in hundredths of milliohms (mΩ/100) above 75 kW (100 HP). On the integrated display unit: 0 to 9999 then 10.00 to 65.53 (10000 to 65536).	According to drive rating	According to drive rating

(1) In corresponds to the rated drive current indicated in the Installation Manual and on the drive nameplate.

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542 291 58 92 - 0 242 335 40 42

Code	Name/Description
SYn-	**[SYNCHRONOUS MOTOR]** (continued)
rEtP	**❏ [Read motor param.]** [No] (nO) **This parameter can only be used with BDH, BRH and BSH type motors from the Telemecanique range.** Can only be accessed if [Encoder protocol] (UECP) page 180 = [Hiperface] (SCHP). Request to load motor parameters from the encoder EEPROM memory. nO ☐ **[No]** (nO): Loading not performed or has failed. YES ☐ **[Yes]** (YES): Loading is performed as soon as possible, then the parameter automatically changes to [Done] (dOnE). dOnE ☐ **[Done]** (dOnE): Loading done. The following parameters are loaded: [Angle offset value] (ASU) page 152, [Nom motor spdsync] (nSPS) page 148, [Nominal I sync.] (nCrS) page 148, [Pole pairs] (PPnS) page 148, [Syn. EMF constant] (PHS) page 148, [Cust. stator R syn] (rSAS) page 148, [Autotune L d-axis] (LdS) page 148, and [Autotune L q-axis] (LqS) page 148. ☞ **Note:** • During loading the drive is in "Freewheel Stop" state with the motor turned off. • If a "line contactor" or "output contactor" function has been configured, the contactor closes during loading.
rEtP	**❏ [Status motor param]** [Not done] (tAb) Can only be accessed if [Encoder protocol] (UECP) page 180 = [Hiperface] (SCHP). Information on the request to load motor parameters from the encoder EEPROM memory (not modifiable). tAb ☐ **[Not done]** (tAb): Loading has not been performed, default motor parameters will be used. PrOG ☐ **[In progress]** (PrOG): Loading in progress. FAIL ☐ **[Failed]** (FAIL): Loading has failed. dOnE ☐ **[Done]** (dOnE): Loading completed successfully. CUS ☐ **[Customized]** (CUS): Loading completed successfully but one or more motor parameters have subsequently been modified by the user via the display terminal or serial link, or auto-tuning has been performed by [Auto-tuning] (tUn).

Synchronous motor parameters that can be accessed in [Expert] mode

Code	Name/Description
SYn-	**[SYNCHRONOUS MOTOR]** (continued)
rSnS	**❏ [R1rS]** Cold state stator resistance (per winding), in read-only mode. This is the drive factory setting or the result of the auto-tuning operation, if it has been performed. Value in milliohms (mΩ) up to 75 kW (100 HP), and in hundredths of milliohms (mΩ/100) above 75 kW (100 HP). On the integrated display unit: 0 to 9999 then 10.00 to 65.53 (10000 to 65536).
FrSS	**❏ [Nominal freq sync.]** Motor frequency at rated speed in Hz, calculated by the drive (rated motor frequency), in read-only mode.

(1) Parameter can also be accessed in the [1.3 SETTINGS] (SEt-) menu.
(2) In corresponds to the rated drive current indicated in the Installation Manual and on the drive nameplate.

Parameter that can be modified during operation or when stopped.

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542 291 58 92 - 0 242 335 40 42

Closed-loop synchronous motor

Operation on a synchronous motor in a closed loop configuration requires an encoder providing the exact position of the motor rotor. The phase-shift angle of the encoder in relation to the rotor must therefore be determined. The drive can perform this measurement automatically.

Selecting a resolver type encoder

If the number of motor poles is not a whole multiple of the number of resolver poles, the resolver is a relative encoder and no longer absolute. You should therefore set the [Angle setting activ.] (AtA) parameter = [Power On] (POn) or [Run order] (AUtO).

Procedure for measuring the phase-shift angle between the motor and the encoder

Preliminary remarks:
Select the [Angle setting type] (ASt) measuring mode according to the type of machine being driven:

- [Angle setting type] (ASt) = [W/o load] (nLd): Measurement with motion, if the rotation of the motor is free (no load, brake released) and safe. During measurement current flows through the motor, which may cause it to rotate one full revolution.

WARNING

UNINTENDED EQUIPMENT OPERATION

Check that the rotation of the motor will not cause any dangerous movements.

Failure to follow this instruction can result in death or serious injury.

- [Angle setting type] (ASt) = [With load] (brC): Measurement without motion, motor with or without load, brake engaged or released. This mode is recommended for a lift, for example. **You must adhere to the following instructions:**
  - The motor rotor must not move during measurement, otherwise the result will be incorrect.
  - In some cases, the measurement current can cause tripping on an [Overcurrent] (OCF) fault; if so, use [W/o load] (nLd) mode. This occurs when using low-inductance motors, high-speed motors, or motors in which the rated voltage is well below the supply voltage of the drive.
  - In some cases, the measurement can cause tripping on an [Angle error] (ASF) fault. This occurs if the motor rotor has moved during measurement (only detected in closed-loop mode), a motor phase is disconnected or if the motor inductance is too high, thus limiting the measurement current (in this case, use [W/o load] (nLd) mode).
- [Angle setting type] (ASt) = [Optimised] (brCO): Measurement without motion, possible with or without load, brake engaged or released. Optimizing the angle detection time, based on the second detection request, even after the product has been turned off.

1. First, follow the "Encoder check procedure" on page 141.
2. Set [Motor control type] (Ctt) = [Sync.CL] (FSY).
3. If you have selected [Angle setting type] (ASt) = [W/o load] (nLd): For measurement with motion, check that the motor is running safely and can turn freely **without resistive or driving torque**. **If these conditions are not met, the resulting measurement will be inaccurate.**
4. Set [Angle auto-test] (ASA) = [Yes] (YES). The measurement is performed and [Angle auto-test] (ASA) changes to [Done] (dOnE). The [Angle offset value] (ASU) parameter changes from [No] (nO) to a numerical value proportional to the electrical angle measured (8191 = 360°).
5. If required, configure automatic measurements using [Angle setting activ.] (AtA). If [Angle setting type] (ASt) = [W/o load] (nLd), ensure that the safety conditions outlined earlier are met at all times.
   If using a relative encoder (incremental or SinCos), it is recommended that you set [Angle setting activ.] (AtA) = [Power On] (POn) or [Run order] (AUtO).
6. If an [Angle error] (ASF) fault occurs, [Angle auto-test] (ASA) returns to [No] (nO).
   - Check that the parameters and instructions relating to this procedure have been carried out correctly and perform the measurement again.

Notes

The phase-shift angle must be re-measured each time:

- The motor is changed
- The encoder is changed
- The coupling between the motor and encoder is removed
- The [Output Ph rotation] (PHr) parameter is modified
- The [Coder rotation inv.] (EnRI) parameter is modified.

If a relative encoder (incremental or SinCos) is used, measurement must be repeated each time the motor is turned off/on. It is therefore recommended that you set [Angle setting activ.] (AtA) = [Power On] (POn) or [Run order] (AUtO).

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542 291 58 92 - 0 242 335 40 42

Code	Name/Description	Adjustment range
ASA-	**[ANGLE TEST SETTING]** Can only be accessed if [Motor control type] (Ctt) page 137 = [Sync.CL] (FSY)	
ASt brC nLd brCO	**❏ [Angle setting type]** Mode for measuring the phase-shift angle between the motor and the encoder. ☐ **[With load]** (brC): Measurement without motion, possible with or without load, brake engaged or released. ☐ **[W/o load]** (nLd): Measurement with motion, only for free motors (brake released), without load. ☐ **[Optimized]** (brCO): Measurement without motion, possible with or without load, brake engaged or released. Optimizing the angle detection time, based on the second detection request, even after the product has been turned off. ☞ **Note:** If [Angle setting type] (ASt) = [W/o load] (nLd), the motor may rotate one full revolution during measurement.	[With load] (brC)
ASA nO YES donE	**❏ [Angle auto-test]** Measurement of the phase-shift angle between the motor and the encoder. ☐ **[No]** (nO): Measurement not performed or has failed, or [Output Ph rotation] (PHr) has been modified, or [Coder rotation Inv.] (EnRI) has been modified. ☐ **[Yes]** (YES): Measurement is performed as soon as possible, then the parameter automatically changes to [Done] (dOnE). ☐ **[Done]** (dOnE): Use of the value given the last time the measurement was performed. **Important:** • It is essential that all the motor parameters are configured correctly before performing measurements: - [Nominal I sync.] (nCrS), [Current Limitation] (CLI), [Nom motor spdsync] (nSPS), [Pole pairs] (PPnS), [Syn. EMF constant] (PHS), [Autotune L d-axis] (LdS), [Autotune L q-axis] (LqS), [Cust. stator R syn] (rSAS). • Measurement is only performed if no stop command has been activated. If a "freewheel stop" or "fast stop" function has been assigned to a logic input, this input must be inactive. • Measurement takes priority over any run commands, which will be taken into account after the measurement sequence. • If measurement fails, the drive displays [No] (nO) and changes to [Angle Error] (ASF) fault mode. • Measurement may take several seconds. Do not interrupt the process. Wait for the display to change to "[Done] (dOnE)" or "[No] (nO)". ☞ **Note:** If a "line contactor" or "output contactor" function has been configured, the contactor closes during measurement.	[No] (nO)
ASL nO LI1 - - -	**❏ [Angle auto test]** Measurement of the phase-shift angle between the motor and the encoder by means of a logic input or command bit. ☐ **[No]** (nO): Not assigned ☐ **[LI1]** (LI1) : : ☐ **[...]** (...): See the assignment conditions on page 204. Measurement is performed when the assigned bit or input changes to 1. ☞ **Note:** If a "line contactor" or "output contactor" function has been configured, the contactor closes during measurement.	[No] (nO)

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542 291 58 92 - 0 242 335 40 42

Code	Name/Description	Adjustment range
ASA-	**[ANGLE TEST SETTING]** (continued)	
AtA nO POn AUtO	❏ **[Angle setting activ.]**	[Run order] (AUtO):
	Activation of automatic measurement of the phase-shift angle between the motor and encoder when using a relative encoder (incremental or SinCos). ☐ **[No]** (nO): Function inactive. ☐ **[Power On]** (POn): Measurement is performed on each power-up (1). ☐ **[Run order]** (AUtO): Measurement is performed on each run command if necessary, i.e., if parameter [Angle offset value] (ASU) is set to [No] (nO). This option is recommended for use with a VW3 A3 401 to 407 card, and with the VW3 A3 411 card when the "line contactor" function has been configured (loss of angle on each stop) (1). If [Angle setting activ.] (AtA) = [Power On] (POn) or [Run order] (AUtO), it is advisable to set [Angle setting type] (ASt) = [With load] (brC). ☞ **Note:** If a "line contactor" or "output contactor" function has been configured, the contactor closes during measurement. **Note:** At each multi-motor configuration switching, the drive performs an automatic measurement of the phase-shift angle at next run order.	
ASU nO -	❏ **[Angle offset value]**	[No] (nO)
	Phase-shift angle between the motor and the encoder. ☐ **[No]** (nO): Measurement has not been performed or has failed, or [Output Ph rotation] (PHr) has been modified, or measurement has been lost due to powering down (1), or [Coder rotation inv.] (EnRI) has been modified. ☐ 0 to 8191: Phase-shift angle. 8191 corresponds to 360°.	
AStS tAb PEnd PrOG FAIL dOnE CUS	❏ **[Angle setting status]**	[Not done] (tAb)
	Information on the phase-shift angle measurement between the motor and the encoder (cannot be modified). ☐ **[Not done]** (tAb): Phase-shift angle not defined. ☐ **[Pending]** (PEnd): Measurement requested but not yet performed. ☐ **[In progress]** (PrOG): Measurement in progress. ☐ **[Failed]** (FAIL): Measurement failed. ☐ **[Done]** (dOnE): Measurement performed successfully. ☐ **[Customized]** (CUS): The phase-shift angle value has been entered by the user via the display terminal or serial link.	

(1) Powering down causes a loss of measurement data in the following cases:

- With a VW3 A3 401 to 407 and VW3 A3 411 card:
  - Every time the power section is turned off, even if the drive control section has a separate power supply (for example, if the "line contactor" function has been configured).
- With a VW3 A3 409 card and a SinCos encoder:
  - Every time the power section is turned off, if the drive control section does not have a separate power supply.
  - Only when the drive control section is turned off (if it has a separate power supply via the 0 and P24 terminals).
  - If the resolver has a number of poles which is not a multiple of the number of motor poles.
- With a VW3 A3 410 card:
  - VW3 A3 410 card manage SINCOS encoders providing signal for the mechanical position of the rotor (if wired) in addition of standard sincos signals of the speed feedback.
  - This mechanical position information is useful with synchronous motor (PMSM) because no more angle test is required at power on (just one is needed at the installation as the absolute encoder).

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542 291 58 92 - 0 242 335 40 42

Code	Name/Description	Adjustment range	Factory setting
FLI-	**[FLUXING BY LI]** Cannot be accessed if [Motor control type] (Ctt) page 137 = [Sync.CL] (FSY).		
FLU ↻	**❑ [Motor fluxing]** (1)		[No] (FnO)
FnC	☐ **[Not cont.]** (FnC): Non-continuous mode		
FCt	☐ **[Continuous]** (FCt): Continuous mode. This option is not possible if [Angle setting type] (ASt) page 153 is [With load] (brC) or if [Auto DC Injection] (AdC) page 223 is [Yes] (YES) or if [Type of stop] (Stt) page 221 is [Freewheel] (nSt).		
FnO	☐ **[No]** (FnO): Function inactive. This option is not possible if [Motor control type] (Ctt) page 137 = [SVCI] (CUC) or [FVC] (FUC). If [Motor control type] (Ctt) page 137 = [SVCI] (CUC), [FVC] (FUC) or [Sync. mot.] (SYn), the factory setting is replaced by [Not Cont.] (FnC). In order to obtain rapid high torque on startup, magnetic flux needs to already have been established in the motor. • In [Continuous] (FCt) mode, the drive automatically builds up flux when it is powered up. • In [Not cont.] (FnC) mode, fluxing occurs when the motor starts up. The flux current is greater than nCr (configured rated motor current) when the flux is established and is then adjusted to the motor magnetizing current. **CAUTION** Check that the motor will withstand this current without overheating. **Failure to follow this instruction can result in equipment damage.** If [Motor control type] (Ctt) page 137 = [Sync. mot.] (SYn), the [Motor fluxing] (FLU) **parameter must be active** ([No] (FnO) is not permitted): this parameter causes rotor angle detection or alignment (according to the configuration of [Angle setting type] (ASt) page 151) and not fluxing. If [Brake assignment] (bLC) page 233 is not [No] (nO), the [Motor fluxing] (FLU) parameter has no effect.		
ASt	**❑ [Angle setting type]**		[With load] (brC)
	This parameter can be accessed only if [Motor control type] (Ctt) page 137 = [Sync. mot.] (SYn) Mode for measuring the phase-shift angle between the motor and the encoder.		
brC	☐ **[With load]** (brC): Measurement without motion, possible with or without load, brake engaged or released.		
nLd	☐ **[W/o load]** (nLd): Measurement with motion, only for free motors (brake released), without load.		
brCO	☐ **[Optimized]** (brCO): Measurement without motion, possible with or without load, brake engaged or released. Optimizing the angle detection time, based on the second detection request, even after the product has been turned off. ☞ **Note:** If [Angle setting type] (ASt) = [W/o load] (nLd), the motor may rotate one full revolution during measurement.		

(1) Parameter can also be accessed in the [1.3 SETTINGS] (SEt-) menu.

↻ Parameter that can be modified during operation or when stopped.

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542 291 58 92 - 0 242 335 40 42

Code	Name/Description	Adjustment range
tUn-	**[AUTOMATIC TUNE]**	
tUn nO YES dOnE	**❑ [Auto tuning]** ☐ **[No]** (nO): Auto-tuning not performed. ☐ **[Yes]** (YES): Auto-tuning is performed as soon as possible, then the parameter automatically changes to [Done] (dOnE). ☐ **[Done]** (dOnE): Use of the values given the last time auto-tuning was performed. **Important:** • It is essential that all the motor parameters are correctly configured before starting auto-tuning. - Asynchronous motor: [Rated motor volt.](UnS), [Rated motor freq.] (FrS), [Rated mot. current] (nCr), [Rated motor speed] (nSP), [Rated motor power] (nPr) page 143. - Synchronous motor: [Nominal I sync.] (nCrS), [Nom motor spdsync] (nSPS), [Pole pairs] (PPnS), [Syn. EMF constant] (PHS), [Autotune L d-axis] (LdS), [Autotune L q-axis] (LqS) page 148. If at least one of these parameters (except [Syn. EMF constant] (PHS), [Autotune L d-axis] (LdS), [Autotune L q-axis] (LqS)) is modified after auto-tuning has been performed, [Auto tuning] (tUn) will return to [No] (nO) and must be repeated. • Auto-tuning is only performed if no stop command has been activated. If a "freewheel stop" or "fast stop" function has been assigned to a logic input, this input must be inactive. • Auto-tuning takes priority over any run or prefluxing commands, which will be taken into account after the auto-tuning sequence. • If auto-tuning fails, the drive displays [No] (nO) and, depending on the configuration of [Autotune fault mgt] (tnL) page 280, may switch to [Auto-tuning] (tnF) fault mode. • Auto-tuning may last for 1 to 2 seconds. Do not interrupt the process. Wait for the display to change to "[Done] (dOnE)" or "[No] (nO)". ☞ **Note:** • During auto-tuning the motor operates at rated current. • If the "line contactor" or "output contactor" function has been configured, the contactor closes during auto-tuning.	[No] (nO)
AUt nO YES	**❑ [Automatic autotune]** ☐ **[No]** (nO): Function inactive. ☐ **[Yes]** (YES): Auto-tuning is performed on every power-up. **Important:** Same comments as for [Auto tuning] (tUn) above.	[No] (nO)
tUL nO LI1 - - -	**❑ [Auto-tune assign.]** Assignment of auto-tuning to a logic input or control bit. ☐ **[No]** (nO): Not assigned ☐ **[LI1]** (LI1) : : ☐ **[...]** (...): See the assignment conditions on page 204. Auto-tuning is performed when the assigned bit or input changes to 1. **Important:** Same comments as for [Auto tuning] (tUn) above.	[No] (nO)

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542 291 58 92 - 0 242 335 40 42

Code	Name/Description	Adjustment range
tUn-	**[AUTOMATIC TUNE]** (continued)	
tUS	❏ **[Auto tuning state]**	[Not done] (tAb)

For information only, cannot be modified.

- ☐ **[Not done]** (tAb): The default stator resistance value is used to control the motor.
- ☐ **[Pending]** (PEnd): Auto-tuning has been requested but not yet performed.
- ☐ **[In progress]** (PrOG): Auto-tuning in progress.
- ☐ **[Failed]** (FAIL): Auto-tuning has failed.
- ☐ **[Done]** (dOnE): The stator resistance measured by the auto-tuning function is used to control the motor.
- ☐ **[Customized]** (CUS): Auto-tuning has been performed but at least one of the parameters [Autotune L d-axis] (LdS), [Autotune L q-axis] (LqS) or [Cust. stator R syn] (rSAS) has subsequently been modified.

The following auto-tuning parameters are affected:

- [Cust stator resist.] (rSA), [Idw] (IdA), [LFw] (LFA) and [Cust. rotor t const.] (trA) page 147 for asynchronous motors.
- [Cust. stator R syn] (rSAS) page 148 for synchronous motors.

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[1.4 MOTOR CONTROL] (drC-)

Code	Name/Description	Adjustment range	Factory setting
SSL-	**[SPEED LOOP]**		
SFC ↻	❏ **[K speed loop filter]** (1) Speed loop filter coefficient. See page 68 for more details of the effect of this parameter.	0 to 100	According to [Motor control type] (Ctt)
SEA ↻	❏ **[Fr.Loop.Stab]** (1) Stability: Used to adapt the return to steady state after a speed transient, according to the dynamics of the machine. Gradually increase the stability to increase control loop attenuation and thus reduce any overspeed.	0 to 100 %	20 %
FLG ↻	❏ **[FreqLoopGain]** (1) Frequency loop gain: Used to adapt the pace of the machine speed transients according to the dynamics. For machines with high resistive torque, high inertia or fast cycles, increase the gain gradually. [FreqLoopGain] (FLG) is set to 20% when [Motor control type] (Ctt) is set to [Sync. mot.] (SYn) or [Sync.CL] (FSY).	0 to 100 %	6 %

(1) Parameter can also be accessed in the [1.3 SETTINGS] (SEt-) menu and [1.1 LIFT] (LIF-).

↻ Parameter that can be modified during operation or when stopped.

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[1.4 MOTOR CONTROL] (drC-)

Parameters that can be accessed in [Expert] mode

Code	Name/Description	Adjustment range	Factory setting
SSL-	**[SPEED LOOP]** (continued)		
FFP	❑ **[Feed forward]**	0 to 200 %	0 %
	Percentage of the high-performance regulator feedforward term. 100% corresponds to the term calculated using the value of [Application Inertia] (JAPL) page 81.		
FFU	❑ **[Bandwidth feedfor.]**	20 to 500 %	100 %
	Bandwidth of the high-performance speed loop feedforward term, as a percentage of the predefined value.		

Parameter that can be modified during operation or when stopped.

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[ENA SYSTEM]

ENA SYSTEM is a control profile designed for rotating machines with unbalanced load. **It only applies to asynchronous motors.**
It is used primarily for oil pumps. The operating principle applied:

- Allows operation without a braking resistor
- Reduces mechanical stress on the rod
- Reduces line current fluctuations
- Reduces energy consumption by improving the electric power/current ratio.

[ENA prop.gain]

This setting is used to achieve a compromise between the reduced energy consumption (and/or line current fluctuations) and the mechanical stress to which the rod is subject.
Energy is saved by reducing current fluctuations and increasing the current while retaining the same average speed.

[ENA integral gain]

This setting is used to smooth the DC bus voltage.

Start up the machine with a low integral and proportional gain (proportional 25% and integral 10%) in order to avoid an overvoltage trip in the absence of a braking resistor. See if these settings are suitable.

Recommended adjustments to be made during operation:

- To eliminate the braking resistor and, therefore, the increase in the DC bus voltage:
  Display the machine speed on the graphic display terminal.
  Reduce the integral gain value until the machine speed drops. When this point is reached, increase the integral gain until the machine speed stabilizes.
  Use the graphic display terminal or an oscilloscope to check that the DC bus voltage is stable.
- To save energy:
  Reducing the proportional gain (gradually) may increase energy savings by reducing the maximum value of the line current, but it will increase speed variations and, therefore, mechanical stress.
  The aim is to identify settings that will enable energy to be saved and minimize mechanical stress.
  When reducing the proportional gain, it may be necessary to readjust the integral gain in order to avoid an overvoltage trip.

Note: Once the adjustments are complete, check that the pump starts up correctly. If the ENA integral gain setting is too low, this may lead to insufficient torque on startup.

[Reduction ratio]

This setting corresponds to the motor speed ahead of gearbox/speed after gearbox ratio. This parameter is used to display the average speed in Hz and the machine speed in customer units (e.g., in strokes per minute) on the graphic display terminal. In order to be displayed on the graphic display terminal, these values must be selected in the [1.2 MONITORING] (SUP-) menu.

Adjustment recommendations for prevention of tripping on an [Overspeed] (SOF) fault

ENA SYSTEM authorizes overspeed, which can trigger an [Overspeed] (SOF) fault. To avoid this occurring, it is advisable to increase the value of the following parameters slightly:

- [Max frequency] (tFr) page 138.
- [Overspd. pulse thd.] (FqA) page 279, if the "frequency meter" function is configured.

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542 291 58 92 - 0 242 335 40 42

[1.4 MOTOR CONTROL] (drC-)

Code	Name/Description	Adjustment range	Factory setting
SSL-	**[SPEED LOOP]** (continued)		
EnA nO YES	❏ **[ENA system]** This parameter can be accessed if [Motor control type] (Ctt) = [SVC V] (UUC), see page 137. ☐ **[No]** (nO): Function inactive ☐ **[Yes]** (YES): Function active		[No] (nO)
GPE ( )	❏ **[ENA prop.gain]** (1) This parameter can be accessed if [ENA system] (EnA) = [Yes] (YES)	1 to 9999	250
GIE ( )	❏ **[ENA integral gain]** (1) This parameter can be accessed if [ENA system] (EnA) = [Yes] (YES)	0 to 9999	100
rAP ( )	❏ **[Reduction ratio]** (1) This parameter can be accessed if [ENA system] (EnA) = [Yes] (YES)	10.0 to 999.9	10

(1) Parameter can also be accessed in the [1.3 SETTINGS] (SEt-) menu.

( ) Parameter that can be modified during operation or when stopped.

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542 291 58 92 - 0 242 335 40 42

[1.4 MOTOR CONTROL] (drC-)

Code	Name/Description	Adjustment range	Factory setting
bOO	❏ **[Boost]** (1) This parameter can be accessed if **[ACCESS LEVEL]** = **[Expert]** and if [Motor control type] (Ctt) page 137 is not [Sync.CL] (FSY). Adjustment of the motor magnetizing current at low speed, as a % of the rated magnetizing current. This parameter is used to increase or reduce the time taken to establish the torque. It allows gradual adjustment up to the frequency set by [Action Boost] (FAb). Negative values apply particularly to tapered rotor motors. Magnetizing current Positive[Boost] (bOO) Rated magnetizing current Negative [Boost] (bOO) 0 Frequency [Action Boost] (FAb)	-100% to 100%	0
FAb	❏ **[Action Boost]** (1) This parameter can be accessed if **[ACCESS LEVEL]** = **[Expert]** and if [Motor control type] (Ctt) page 137 is not [Sync.CL] (FSY). Frequency above which the magnetizing current is not longer affected by [Boost] (bOO).	0 to 500 Hz	0
UFr ( )	❏ **[IR compensation]** (2) This parameter can be accessed if [Motor control type] (Ctt) page 137 is not [V/F 2pts] (UF2) or [V/F 5pts] (UF5). Used to optimize the torque at very low speed (increase [IR compensation] (UFr) if the torque is insufficient). Check that the [IR compensation] (UFr) value is not too high when the motor is warm (risk of instability).	25 to 200%	100%
nrd nO YES	❏ **[Noise reduction]** ☐ **[No]** (nO): Fixed frequency. ☐ **[Yes]** (YES): Frequency with random modulation. Random frequency modulation prevents any resonance, which may occur at a fixed frequency.		[Yes] (YES)

(1) These two parameters cannot be accessed in closed-loop synchronous mode [Sync.CL] (FSY).
(2) Parameter can also be accessed in the [1.3 SETTINGS] (SEt-) menu.

( ) Parameter that can be modified during operation or when stopped.

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542 291 58 92 - 0 242 335 40 42

Code	Name/Description	Adjustment range	Factory setting
SUL	❏ **[Motor surge limit.]** This function limits motor overvoltages and is useful in the following applications: - NEMA motors - Japanese motors - Spindle motors - Rewound motors nO ☐ **[No]** (nO): Function inactive YES ☐ **[Yes]** (YES): Function active This parameter is forced to [No] (nO) if [Sinus filter] (OFI) page 139 = [Yes] (YES). This parameter can remain = [No] (nO) for 230/400 V motors used at 230 V, or if the length of cable between the drive and the motor does not exceed: - 4 m with unshielded cables - 10 m with shielded cables		[No] (nO)
SOP	❏ **[Volt surge limit. opt]** Optimization parameter for transient overvoltages at the motor terminals. Can be accessed if [Motor surge limit.] (SUL) = [Yes] (YES). Set to 6, 8, or 10 µs, according to the following table.		10 µs

The value of the "SOP" parameter corresponds to the attenuation time of the cable used. It is defined to prevent the superimposition of voltage wave reflections resulting from long cable lengths. It limits overvoltages to twice the DC bus rated voltage.
The tables on the following page give examples of correspondence between the "SOP" parameter and the length of the cable between the drive and the motor. For longer cable lengths, a sinus filter or a dV/dt protection filter must be used.

- For motors in parallel, the sum of all the cable lengths must be taken into consideration. Compare the length given in the table row corresponding to the power for one motor with that corresponding to the total power, and select the shorter length. E.g. Two 7.5 kW (10 HP) motors - take the lengths on the 15 kW (20 HP) table row, which are shorter than those on the 7.5 kW (10 HP) row, and divide by the number of motors to obtain the length per motor (with unshielded "GORSE" cable and SOP = 6, the result is 40/2 = 20 m maximum for each 7.5 kW (10 HP) motor).

In special cases (for example, different types of cable, different motor powers in parallel, different cable lengths in parallel, etc.), we recommend using an oscilloscope to check the overvoltage values obtained at the motor terminals.

To retain the overall drive performance, do not increase the SOP value unnecessarily.

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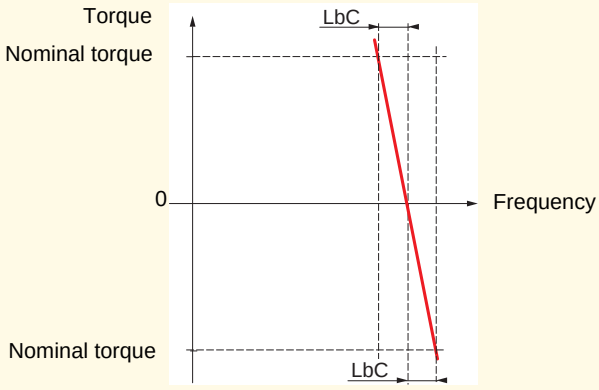
542 291 58 92 - 0 242 335 40 42

[1.4 MOTOR CONTROL] (drC-)

Code	Name/Description	Adjustment range	Factory setting
UbR	**❏ [Braking level]**		According to drive voltage rating
	DC bus voltage threshold above which the braking transistor cuts in to limit this voltage. ATV71L●●●M3●Z: factory setting 395 V. ATV71L●●●N4Z: factory setting 785 V. The adjustment range depends on the voltage rating of the drive and the [Mains voltage] (UrES) parameter, page 272.		
bbA nO YES	**❏ [Braking balance]**		[No] (nO)
	☐ **[No]** (nO): Function inactive ☐ **[Yes]** (YES): Function active, to be used on drives connected in parallel via their DC bus. Used to balance the braking power between the drives. The [Braking level] (Ubr) parameter must be set to the same value on the various drives. The value [Yes] (YES) is possible only if [Dec ramp adapt.] (brA) = [No] (nO) (see page 220).		
LbA nO YES	**❏ [Load sharing]**		[No] (nO)
	When 2 motors are connected mechanically and therefore at the same speed, and each is controlled by a drive, this function can be used to improve torque distribution between the two motors. To do this, it varies the speed based on the torque. ☐ **[No]** (nO): Function inactive ☐ **[Yes]** (YES): Function active The parameter can only be accessed if [Motor control type] (Ctt) page 137 is not [V/F 2pts] (UF2) or [V/F 5pts] (UF5).		
LbC	**❏ [Load correction]** (1)	0 to 1,000 Hz	0
	Rated correction in Hz. This parameter can be accessed if [Load sharing] (LbA) = [Yes] (YES)		



(1) Parameter can also be accessed in the [1.3 SETTINGS] (SEt-) menu.

Parameter that can be modified during operation or when stopped.

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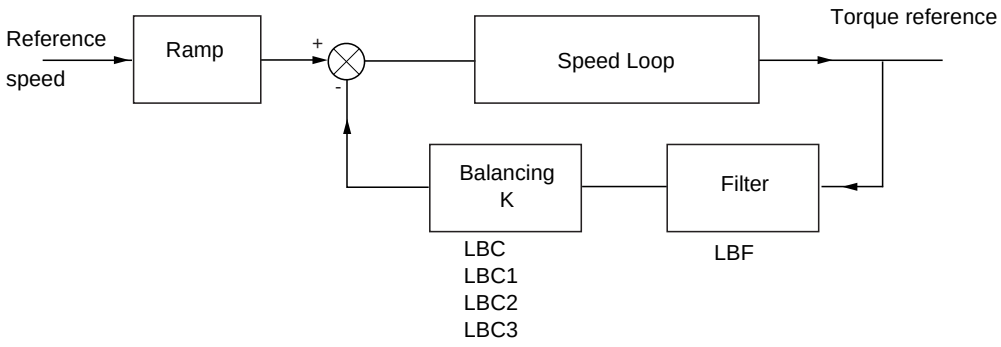
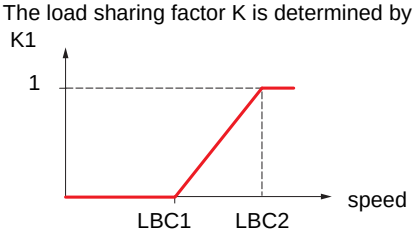
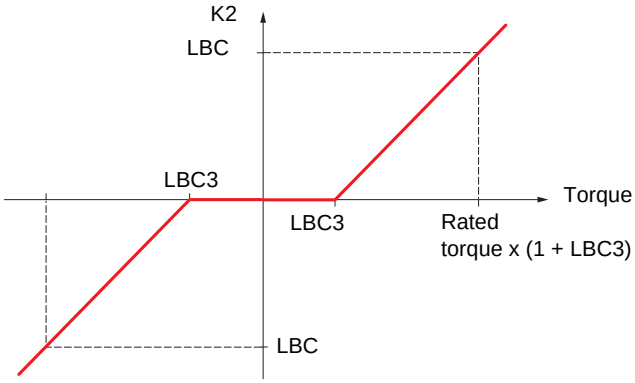
Load sharing, parameters that can be accessed at Expert level

Principle



The load sharing factor K is determined by the torque and speed, with two factors K1 and K2 (K = K1 x K2).





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[1.4 MOTOR CONTROL] (drC-)

Code	Name/Description	Adjustment range	Factory setting
LbC1	❑ **[Correction min spd]** This parameter can be accessed if [Load sharing] (LbA) = [Yes] (YES) Minimum speed for load correction in Hz. Below this threshold, no corrections are made. Used to prevent correction at very low speed if this would hamper rotation of the motor.	0 to 999.9 Hz	0
LbC2	❑ **[Correction max spd]** This parameter can be accessed if [Load sharing] (LbA) = [Yes] (YES) Speed threshold in Hz above which maximum load correction is applied.	[Correction min spd] (LbC1) + 0.1 at 1,000 Hz	0.1
LbC3	❑ **[Torque offset]** This parameter can be accessed if [Load sharing] (LbA) = [Yes] (YES) Minimum torque for load correction as a % of the rated torque. Below this threshold, no corrections are made. Used to avoid torque instabilities when the torque direction is not constant.	0 to 300 %	0 %
LbF	❑ **[Sharing filter]** This parameter can be accessed if [Load sharing] (LbA) = [Yes] (YES) Time constant (filter) for correction in ms. Used in the event of flexible mechanical coupling in order to avoid instabilities.	100 ms to 20 s	100 ms

Parameter that can be modified during operation or when stopped.

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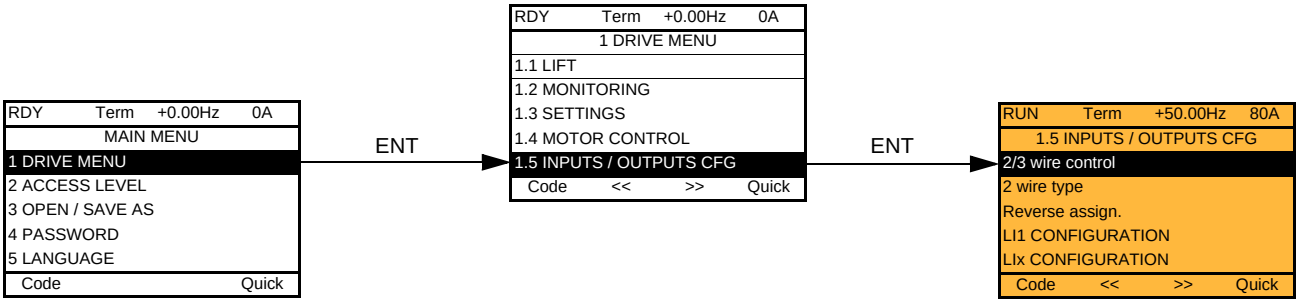
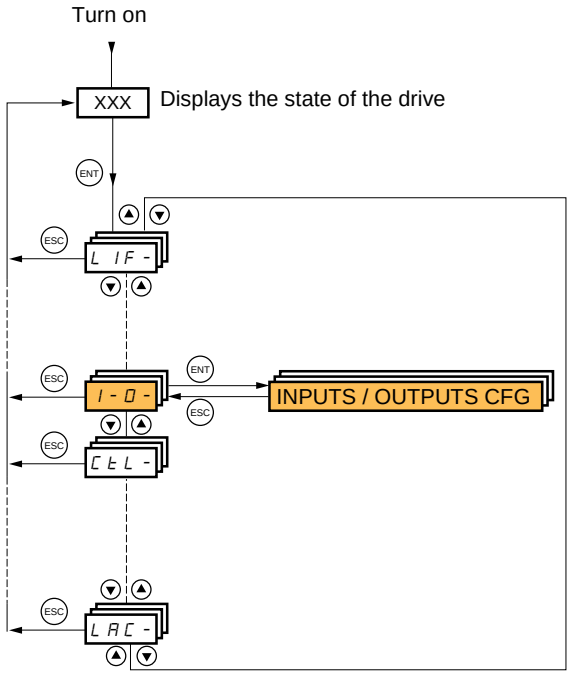
[1.5 INPUTS / OUTPUTS CFG] (I-O-)

With graphic display terminal:



With integrated display terminal:



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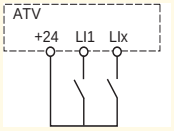
[1.5 INPUTS / OUTPUTS CFG] (I-O-)

The parameters in the [1.5 INPUTS / OUTPUTS CFG] (I-O-) menu can only be modified when the drive is stopped and no run command is present.

Code	Name/Description	Adjustment range	Factory setting
tCC	**[2/3 wire control]**		[2 wire] (2C)
2C	☐ **[2 wire]** (2C)		
3C	☐ **[3 wire]** (3C)		

2-wire control: This is the input state (0 or 1) or edge (0 to 1 or 1 to 0), which controls running or stopping.

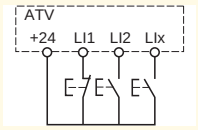
Example of "source" wiring:



LI1: Forward
LIx: Reverse

3-wire control (pulse commands): A "forward" or "reverse" pulse is sufficient to control startup, a "stop" pulse is sufficient to control stopping.

Example of "source" wiring:



LI1: Stop
LI2: Forward
LIx: Reverse

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

To change the assignment of [2/3 wire control] (tCC) press and hold down the “ENT” key for 2 s.
It causes the following functions to return to factory setting: [2 wire type] (tCt) and [Reverse assign.] (rrS) below, and all functions which assign logic inputs and analog inputs.
The macro configuration selected will also be reset if it has been customized (loss of custom settings).
It is advisable to configure this parameter before configuring the [1.6 COMMAND] (CtL-) and [1.7 APPLICATION FUNCT.] (FUn-) menus.
Check that this change is compatible with the wiring diagram used.
Failure to follow this instruction can result in death or serious injury.

tCt	**[2 wire type]**		[Transition] (trn)
LEL	☐ **[Level]** (LEL): State 0 or 1 is taken into account for run (1) or stop (0).		
trn	☐ **[Transition]** (trn): A change of state (transition or edge) is necessary to initiate operation, in order to prevent accidental restarts after a break in the power supply.		
PFO	☐ **[Fwd priority]** (PFO): State 0 or 1 is taken into account for run or stop, but the "forward" input always takes priority over the "reverse" input.		
rrS	**[Reverse assign.]**		[LI2] (LI2)
nO	☐ **[No]** (nO): Not assigned		
LI1	☐ **[LI1]** (LI1) to **[LI6]** (LI6)		
-	☐ **[LI7]** (LI7) to **[LI10]** (LI10): If VW3A3201 logic I/O card has been inserted		
-	☐ **[LI11]** (LI11) to **[LI12]** (LI12): If VW3A3203 ESIM card has been inserted		
-	☐ **[LI11]** (LI11) to **[LI14]** (LI14): If VW3A3202 extended I/O card has been inserted		
C101	☐ **[C101]** (C101) to **[C115]** (C115): With integrated Modbus in [I/O profile] (IO)		
-	☐ **[C201]** (C201) to **[C215]** (C215): With integrated CANopen in [I/O profile] (IO)		
-	☐ **[C301]** (C301) to **[C315]** (C315): With a communication card in [I/O profile] (IO)		
-	☐ **[C401]** (C401) to **[C415]** (C415): With a Controller Inside card in [I/O profile] (IO)		
CD00	☐ **[CD00]** (Cd00) to **[CD13]** (Cd13): In [I/O profile] (IO) can be switched with possible logic inputs		
-	☐ **[CD14]** (Cd14) to **[CD15]** (Cd15): In [I/O profile] (IO) can be switched without logic inputs		
	Assignment of the reverse direction command.		

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542 291 58 92 - 0 242 335 40 42

Code	Name/Description	Adjustment range	Factory setting
L I -	**[LI1 CONFIGURATION]**		
L IA	❏ **[LI1 assignment]** Read-only parameter, cannot be configured. It displays all the functions that are assigned to input LI1 in order to check for multiple assignments.		
L Id	❏ **[LI1 >On Delay]** This parameter is used to take account of the change of the logic input to state 1 with a delay that can be adjusted between 0 and 200 milliseconds, in order to filter out possible interference. The change to state 0 is taken into account without delay. **⚠ WARNING** **UNINTENDED EQUIPMENT OPERATION** Check that the delay set does not pose a risk or lead to undesired operation. The relative order in which these inputs are taken into account may be modified according to the delay values of the various logic inputs, and thus lead to unintended operation. **Failure to follow this instruction can result in death or serious injury.**	0 to 200 ms	0
L - -	**[LIx CONFIGURATION]**		
	All the logic inputs available on the drive are processed as in the example for LI1 above, up to LI6, LI10 or LI14, depending on whether or not option cards have been inserted.		

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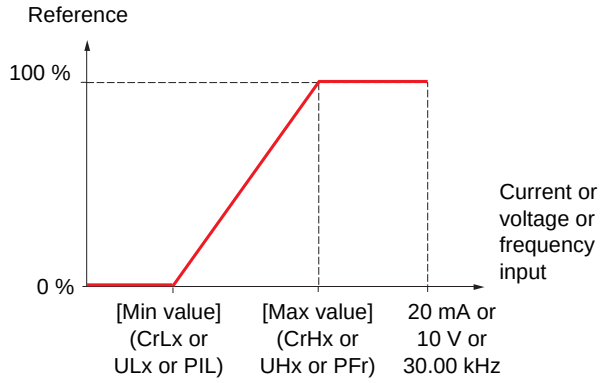
542 291 58 92 - 0 242 335 40 42

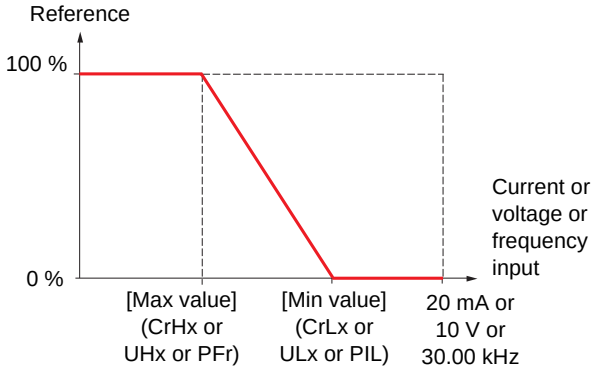
Configuration of analog inputs and Pulse input

The minimum and maximum input values (in volts, mA, etc.) are converted to % in order to adapt the references to the application.

Minimum and maximum input values:

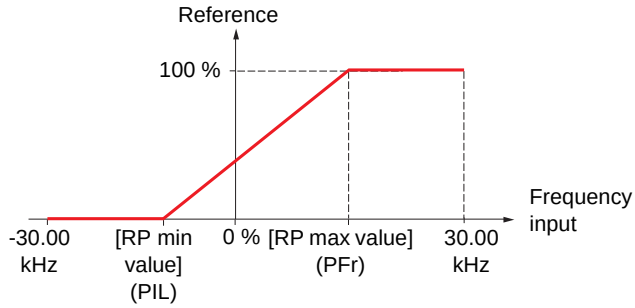
The minimum value corresponds to a reference of 0% and the maximum value to a reference of 100%. The minimum value may be greater than the maximum value:





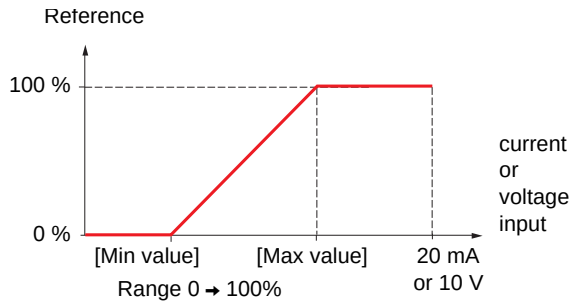
For +/- bidirectional inputs, the min. and max. are relative to the absolute value, for example, +/- 2 to 8 V.

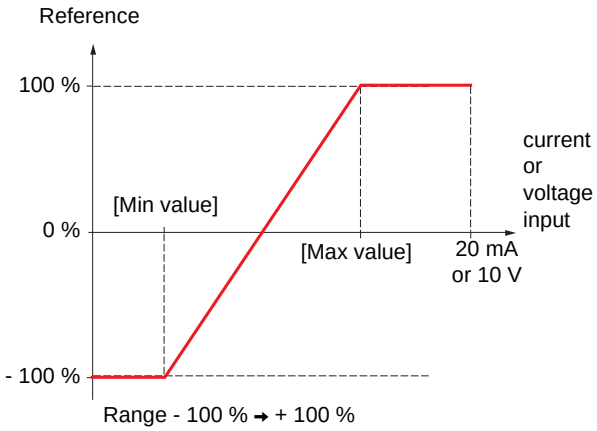
Negative min. value of Pulse input:



Range (output values): For analog inputs only

This parameter is used to configure the reference range to [0% ➞100%] or [-100% ➞ +100%] in order to obtain a bidirectional output from a unidirectional input.





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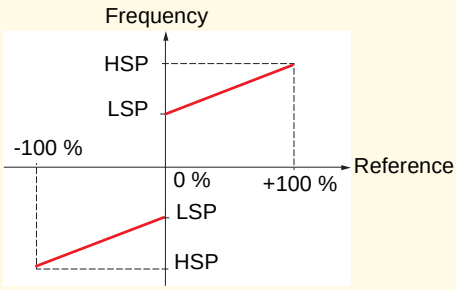
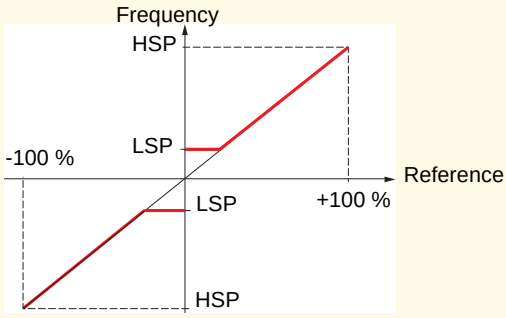
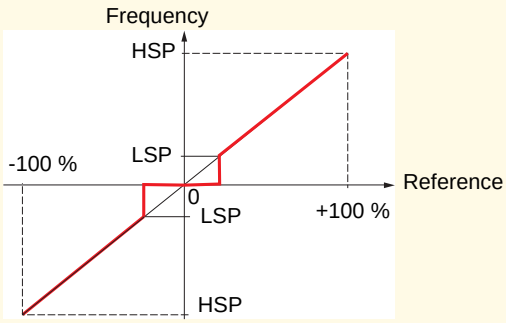
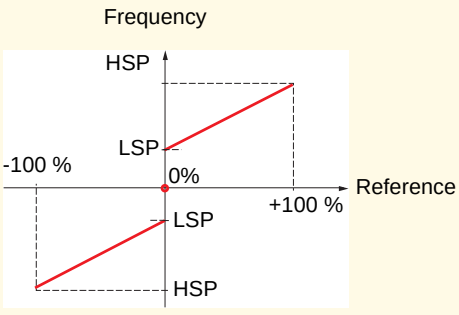
542 291 58 92 - 0 242 335 40 42

Code	Name/Description	Adjustment range	Factory setting
bSP	❏ [Reference template]		[Standard] (bSd)
bSd	☐ [Standard] (bSd)	At zero reference the frequency = LSP	
bLS	☐ [Pedestal] (bLS)	At reference = 0 to LSP the frequency = LSP	
bnS	☐ [Deadband] (bnS)	At reference = 0 to LSP the frequency = 0	
bnS0	☐ [Deadband 0] (bnS0)	This operation is the same as [Standard] (bSd), except that in the following cases at zero reference, the frequency = 0: • The signal is less than [Min value], which is greater than 0 (example 1 V on a 2 - 10 V input) • The signal is greater than [Min value], which is greater than [Max value] (example 11 V on a 10 - 0 V input). If the input range is configured as "bidirectional", operation remains identical to [Standard] (bSd).	









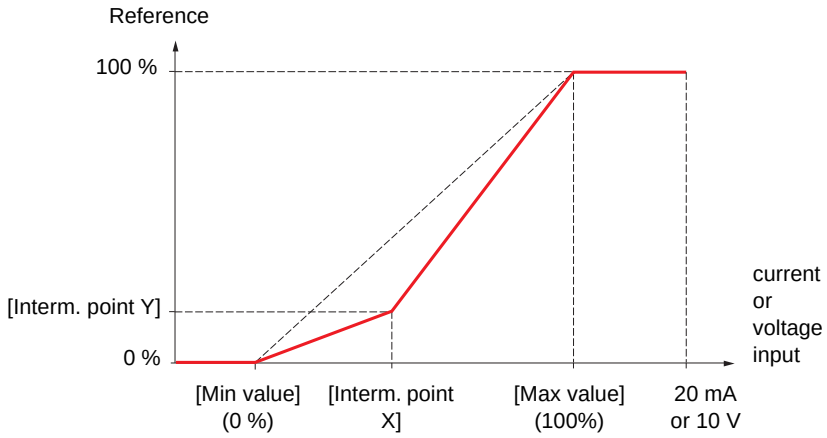
This parameter defines how the speed reference is taken into account, for analog inputs and Pulse input only.
The limits are set by the [Low speed] (LSP) and [High speed] (HSP) parameters, page 126.

www.eforsan.com.tr
542 291 58 92 - 0 242 335 40 42

Delinearization: For analog inputs only

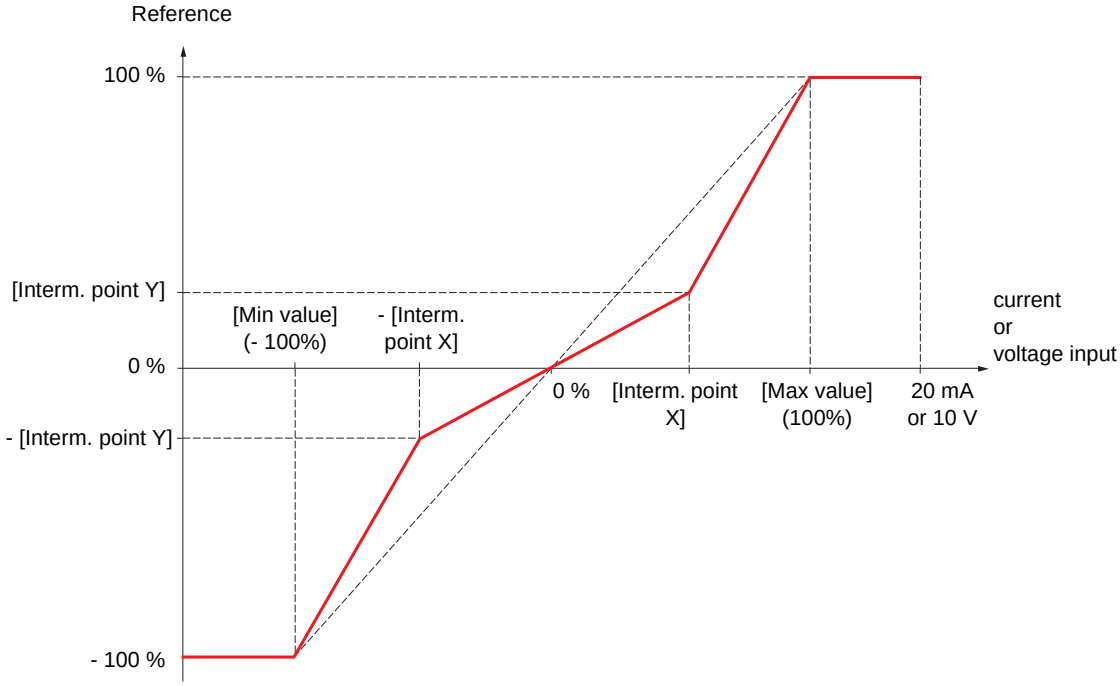
The input can be delinearized by configuring an intermediate point on the input/output curve of this input:

For range 0 ➡ 100%



Note: For [Interm. point X], 0% corresponds to [Min value] and 100% to [Max value]

For range -100% ➡ 100%



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542 291 58 92 - 0 242 335 40 42

Code	Name/Description	Adjustment range	Factory setting
AI1-	**[AI1 CONFIGURATION]**		
AI1A	❏ **[AI1 assignment]** Read-only parameter, cannot be configured. It displays all the functions associated with input AI1 in order to check, for example, for compatibility problems.		
AI1t 10U n10U	❏ **[AI1 Type]** ☐ **[Voltage]** (10U): Positive voltage input (negative values are interpreted as zero: the input is unidirectional). ☐ **[Voltage +/-]** (n10U): Positive and negative voltage input (the input is bidirectional).		[Voltage] (10U)
UIL1	❏ **[AI1 min value]**	0 to 10.0 V	0 V
UIH1	❏ **[AI1 max value]**	0 to 10.0 V	10.0 V
AI1F	❏ **[AI1 filter]** Interference filtering.	0 to 10.00 s	0 s
AI1E	❏ **[AI1 Interm. point X]** Input delinearization point coordinate. • 0% corresponds to [AI1 min value] (UIL1). • 100% corresponds to [AI1 max value] (UIH1).	0 to 100 %	0 %
AI1S	❏ **[AI1 Interm. point Y]** Output delinearization point coordinate (frequency reference).	0 to 100 %	0 %

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542 291 58 92 - 0 242 335 40 42

Code	Name/Description	Adjustment range	Factory setting
AI2-	**[AI2 CONFIGURATION]**		
AI2A	**❑ [AI2 assignment]** Read-only parameter, cannot be configured. It displays all the functions associated with input AI2 in order to check, for example, for compatibility problems.		
AI2t 10U 0A	**❑ [AI2 Type]** ☐ **[Voltage]** (10U): Voltage input ☐ **[Current]** (0 A): Current input		[Current] (0A)
CrL2	**❑ [AI2 min. value]** This parameter can be accessed if [AI2 Type] (AI2t) = [Current] (0 A)	0 to 20.0 mA	0 mA
UIL2	**❑ [AI2 min. value]** This parameter can be accessed if [AI2 Type] (AI2t) = [Voltage] (10U)	0 to 10.0 V	0 V
CrH2	**❑ [AI2 max. value]** This parameter can be accessed if [AI2 Type] (AI2t) = [Current] (0 A)	0 to 20.0 mA	20.0 mA
UIH2	**❑ [AI2 max. value]** This parameter can be accessed if [AI2 Type] (AI2t) = [Voltage] (10U)	0 to 10.0 V	10.0 V
AI2F	**❑ [AI2 filter]** Interference filtering.	0 to 10.00 s	0 s
AI2L POS nEG	**❑ [AI2 range]** ☐ **[0 - 100%]** (POS): Unidirectional input ☐ **[+/- 100%]** (nEG): Bidirectional input E.g. On a 0/10 V input - 0 V corresponds to reference - 100% - 5 V corresponds to reference 0 % - 10 V corresponds to reference + 100%		[0 - 100%] (POS)
AI2E	**❑ [AI2 Interm. point X]** Input delinearization point coordinate. • 0% corresponds to [Min value] if the range is 0 ➡ 100%. • 0% corresponds to $\frac{\text{[Max value]} + \text{[Min value]}}{2}$ if the range is -100% ➡ + 100%. • 100% corresponds to [Max value].	0 to 100 %	0 %
AI2S	**❑ [AI2 Interm. point Y]** Output delinearization point coordinate (frequency reference).	0 to 100 %	0 %

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542 291 58 92 - 0 242 335 40 42

Code	Name/Description	Adjustment range	Factory setting
AI3-	**[AI3 CONFIGURATION]** Can be accessed if a VW3A3202 option card has been inserted		
AI3A	❏ **[AI3 assignment]** Read-only parameter, cannot be configured. It displays all the functions associated with input AI3 in order to check, for example, for compatibility problems.		
AI3t OA	❏ **[AI3 Type]** Read-only parameter, cannot be configured. ☐ **[Current]** (0 A): Current input		[Current] (0A)
CrL3	❏ **[AI3 min. value]**	0 to 20.0 mA	0 mA
CrH3	❏ **[AI3 max. value]**	0 to 20.0 mA	20.0 mA
AI3F	❏ **[AI3 filter]** Interference filtering.	0 to 10.00 s	0 s
AI3L POS nEG	❏ **[AI3 range]** ☐ **[0 - 100%]** (POS): Unidirectional input ☐ **[+/- 100%]** (nEG): Bidirectional input E.g. On a 4 - 20 mA input - 4 mA corresponds to reference - 100% - 12 mA corresponds to reference 0 % - 20 mA corresponds to reference + 100% Since AI3 is, in physical terms, a bidirectional input, the [+/- 100%] (nEG) configuration must only be used if the signal applied is unidirectional. A bidirectional signal is not compatible with a bidirectional configuration.		[0 - 100%] (POS)
AI3E	❏ **[AI3 Interm. point X]** Input delinearization point coordinate. • 0% corresponds to [Min value] (CrL3) if the range is 0 → 100%. • 0% corresponds to $\frac{\text{[AI3 max. value] (CrH3) - [AI3 min. value]}}{2}$ if the range is -100% → +100%. • 100% corresponds to [AI3 max. value] (CrH3).	0 to 100 %	0 %
AI3S	❏ **[AI3 Interm. point Y]** Output delinearization point coordinate (frequency reference).	0 to 100 %	0 %

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542 291 58 92 - 0 242 335 40 42

[1.5 INPUTS / OUTPUTS CFG] (I-O-)

Code	Name/Description	Adjustment range	Factory setting
AI4-	**[AI4 CONFIGURATION]** Can be accessed if a VW3A3202 option card has been inserted		
AI4A	❑ **[AI4 assignment]** Read-only parameter, cannot be configured. It displays all the functions associated with input AI4 in order to check, for example, for compatibility problems.		
AI4t 10U 0A	❑ **[AI4 Type]** ☐ **[Voltage]** (10U): Voltage input ☐ **[Current]** (0 A): Current input		[Voltage] (10U)
CrL4	❑ **[AI4 min value]** This parameter can be accessed if [AI4 Type] (AI4t) = [Current] (0 A)	0 to 20.0 mA	0 mA
UIL4	❑ **[AI4 min value]** This parameter can be accessed if [AI4 Type] (AI4t) = [Voltage] (10U)	0 to 10.0 V	0 V
CrH4	❑ **[AI4 max value]** This parameter can be accessed if [AI4 Type] (AI4t) = [Current] (0 A)	0 to 20.0 mA	20.0 mA
UIH4	❑ **[AI4 max value]** This parameter can be accessed if [AI4 Type] (AI4t) = [Voltage] (10U)	0 to 10.0 V	10.0 V
AI4F	❑ **[AI4 filter]** Interference filtering.	0 to 10.00 s	0 s
AI4L POS nEG	❑ **[AI4 range]** ☐ **[0 - 100%]** (POS): Unidirectional input ☐ **[+/- 100%]** (nEG): Bidirectional input E.g. On a 0/10 V input - 0 V corresponds to reference - 100% - 5 V corresponds to reference 0 % - 10 V corresponds to reference + 100%		[0 - 100%] (POS)
AI4E	❑ **[AI4 Interm.point X]** Input delinearization point coordinate. • 0% corresponds to [Min value] if the range is 0 ➡ 100%. • 0% corresponds to $\frac{\text{[Max value]} + \text{[Min value]}}{2}$ if the range is -100% ➡ + 100%. • 100% corresponds to [Max value].	0 to 100 %	0 %
AI4S	❑ **[AI4 Interm.point Y]** Output delinearization point coordinate (frequency reference).	0 to 100 %	0 %

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542 291 58 92 - 0 242 335 40 42

Code	Name/Description	Adjustment range	Factory setting
AUI-	**[VIRTUAL AI1]**		
AIC I	❏ **[AI net. channel]**		[No] (nO)

Virtual input.

nO **[No]** (nO): Not assigned (in this case, the virtual input does not appear in the analog input assignment parameters for the functions)

Mdb ☐ **[Modbus]** (Mdb): Integrated Modbus

CAn ☐ **[CANopen]** (CAn): Integrated CANopen

nEt ☐ **[Com. card]** (nEt): Communication card (if inserted)

APP ☐ **[C.Insid. card]** (APP): Controller Inside card (if inserted)

Scale: The value 8192 transmitted by this input is equivalent to 10 V on a 10 V input.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

If the equipment switches to forced local mode (see page 286), the virtual input remains frozen at the last value transmitted.

Do not use the virtual input and forced local mode in the same configuration.

Failure to follow this instruction can result in death or serious injury.

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542 291 58 92 - 0 242 335 40 42

[1.5 INPUTS / OUTPUTS CFG] (I-O-)

Code	Name/Description	Adjustment range	Factory setting
PLI-	**[RP CONFIGURATION]** Can be accessed if a VW3A3202 option card has been inserted		
PIA	❑ **[RP assignment]** Read-only parameter, cannot be configured. It displays all the functions associated with the Pulse In input in order to check, for example, for compatibility problems.		
PIL	❑ **[RP min value]** Frequency corresponding to the minimum speed	- 30.00 to 30.00 kHz	0
PFr	❑ **[RP max value]** Frequency corresponding to the maximum speed	0 to 30.00 kHz	30.00 kHz
PFI	❑ **[RP filter]** Interference filtering.	0 to 1000 ms	0

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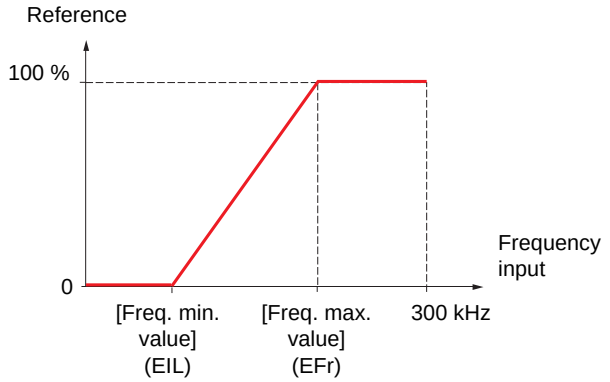
542 291 58 92 - 0 242 335 40 42

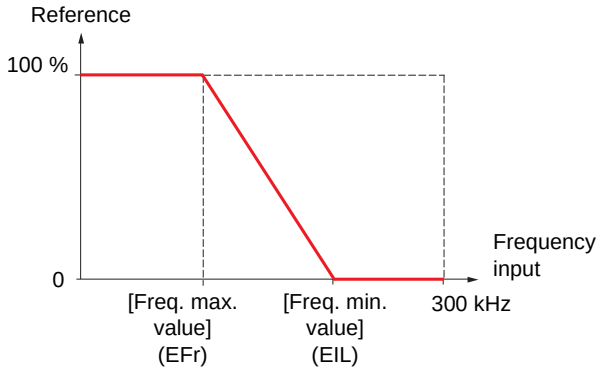
Configuration of the encoder input serving as a reference, with a frequency generator

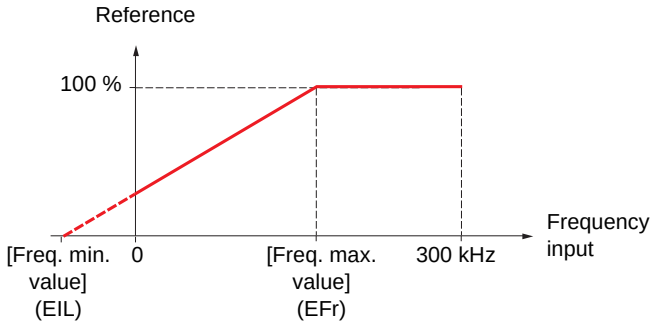
This reference is not signed, therefore the directions of operation must be given via the control channel (logic inputs, for example).

Minimum and maximum values (input values):

The minimum value corresponds to a minimum reference of 0% and the maximum value to a maximum reference of 100%. The minimum value may be greater than the maximum value. It may also be negative.







A reference can be obtained at zero frequency by assigning a negative value to the minimum value.

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542 291 58 92 - 0 242 335 40 42

[1.5 INPUTS / OUTPUTS CFG] (I-O-)

The encoder configuration can also be accessed in the [1.4 MOTOR CONTROL] (drC-) menu.

Note 1: When an encoder is used with a VW3 A3 408 or VW3 A3 409 card, it is only possible to configure the "encoder" input for speed feedback. Functions can only be configured as references or inputs with a VW3 A3 401 to 407 and VW3 A3 411 card.
Note 2: When an encoder is used with a VW3 A3 409 card, the drive remains locked in stop mode (displays nSt or nLP) if the encoder is not fully configured.

Code	Name/Description	Adjustment range	Factory setting
IEn-	**[ENCODER CONFIGURATION]** The encoder parameters can only be accessed if an encoder card has been inserted, and the selections available will depend on the type of encoder card used.		
EnS	❑ **[Encoder type]** This parameter can be accessed if an incremental encoder card has been inserted. To be configured in accordance with the type of encoder used. nO ☐ **[No]** (nO): Function inactive. AAbb ☐ **[AABB]** (AAbb): For signals A, A-, B, B- or A, A-, B, B-, Z, Z- Ab ☐ **[AB]** (Ab): For signals A, B. A ☐ **[A]** (A): For signal A. Value cannot be accessed if [Encoder usage] (EnU) = [Spd fdk reg.] (rEG)	[AABB] (AAbb)	
EnC	❑ **[Encoder check]** Check encoder feedback. See procedure page 141. This parameter can be accessed if an encoder card has been inserted and if [Encoder usage] (EnU) is not [Speed ref.] (PGr). nO ☐ **[Not done]** (nO): Check not performed. YES ☐ **[Yes]** (YES): Activates monitoring of the encoder. dOnE ☐ **[Done]** (dOnE): Check performed successfully. The check procedure checks: - The direction of rotation of the encoder/motor - The presence of signals (wiring continuity) - The number of pulses/revolution If a fault is detected, the drive locks in [Encoder fault] (EnF) fault mode.	[Not done] (nO)	
EnU	❑ **[Encoder usage]** This parameter can be accessed if an encoder card has been inserted. nO ☐ **[No]** (nO): Function inactive, In this case, the other parameters cannot be accessed. SEC ☐ **[Fdbk monit.]** (SEC): The encoder provides speed feedback for monitoring only. rEG ☐ **[Spd fdk reg.]** (rEG): The encoder provides speed feedback for regulation and monitoring. This configuration is automatic if the drive is configured for closed-loop operation ([Motor control type] (Ctt) = [FVC] (FUC) or [Sync.CL] (FSY). If [Motor control type] (Ctt) = [SVC V] (UUC) the encoder operates in speed feedback mode and enables static correction of the speed to be performed. This configuration is not accessible for other [Motor control type] (Ctt) values. PGr ☐ **[Speed ref.]** (PGr): The encoder provides a reference. Can only be selected with an incremental encoder card.	[No] (nO)	
Enr I	❑ **[Coder rotation inv.]** This parameter can be accessed if an encoder card has been inserted. Activates reversal of encoder rotation. In some assemblies, the encoder positive direction of rotation is reversed in relation to the motor direction. When this is the case, this parameter needs to be activated in order for the motor and the encoder both to have a positive direction of rotation. nO ☐ **[No]** (nO): Reversal not activated YES ☐ **[Yes]** (YES): Reversal activated	[No] (nO)	

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542 291 58 92 - 0 242 335 40 42

Code	Name/Description	Adjustment range	Factory setting
	[ENCODER CONFIGURATION] (continued)		
PGI	❏ **[Number of pulses]**	100 to 10000	1024
	Number of pulses per encoder revolution. This parameter can be accessed if a VW3 A3 401 to 407 or VW3 A3 411 card has been inserted.		
PGA	❏ **[Reference type]**		[Encoder] (EnC)
	This parameter can be accessed if [Encoder usage] (EnU) = [Speed ref.] (PGr). EnC ☐ **[Encoder]** (EnC): Use of an encoder (incremental encoder only). PtG ☐ **[Freq. gen.]** (PtG): Use of a frequency generator (unsigned reference).		
EIL	❏ **[Freq. min. value]**	- 300 to 300 kHz	0
	This parameter can be accessed if [Encoder usage] (EnU) = [Speed ref.] (PGr) and if [Reference type] (PGA) = [Freq. gen.] (PtG). Frequency corresponding to the minimum speed.		
EFr	❏ **[Freq. max value]**	0.00 to 300 kHz	300 kHz
	This parameter can be accessed if [Encoder usage] (EnU) = [Speed ref.] (PGr) and if [Reference type] (PGA) = [Freq. gen.] (PtG). Frequency corresponding to the maximum speed.		
EFI	❏ **[Freq. signal filter]**	0 to 1000 ms	0
	This parameter can be accessed if [Encoder usage] (EnU) = [Speed ref.] (PGr). Interference filtering.		
FrES	❏ **[Resolver Exct. Freq.]**		[8 kHz] (8)
	Resolver excitation frequency. This parameter can be accessed if a VW3 A3 408 encoder card (for resolver) has been inserted. 4 ☐ **[4 kHz]** (4): 4 kHz 8 ☐ **[8 kHz]** (8): 8 kHz 12 ☐ **[12 kHz]** (12): 12 kHz		
rPPn	❏ **[Resolver poles nbr]**		[2 poles] (2P)
	Number of resolver poles. This parameter can be accessed if a VW3 A3 408 encoder card (for resolver) has been inserted. 2P ☐ **[2 poles]** (2P): 2 poles, max. speed 7500 rpm 4P ☐ **[4 poles]** (4P): 4 poles, max. speed 3750 rpm 6P ☐ **[6 poles]** (6P): 6 poles, max. speed 2500 rpm 8P ☐ **[8 poles]** (8P): 8 poles, max. speed 1875 rpm ☞ **If the number of motor poles is not a whole multiple of the number of resolver poles**, the resolver is a relative encoder and no longer absolute. You should therefore set the [Angle setting activ.] (AtA) parameter = [Power On] (POn) or [Run order] (AUtO).		

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542 291 58 92 - 0 242 335 40 42

Code	Name/Description	Adjustment range	Factory setting
	[ENCODER CONFIGURATION] (continued) **These parameters can be accessed if a VW3 A3 409 encoder card has been inserted.**		
UECP Und End SCHP SC SSI EnSC	❏ **[Encoder protocol]** Type of encoder used. ☐ **[Undefined]** (Und): Not defined. ☐ **[EnDat 2.1]** (End): EnDat encoder. ☐ **[Hiperface]** (SCHP): Hiperface encoder. ☐ **[SinCos]** (SC): SinCos encoder. ☐ **[SSI]** (SSI): SSI encoder. ☐ **[EndatSincos]** (EnSC): EndatSincos encoder.		[Undefined] (Und)
UECU Und 5U 8U 12U	❏ **[Encoder supply volt.]** Rated voltage of encoder used. The parameter can be accessed if [Encoder protocol] (UECP) is not [Undefined] (Und). ☐ **[Undefined]** (Und): Not defined. ☐ **[5 volts]** (5U): 5 Volts. Only possible value if [Encoder protocol] (UECP) = [EnDat 2.1] (End) or [EndatSincos] (EnSC). ☐ **[8 volts]** (8U): 8 Volts. ☐ **[12 volts]** (12U): 12 Volts. To make any changes to this parameter with the integrated display terminal, press and hold down the "ENT" key for 2 s for the change to be taken into account. When using the graphic display terminal, confirmation is requested.		[Undefined] (Und)
ULC Und -	❏ **[Sincos lines count]** Number of lines. This parameter can be accessed if [Encoder protocol] (UECP) = [SinCos] (SC) or [EndatSinCos](End). ☐ **[Undefined]** (Und): Not defined. ☐ **1 to 10000**: 1 to 10,000 lines.		[Undefined] (Und)
SSCP Und nO Odd EUEn	❏ **[SSI parity]** Parity. This parameter can be accessed if [Encoder protocol] (UECP) = [SSI] (SSI). ☐ **[Undefined]** (Und): Not defined. ☐ **[No parity]** (nO): No parity. ☐ **[Odd parity]** (Odd): Odd parity. ☐ **[Even parity]** (EUEn): Even parity.		[Undefined] (Und)
SSFS Und -	❏ **[SSI frame size]** Frame length (number of bits). This parameter can be accessed if [Encoder protocol] (UECP) = [SSI] (SSI). ☐ **[Undefined]** (Und): Not defined. Only possible value if [SSI parity] (SSCP) = [Undefined] (Und). ☐ **10 to 27**: 10 to 25 if [SSI parity] (SSCP) = [No parity] (nO). 12 to 27 if [SSI parity] (SSCP) = [Odd parity] (Odd) or [Even parity] (EUEn).		[Undefined] (Und)
EnNr Und -	❏ **[Nbr of revolution]** Format of the number of revolutions (in number of bits). This parameter can be accessed if [Encoder protocol] (UECP) = [SSI] (SSI). ☐ **[Undefined]** (Und): Not defined. Only possible value if [SSI frame size] (SSFS) = [Undefined] (Und). ☐ **0 to 15**: 0 to [SSI frame size] (SSFS) - 10 if [SSI parity] (SSCP) = [No parity] (nO). 0 to [SSI frame size] (SSFS) - 12 if [SSI parity] (SSCP) = [Odd parity] (Odd) or [Even parity] (EUEn).		[Undefined] (Und)
Entr Und -	❏ **[Turn bit resolution]** Resolution per revolution (in number of bits). This parameter can be accessed if [Encoder protocol] (UECP) = [SSI] (SSI). ☐ **[Undefined]** (Und): Not defined. Only value possible if[Nbr of revolution] (EnMr) = [Undefined] (Und). ☐ **10 to 25**: If [SSI parity] (SSCP) = [No parity] (nO), the maximum value is: [SSI frame size] (SSFS) - [Nbr of revolution] (EnMr). If [SSI parity] (SSCP) = [Odd parity] (Odd) or [Even parity] (EUEn), the maximum value is: [SSI frame size] (SSFS) - [Nbr of revolution] (EnMr) - 2.		[Undefined] (Und)

www.eforsan.com.tr
542 291 58 92 - 0 242 335 40 42

Code	Name/Description	Adjustment range	Factory setting
	[ENCODER CONFIGURATION] (continued) **These parameters can be accessed if a VW3 A3 409 encoder card has been inserted.**		
SSCd	❏ **[SSI code type]**		[Undefined] (Und)
	Type of code. This parameter can be accessed if [Encoder protocol] (UECP) = [SSI] (SSI). ☐ **[Undefined]** (Und): Not defined. ☐ **[Binary code** (bIn): Binary code. ☐ **[Gray code]** (GrAY): Gray code.		
Und			
bIn			
GrAY			
EnSP	❏ **[Clock frequency]**		[500 kHz] (500)
	This parameter can be accessed if **[ACCESS LEVEL]** = **[Expert]** and if [Encoder protocol] (UECP) = [SSI] (SSI) or [EnDat 2.1] (End) ou [EndatSincos] (EnSC). Clock frequency for Endat encoder, SSI encoder, and Endat Sincos encoder. ☐ **[160 kHz]** (160) ☐ **[200 kHz]** (200) ☐ **[300 kHz]** (300) ☐ **[400 kHz]** (400) ☐ **[500 kHz]** (500) ☐ **[600 kHz]** (600) ☐ **[700 kHz]** (700) ☐ **[800 kHz]** (800) ☐ **[Auto]** (AUtO) : This value appears only if [Encoder protocol] (UECP) = [SSI] (SSI) and if the version of this encoder board is upper or equal to V1.2IE01.		
160			
200			
300			
400			
500			
600			
700			
800			
AUtO			

Code	Name/Description	Adjustment range	Factory setting
	[ENCODER CONFIGURATION] (continued) **These parameters can only be accessed when [ACCESS LEVEL] = [Expert] and an encoder card has been inserted.**		
FFA	❏ **[Encoder filter activ.]**		[No] (nO)
	Activation of encoder feedback filter. ☐ **[No]** (no): Filter deactivated. ☐ **[Yes]** (YES): Filter activated.		
nO			
YES			
FFr	❏ **[Encoder filter value]**	0 to 50 ms	Acc. to encoder type
	This parameter can be accessed if [Encoder filter activ.] (FFA) = [Yes] (YES). Encoder feedback filter time constant in milliseconds.		

( ) Parameter that can be modified during operation or when stopped.

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Code	Name/Description	Adjustment range	Factory setting
r I-	**[R1 CONFIGURATION]**		
r I	❑ **[R1 Assignment]**		[No] (nO)

- ☐ **[No]** (nO): Not assigned
- ☐ **[No drive flt]** (FLt): Drive not faulty (relay normally energized, and de-energized if there is a fault)
- ☐ **[Drv running]** (rUn): Drive running
- ☐ **[Freq. Th. attain.]** (FtA): Frequency threshold attained ([Freq. threshold] (Ftd) page 135)
- ☐ **[HSP attain.]** (FLA): High speed attained
- ☐ **[I attained]** (CtA): Current threshold attained ([Current threshold] (Ctd) page 134)
- ☐ **[Freq.ref.att]** (SrA): Frequency reference attained
- ☐ **[Th.mot. att.]** (tSA): Motor 1 thermal state attained
- ☐ **[AI2 AI. 4-20]** (AP2): Alarm indicating absence of 4-20 mA signal on input AI2
- ☐ **[Freq. Th. 2 attain.]** (F2A): Frequency threshold 2 attained ([Freq. threshold 2] (F2d) page 135)
- ☐ **[Th.drv.att.]** (tAd): Drive thermal state attained
- ☐ **[High tq. att.]** (ttHA): Motor torque higher than high threshold [High torque thd.] (ttH) page 134.
- ☐ **[Low tq. att.]** (ttLA): Motor torque less than low threshold [Low torque thd.] (ttL) page 134.
- ☐ **[Forward]** (MFrd): Motor running forward
- ☐ **[Reverse]** (MrrS): Motor running in reverse
- ☐ **[Th.mot2 att.]** (tS2): Motor 2 thermal state attained
- ☐ **[Th.mot3 att]** (tS3): Motor 3 thermal state attained
- ☐ **[Neg Torque]** (AtS): Negative torque (braking)
- ☐ **[Cnfg.0 act.]** (CnF0): Configuration 0 active
- ☐ **[Cnfg.1 act.]** (CnF1): Configuration 1 active
- ☐ **[Cnfg.2 act.]** (CnF2): Configuration 2 active
- ☐ **[Set 1 active]** (CFP1): Parameter set 1 active
- ☐ **[Set 2 active]** (CFP2): Parameter set 2 active
- ☐ **[Set 3 active]** (CFP3): Parameter set 3 active
- ☐ **[DC charged]** (dbL): DC bus charging
- ☐ **[In braking]** (brS): Drive braking
- ☐ **[P. removed]** (PRM): Drive locked by "Power removal" input
- ☐ **[Fr.met. alar.]** (FqLA): Measured speed threshold attained: [Pulse warning thd.] (FqL) page 135.
- ☐ **[I present]** (MCP): Motor current present
- ☐ **[Limit sw. att]** (LSA): Limit switch reached
- ☐ **[Alarm Grp 1]** (AGI): Alarm group 1
- ☐ **[Alarm Grp 2]** (AG2): Alarm group 2
- ☐ **[Alarm Grp 3]** (AG3): Alarm group 3
- ☐ **[PTC1 alarm]** (P1A): Probe alarm 1
- ☐ **[PTC2 alarm]** (P2A): Probe alarm 2
- ☐ **[LI6=PTC al.]** (PLA): LI6 = PTC probe alarm
- ☐ **[Ext. fault al]** (EFA): External fault alarm
- ☐ **[Under V. al.]** (USA): Undervoltage alarm
- ☐ **[Uvolt warn]** (UPA): Undervoltage warning
- ☐ **[slipping al.]** (AnA): Slipping alarm
- ☐ **[AI. °C drv]** (tHA): Drive overheating
- ☐ **[Load mvt al]** (bSA): Braking speed alarm
- ☐ **[Brk cont. al]** (bCA): Brake contact alarm
- ☐ **[Lim T/I att.]** (SSA): Torque limit alarm
- ☐ **[Trq. ctrl. al.]** (rtA): Torque control alarm
- ☐ **[IGBT al.]** (tJA): IGBT alarm
- ☐ **[Brake R. al.]** (bOA): Braking resistor temperature alarm
- ☐ **[Option al.]** (APA): Alarm generated by the Controller Inside card
- ☐ **[AI3 AI. 4-20]** (AP3): Alarm indicating absence of 4-20 mA signal on input AI3
- ☐ **[AI4 AI. 4-20]** (AP4): Alarm indicating absence of 4-20 mA signal on input AI4
- ☐ **[Ready]** (rdY): Drive ready

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Code	Name/Description	Adjustment range	Factory setting
	[R1 CONFIGURATION] (continued)		
r 1d	❏ **[R1 Delay time]** The change in state only takes effect once the configured time has elapsed, when the information becomes true. The delay cannot be set for the [No drive flt] (FLt) assignment, and remains at 0.	0 to 9999 ms	0
r 1S POS nEG	❏ **[R1 Active at]** Configuration of the operating logic: ☐ **[1]** (POS): State 1 when the information is true ☐ **[0]** (nEG): State 0 when the information is true Configuration [1] (POS) cannot be modified for the [No drive flt] (FLt) assignment.		[1] (POS)
r 1H	❏ **[R1 Holding time]** The change in state only takes effect once the configured time has elapsed, when the information becomes false. The holding time cannot be set for the [No drive flt] (FLt) assignment, and remains at 0.	0 to 9999 ms	0
r 2-	**[R2 CONFIGURATION]**		
r 2 bLC LLC OCC dCO	❏ **[R2 Assignment]** Identical to R1 (see page 182) with the addition of (shown for information only as these selections can only be configured in the [1.7 APPLICATION FUNCT.] (Fun-) menu): ☐ **[Brk control]** (bLC): Brake contactor control ☐ **[Input cont.]** (LLC): Line contactor control ☐ **[Output cont]** (OCC): Output contactor control ☐ **[DC charging]** (dCO): DC bus precharging contactor control.		[Brk control] (bLC)
r 2d	❏ **[R2 Delay time]** The delay cannot be set for the [No drive flt] (FLt), [Brk control] (bLC), [Output cont.] (OCC), [DC charging] (dCO), and [Input cont.] (LLC) assignments, and remains at 0. The change in state only takes effect once the configured time has elapsed, when the information becomes true.	0 to 9999 ms	0
r 2S POS nEG	❏ **[R2 Active at]** Configuration of the operating logic: ☐ **[1]** (POS): State 1 when the information is true ☐ **[0]** (nEG): State 0 when the information is true The configuration [1] (POS) cannot be modified for the [No drive flt] (FLt), [Brk control] (bLC), [DC charging] (dCO), and [Input cont.] (LLC) assignments.		[1] (POS)
r 2H	❏ **[R2 Holding time]** The holding time cannot be set for the [No drive flt] (FLt), [Brk control] (bLC), [DC charging] (dCO), and [Input cont] (LLC) assignments, and remains at 0. The change in state only takes effect once the configured time has elapsed, when the information becomes false.	0 to 9999 ms	0

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Code	Name/Description	Adjustment range	Factory setting
r 3 -	**[R3 CONFIGURATION]** Can be accessed if a VW3A3201 option card has been inserted		
r 3	❏ **[R3 Assignment]** Identical to R2		[No] (nO)
r 3 d	❏ **[R3 Delay time]** The delay cannot be set for the [No drive flt] (FLt), [Brk control] (bLC), [Output cont.] (OCC), [DC charging] (dCO), and [Input cont.] (LLC) assignments, and remains at 0. The change in state only takes effect once the configured time has elapsed, when the information becomes true.	0 to 9999 ms	0
r 3 S POS nEG	❏ **[R3 Active at]** Configuration of the operating logic: ☐ **[1]** (POS): State 1 when the information is true ☐ **[0]** (nEG): State 0 when the information is true The configuration [1] (POS) cannot be modified for the [No drive flt] (FLt), [Brk control] (bLC), [DC charging] (dCO), and [Input cont.] (LLC) assignments.		[1] (POS)
r 3 H	❏ **[R3 Holding time]** The holding time cannot be set for the [No drive flt] (FLt), [Brk control] (bLC), [DC charging] (dCO), and [Input cont] (LLC) assignments, and remains at 0. The change in state only takes effect once the configured time has elapsed, when the information becomes false.	0 to 9999 ms	0
r 4 -	**[R4 CONFIGURATION]** Can be accessed if a VW3A3202 or VW3A3203 option card has been inserted		
r 4	❏ **[R4 Assignment]** Identical to R2 (see page 183).		[No] (nO)
r 4 d	❏ **[R4 Delay time]** The delay cannot be set for the [No drive flt] (FLt), [Brk control] (bLC), [Output cont.] (OCC), [DC charging] (dCO), and [Input cont.] (LLC) assignments, and remains at 0. The change in state only takes effect once the configured time has elapsed, when the information becomes true.	0 to 9999 ms	0
r 4 S POS nEG	❏ **[R4 Active at]** Configuration of the operating logic: ☐ **[1]** (POS): State 1 when the information is true ☐ **[0]** (nEG): State 0 when the information is true The configuration [1] (POS) cannot be modified for the [No drive flt] (FLt), [Brk control] (bLC), [DC charging] (dCO), and [Input cont.] (LLC) assignments.		[1] (POS)
r 4 H	❏ **[R4 Holding time]** The holding time cannot be set for the [No drive flt] (FLt), [Brk control] (bLC), [DC charging] (dCO), and [Input cont] (LLC) assignments, and remains at 0. The change in state only takes effect once the configured time has elapsed, when the information becomes false.	0 to 9999 ms	0

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Code	Name/Description	Adjustment range	Factory setting
r S -	**[R5 CONFIGURATION]** Can be accessed if a VW3A3203 option card has been inserted		
r S	❏ **[R5 Assignment]** Identical to R2 (see page 183).		[No] (nO)
r S d	❏ **[R5 Delay time]** The delay cannot be set for the [No drive flt] (FLt), [Brk control] (bLC), [Output cont.] (OCC), [DC charging] (dCO), and [Input cont.] (LLC) assignments, and remains at 0. The change in state only takes effect once the configured time has elapsed, when the information becomes true.	0 to 9999 ms	0
r S S P O S n E G	❏ **[R5 Active at]** Configuration of the operating logic: ☐ **[1]** (POS): State 1 when the information is true ☐ **[0]** (nEG): State 0 when the information is true The configuration [1] (POS) cannot be modified for the [No drive flt] (FLt), [Brk control] (bLC), [DC charging] (dCO), and [Input cont.] (LLC) assignments.		[1] (POS)
r S H	❏ **[R5 Holding time]** The holding time cannot be set for the [No drive flt] (FLt), [Brk control] (bLC), [DC charging] (dCO), and [Input cont] (LLC) assignments, and remains at 0. The change in state only takes effect once the configured time has elapsed, when the information becomes false.	0 to 9999 ms	0

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Code	Name/Description	Adjustment range	Factory setting
LO1-	**[LO1 CONFIGURATION]** Can be accessed if a VW3A3201 option card has been inserted		
LO1	❏ **[LO1 assignment]**		[No] (nO)
	Identical to R1 (see page 182) with the addition of (shown for information only as these selections can only be configured in the [1.7 APPLICATION FUNCT.] (Fun-) menu): ☐ **[Brk control]** (bLC): Brake contactor control ☐ **[Input cont.]** (LLC): Line contactor control ☐ **[Output cont]** (OCC): Output contactor control ☐ **[DC charging]** (dCO): DC bus precharging contactor control.		
bLC LLC OCC dCO			
LO1d	❏ **[LO1 delay time]**	0 to 9999 ms	0
	The delay cannot be set for the [No drive flt] (FLt), [Brk control] (bLC), [Output cont.] (OCC), [DC charging] (dCO), and [Input cont.] (LLC) assignments, and remains at 0. The change in state only takes effect once the configured time has elapsed, when the information becomes true.		
LO1S	❏ **[LO1 active at]**		[1] (POS)
	Configuration of the operating logic: ☐ **[1]** (POS): State 1 when the information is true ☐ **[0]** (nEG): State 0 when the information is true The configuration [1] (POS) cannot be modified for the [No drive flt] (FLt), [Brk control] (bLC), [DC charging] (dCO), and [Input cont.] (LLC) assignments.		
POS nEG			
LO1H	❏ **[LO1 holding time]**	0 to 9999 ms	0
	The holding time cannot be set for the [No drive flt] (FLt), [Brk control] (bLC), [DC charging] (dCO), and [Input cont] (LLC) assignments, and remains at 0. The change in state only takes effect once the configured time has elapsed, when the information becomes false.		
LO2-	**[LO2 CONFIGURATION]** Can be accessed if a VW3A3201 option card has been inserted		
LO2	❏ **[LO2 assignment]**		[No] (nO)
	Identical to LO1.		
LO2d	❏ **[LO2 delay time]**	0 to 9999 ms	0
	The delay cannot be set for the [No drive flt] (FLt), [Brk control] (bLC), [Output cont.] (OCC), [DC charging] (dCO), and [Input cont.] (LLC) assignments, and remains at 0. The change in state only takes effect once the configured time has elapsed, when the information becomes true.		
LO2S	❏ **[LO2 active at]**		[1] (POS)
	Configuration of the operating logic: ☐ **[1]** (POS): State 1 when the information is true ☐ **[0]** (nEG): State 0 when the information is true The configuration [1] (POS) cannot be modified for the [No drive flt] (FLt), [Brk control] (bLC), [DC charging] (dCO), and [Input cont.] (LLC) assignments.		
POS nEG			
LO2H	❏ **[LO2 holding time]**	0 to 9999 ms	0
	The holding time cannot be set for the [No drive flt] (FLt), [Brk control] (bLC), [DC charging] (dCO), and [Input cont] (LLC) assignments, and remains at 0. The change in state only takes effect once the configured time has elapsed, when the information becomes false.		

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[1.5 INPUTS / OUTPUTS CFG] (I-O-)

Code	Name/Description	Adjustment range	Factory setting
L03-	**[LO3 CONFIGURATION]** Can be accessed if a VW3A3202 option card has been inserted		
L03	❏ **[LO3 assignment]** Identical to LO1 (see page 186).		[No] (nO)
L03d	❏ **[LO3 delay time]** The delay cannot be set for the [No drive flt] (FLt), [Brk control] (bLC), [Output cont.] (OCC), [DC charging] (dCO), and [Input cont.] (LLC) assignments, and remains at 0. The change in state only takes effect once the configured time has elapsed, when the information becomes true.	0 to 9999 ms	0
L03S POS nEG	❏ **[LO3 active at]** Configuration of the operating logic: ☐ **[1]** (POS): State 1 when the information is true ☐ **[0]** (nEG): State 0 when the information is true The configuration [1] (POS) cannot be modified for the [No drive flt] (FLt), [Brk control] (bLC), [DC charging] (dCO), and [Input cont.] (LLC) assignments.		[1] (POS)
L03H	❏ **[LO3 holding time]** The holding time cannot be set for the [No drive flt] (FLt), [Brk control] (bLC), [DC charging] (dCO), and [Input cont] (LLC) assignments, and remains at 0. The change in state only takes effect once the configured time has elapsed, when the information becomes false.	0 to 9999 ms	0
L04-	**[LO4 CONFIGURATION]** Can be accessed if a VW3A3202 option card has been inserted		
L04	❏ **[LO4 assignment]** Identical to LO1 (see page 186).		[No] (nO)
L04d	❏ **[LO4 delay time]** The delay cannot be set for the [No drive flt] (FLt), [Brk control] (bLC), [Output cont.] (OCC), [DC charging] (dCO), and [Input cont.] (LLC) assignments, and remains at 0. The change in state only takes effect once the configured time has elapsed, when the information becomes true.	0 to 9999 ms	0
L04S POS nEG	❏ **[LO4 active at]** Configuration of the operating logic: ☐ **[1]** (POS): State 1 when the information is true ☐ **[0]** (nEG): State 0 when the information is true The configuration [1] (POS) cannot be modified for the [No drive flt] (FLt), [Brk control] (bLC), [DC charging] (dCO), and [Input cont.] (LLC) assignments.		[1] (POS)
L04H	❏ **[LO4 holding time]** The holding time cannot be set for the [No drive flt] (FLt), [Brk control] (bLC), [DC charging] (dCO), and [Input cont] (LLC) assignments, and remains at 0. The change in state only takes effect once the configured time has elapsed, when the information becomes false.	0 to 9999 ms	0

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542 291 58 92 - 0 242 335 40 42

Use of analog output AO1 as a logic output

Analog output AO1 can be used as a logic output, by assigning dO1. In this case, state 0 of this output corresponds to the minimum value of AO1 (0 V or 0 mA, for example), and state 1 corresponds to the maxium value of AO1 (10 V or 20 mA, for example).
The electrical characteristics of this analog output remain unchanged. As they differ from logic output characteristics, it is important to ensure that they are compatible with the intended application.

Code	Name/Description	Adjustment range	Factory setting
dO1-	**[DO1 CONFIGURATION]**		
dO1	❏ **[DO1 assignment]**		[Output cont] (OCC)
	Identical to R1 (see page 182) with the addition of (shown for information only as these selections can only be configured in the [1.7 APPLICATION FUNCT.] (Fun-) menu): ☐ **[Brk control]** (bLC): Brake contactor control ☐ **[Input cont.]** (LLC): Line contactor control ☐ **[Output cont]** (OCC): Output contactor control ☐ **[DC charging]** (dCO): DC bus precharging contactor control		
dO1d	❏ **[DO1 delay time]**	0 to 9999 ms	0
	The delay cannot be set for the [No drive flt] (FLt), [Brk control] (bLC), [Output cont.] (OCC), [DC charging] (dCO), and [Input cont.] (LLC) assignments, and remains at 0. The change in state only takes effect once the configured time has elapsed, when the information becomes true.		
dO1S	❏ **[DO1 active at]**		[1] (POS)
	Configuration of the operating logic: ☐ **[1]** (POS): State 1 when the information is true ☐ **[0]** (nEG): State 0 when the information is true The configuration [1] (POS) cannot be modified for the [No drive flt] (FLt), [Brk control] (bLC), [DC charging] (dCO), and [Input cont.] (LLC) assignments.		
dO1H	❏ **[DO1 holding time]**	0 to 9999 ms	0
	The holding time cannot be set for the [No drive flt] (FLt), [Brk control] (bLC), [DC charging] (dCO), and [Input cont] (LLC) assignments, and remains at 0. The change in state only takes effect once the configured time has elapsed, when the information becomes false.		

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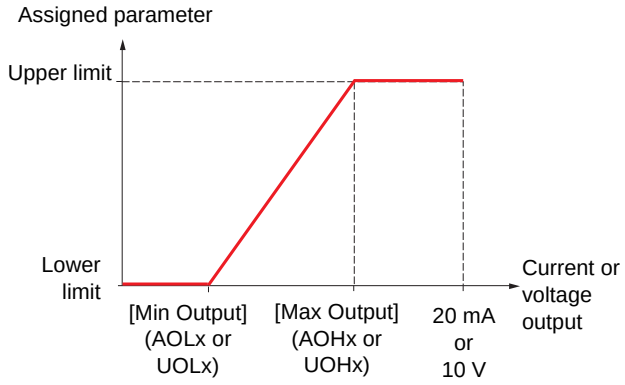
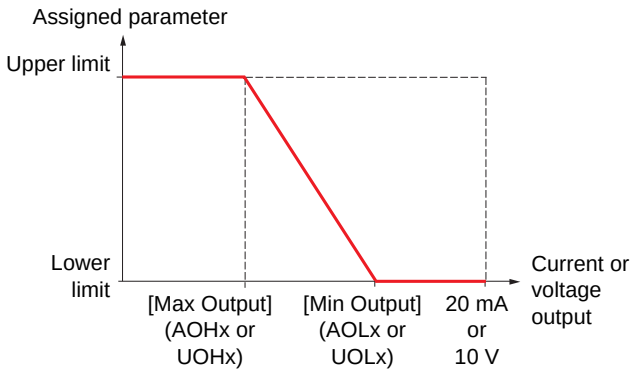
542 291 58 92 - 0 242 335 40 42

Configuration of analog outputs

Minimum and maximum values (output values):

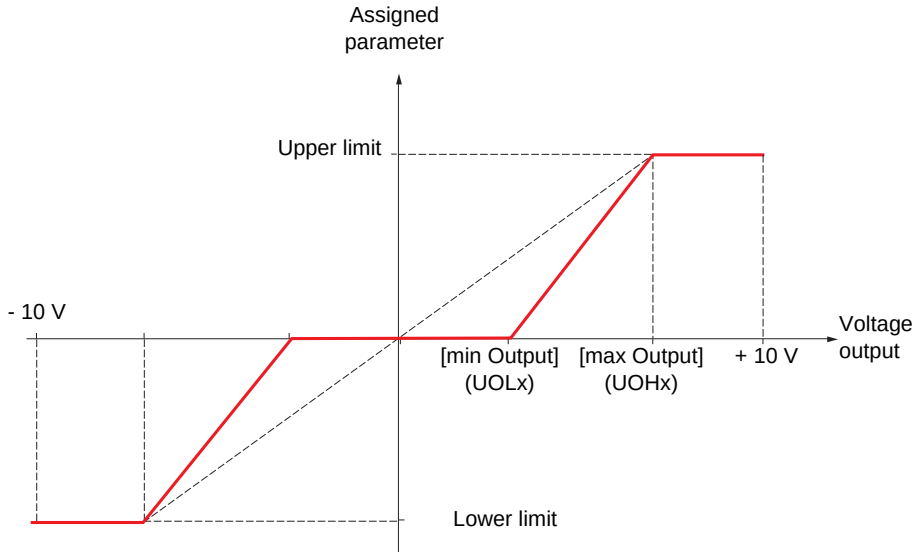
The minimum output value, in volts or mA, corresponds to the lower limit of the assigned parameter and the maximum value corresponds to its upper limit. The minimum value may be greater than the maximum value:





Outputs AO2 and AO3 configured as bipolar outputs (strongly recommended for signed parameters):

The [min Output] (UOLx) and [max Output] (UOHx) parameters are absolute values, although they function symmetrically. In the case of bipolar outputs, always set the maximum value higher than the minimum value.
The [max Output] (UOHx) corresponds to the upper limit of the assigned parameter, and the [min Output] (UOLx) corresponds to an average value between the upper and lower limits (0 for a signed and symmetrical parameter such as in the example below).



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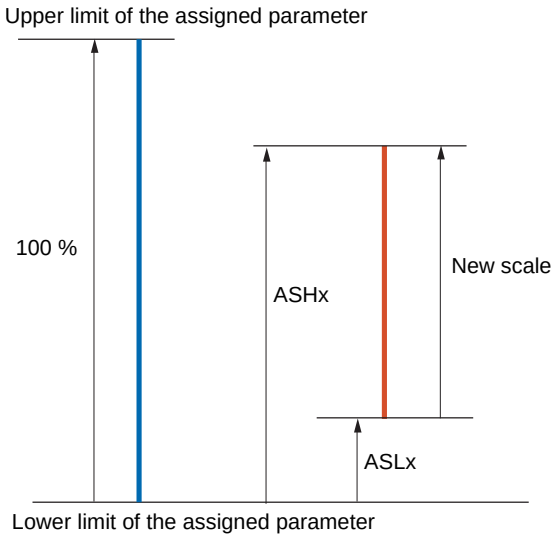
542 291 58 92 - 0 242 335 40 42

Scaling of the assigned parameter

The scale of the assigned parameter can be adapted in accordance with requirements by modifying the values of the lower and upper limits by means of two parameters for each analog output.
These parameters are given as a %; 100% corresponds to the total variation range of the configured parameter, so:

- 100% = upper limit - lower limit. For example, for [Sign. torque] (Stq), which varies between -3 and +3 times the rated torque, 100% corresponds to 6 times the rated torque.

- The parameter [Scaling AOx min] (ASLx) modifies the lower limit: new value = lower limit + (range x ASLx). The value 0% (factory setting) does not modify the lower limit.
- The [Scaling AOx max] (ASLx) parameter modifies the upper limit: new value = lower limit + (range x ASHx). The value 100% (factory setting) does not modify the upper limit.
- [Scaling AOx min] (ASLx) must always be lower than [Scaling AOx max] (ASHx).



Application example 1

The value of the signed motor torque at the AO2 output is to be transferred with +/- 10 V, with a range of -2 Tr to +2 Tr.

The parameter [Sign. torque.] (Stq) varies between -3 and +3 times the rated torque, or a range of 6 times the rated torque.

[Scaling AO2 min] (ASL2) must modify the lower limit by 1x the rated torque, or 100/6 = 16.7% (new value = lower limit + (range x ASL2).

[Scaling AO2 max] (ASH2) must modify the upper limit by 1x the rated torque, or 100 - 100/6 = 83.3% (new value = lower limit + (range x ASH2).

Application example 2

The value of the motor current at the AO2 output is to be transferred with 0 - 20 mA, with a range of 2 In motor, In motor being the equivalent of a 0.8 In drive.

The parameter [I motor] (OCr) varies between 0 and 2 times the rated drive current, or a range of 2.5 times the rated drive current.

[Scaling AO2 min] (ASL2) must not modify the lower limit, which therefore remains at its factory setting of 0%.

[Scaling AO2 max] (ASH2) must modify the upper limit by 0.5x the rated motor torque, or 100 - 100/5 = 80% (new value = lower limit + (range x ASH2).

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[1.5 INPUTS / OUTPUTS CFG] (I-O-)

Code	Name/Description	Adjustment range	Factory setting
AO1-	**[AO1 CONFIGURATION]**		
AO1	❏ **[AO1 assignment]**		[dO1] (dO1)
	☐ **[No]** (nO): Not assigned ☐ **[I motor]** (OCr): Current in the motor, between 0 and 2 In (In = rated drive current indicated in the Installation Manual and on the drive nameplate). ☐ **[Motor freq.]** (OFr): Output frequency, between 0 and [Max frequency] (tFr) ☐ **[Ramp out.]** (OrP): Between 0 and [Max frequency] (tFr) ☐ **[Motor torq.]** (trq): Motor torque, between 0 and 3 times the rated motor torque ☐ **[Sign. torque]** (Stq): Signed motor torque, between -3 and +3 times the rated motor torque. The + sign corresponds to motor mode and the - sign to generator mode (braking). ☐ **[sign ramp]** (OrS): Signed ramp output, between - [Max frequency] (tFr) and + [Max frequency] (tFr) ☐ **[Mot. power]** (OPr): Motor power, between 0 and 2.5 times [Rated motor power] (nPr) ☐ **[Mot thermal]** (tHr): Motor thermal state, between 0 and 200% of the rated thermal state ☐ **[Drv thermal]** (tHd): Drive thermal state, between 0 and 200% of the rated thermal state ☐ **[Torque 4Q]** (tqMS): Signed motor torque, between -3 and +3 times the rated motor torque. The + sign and the - sign correspond to the physical direction of the torque, regardless of mode (motor or generator). Example of usage: "master-slave" with the [TORQUE CONTROL] (tOr-) function, page 241. ☐ **[Meas.mot.fr]** (OFrr): Measured motor speed ☐ **[Sig. o/p frq.]** (OFS): Signed output frequency, between - [Max frequency] (tFr) and + [Max frequency] (tFr) ☐ **[Mot therm2]** (tHr2): Thermal state of motor 2, between 0 and 200% of the rated thermal state ☐ **[Mot therm3]** (tHr3): Thermal state of motor 3, between 0 and 200% of the rated thermal state ☐ **[Uns.TrqRef]** (Utr): Torque reference, between 0 and 3 times the rated motor torque ☐ **[Sign trq ref.]** (Str): Signed torque reference, between -3 and +3 times the rated motor torque ☐ **[Torque lim.]** (tqL): Torque limit, between 0 and 3 times the rated motor torque ☐ **[Motor volt.]** (UOP): Voltage applied to the motor, between 0 and [Rated motor volt.] (UnS) ☐ **[dO1]** (dO1): Assigned as logic output. This assignment can only appear if [DO1 assignment] (dO1) page 188 has been assigned. This is the only possible choice in this case, and is displayed for information purposes only.		
AO1t	❏ **[AO1 Type]**		[Current] (0A)
	☐ **[Voltage]** (10U): Voltage output ☐ **[Current]** (0 A): Current output		
AOL1	❏ **[AO1 min Output]**	0 to 20.0 mA	0 mA
	This parameter can be accessed if [AO1 Type] (AO1t) = [Current] (0A)		
AOH1	❏ **[AO1 max Output]**	0 to 20.0 mA	20.0 mA
	This parameter can be accessed if [AO1 Type] (AO1t) = [Current] (0A)		
UOL1	❏ **[AO1 min Output]**	0 to 10.0 V	0 V
	This parameter can be accessed if [AO1 Type] (AO1t) = [Voltage] (10U)		
UOH1	❏ **[AO1 max Output]**	0 to 10.0 V	10.0 V
	This parameter can be accessed if [AO1 Type] (AO1t) = [Voltage] (10U)		

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542 291 58 92 - 0 242 335 40 42

Code	Name/Description	Adjustment range	Factory setting
AO1-	**[AO1 CONFIGURATION]** (continued)		
ASL1	❑ **[Scaling AO1 min]**	0 to 100.0 %	0 %
	Scaling of the lower limit of the assigned parameter, as a % of the maximum possible variation.		
ASH1	❑ **[Scaling AO1 max]**	0 to 100.0 %	100,0 %
	Scaling of the upper limit of the assigned parameter, as a % of the maximum possible variation.		
AO1F	❑ **[AO1 Filter]**	0 to 10.00 s	0 s
	Interference filtering. This parameter is forced to 0 if [AO1 assignment] (AO1) = [dO1] (dO1).		

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[1.5 INPUTS / OUTPUTS CFG] (I-O-)

Code	Name/Description	Adjustment range	Factory setting
AO2-	**[AO2 CONFIGURATION]** Can be accessed if a VW3A3202 option card has been inserted		
AO2	❏ **[AO2 assignment]** Same assignments as AO1, without [dO1] (dO1).		[No] (nO)
AO2t 10U 0A n10U	❏ **[AO2 Type]** ☐ **[Voltage]** (10U): Voltage output ☐ **[Current]** (0 A): Current output ☐ **[Voltage +/-]** (n10U): Bipolar voltage output		[Current] (0A)
AOL2	❏ **[AO2 min Output]** This parameter can be accessed if [AO2 Type] (AO2t) = [Current] (0A)	0 to 20.0 mA	0 mA
AOH2	❏ **[AO2 max Output]** This parameter can be accessed if [AO2 Type] (AO2t) = [Current] (0A)	0 to 20.0 mA	20.0 mA
UOL2	❏ **[AO2 min Output]** This parameter can be accessed if [AO2 Type] (AO2t) = [Voltage] (10U) or [Voltage +/-] (n10U)	0 to 10.0 V	0 V
UOH2	❏ **[AO2 max Output]** This parameter can be accessed if [AO2 Type] (AO2t) = [Voltage] (10U) or [Voltage +/-] (n10U)	0 to 10.0 V	10.0 V
ASL2	❏ **[Scaling AO2 min]** Scaling of the lower limit of the assigned parameter, as a % of the maximum possible variation.	0 to 100.0 %	0 %
ASH2	❏ **[Scaling AO2 max]** Scaling of the upper limit of the assigned parameter, as a % of the maximum possible variation.	0 to 100.0 %	100,0 %
AO2F	❏ **[AO2 Filter]** Interference filtering.	0 to 10.00 s	0 s

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542 291 58 92 - 0 242 335 40 42

[1.5 INPUTS / OUTPUTS CFG] (I-O-)

Code	Name/Description	Adjustment range	Factory setting
AO3-	**[AO3 CONFIGURATION]** Can be accessed if a VW3A3202 option card has been inserted		
AO3	❑ **[AO3 assignment]** Same assignments as AO1, without [dO1] (dO1).		[No] (nO)
AO3t 10U 0A n10U	❑ **[AO3 Type]** ☐ **[Voltage]** (10U): Voltage output ☐ **[Current]** (0 A): Current output ☐ **[Voltage +/-]** (n10U): Bipolar voltage output		[Current] (0A)
AOL3	❑ **[AO3 min Output]** This parameter can be accessed if [AO3 Type] (AO3t) = [Current] (0A)	0 to 20.0 mA	0 mA
AOH3	❑ **[AO3 max Output]** This parameter can be accessed if [AO3 Type] (AO3t) = [Current] (0A)	0 to 20.0 mA	20.0 mA
UOL3	❑ **[AO3 min Output]** This parameter can be accessed if [AO3 Type] (AO3t) = [Voltage] (10U) or [Voltage +/-] (n10U)	0 to 10.0 V	0 V
UOH3	❑ **[AO3 max Output]** This parameter can be accessed if [AO3 Type] (AO3t) = [Voltage] (10U) or [Voltage +/-] (n10U)	0 to 10.0 V	10.0 V
ASL3	❑ **[Scaling AO3 min]** Scaling of the lower limit of the assigned parameter, as a % of the maximum possible variation.	0 to 100.0 %	0 %
ASH3	❑ **[Scaling AO3 max]** Scaling of the upper limit of the assigned parameter, as a % of the maximum possible variation.	0 to 100.0 %	100,0 %
AO3F	❑ **[AO3 Filter]** Interference filtering.	0 to 10.00 s	0 s

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[1.5 INPUTS / OUTPUTS CFG] (I-O-)

The following submenus group the alarms into 1 to 3 groups, each of which can be assigned to a relay or a logic output for remote signaling. These groups can also be displayed on the graphic display terminal (see [6 MONITORING CONFIG.] menu) and viewed via the [1.2 MONITORING] (SUP) menu.
When one or a number of alarms selected in a group occurs, this alarm group is activated.

Code	Name/Description	Adjustment range	Factory setting
A1C-	**[ALARM GRP1 DEFINITION]**		
	Selection to be made from the following list: ☐ **[LI6=PTC al.]** (PLA): LI6 = PTC probe alarm ☐ **[PTC1 alarm]** (P1A): Probe alarm 1 ☐ **[PTC2 alarm]** (P2A): Probe alarm 2 ☐ **[Ext. fault al]** (EFA): External fault alarm ☐ **[Under V. al.]** (USA): Undervoltage alarm ☐ **[slipping al.]** (AnA): Slipping alarm ☐ **[I attained]** (CtA): Current threshold attained ([Current threshold] (Ctd) page 134) ☐ **[Freq. Th. attain.]** (FtA): Frequency threshold attained ([Freq. threshold] (Ftd) page 135) ☐ **[Freq. Th. 2 attain.]** (F2A): Frequency threshold 2 attained ([Freq. threshold 2] (F2d) page 135) ☐ **[Freq.ref.att]** (SrA): Frequency reference attained ☐ **[Th.mot. att.]** (tSA): Motor 1 thermal state attained ☐ **[Th.mot2 att.]** (tS2): Motor 2 thermal state attained ☐ **[Th.mot3 att]** (tS3): Motor 3 thermal state attained ☐ **[Uvolt warn]** (UPA): Undervoltage warning ☐ **[HSP attain.]** (FLA): High speed attained ☐ **[AI. °C drv]** (tHA): Drive overheating ☐ **[Load mvt al]** (bSA): Braking speed alarm ☐ **[Brk cont. al]** (bCA): Brake contact alarm ☐ **[AI2 AI. 4-20]** (AP2): Alarm indicating absence of 4-20 mA signal on input AI2 ☐ **[AI3 AI. 4-20]** (AP3): Alarm indicating absence of 4-20 mA signal on input AI3 ☐ **[AI4 AI. 4-20]** (AP4): Alarm indicating absence of 4-20 mA signal on input AI4 ☐ **[Lim T/I att.]** (SSA): Torque limit alarm ☐ **[Th.drv.att.]** (tAd): Drive thermal state reached ☐ **[IGBT alarm]** (tJA): IGBT alarm ☐ **[Torque Control al.]** (rtA): Torque control alarm ☐ **[Brake R. al.]** (bOA): Braking resistor temperature alarm ☐ **[Option alarm]** (APA): Alarm generated by an option card. ☐ **[Regen. underV. al.]** (UrA): Reserved. ☐ **[High torque alarm]** (ttHA): Motor torque higher than high threshold [High torque thd.] (ttH) page 134. ☐ **[Low torque alarm]** (ttLA): Motor torque less than low threshold [Low torque thd.] (ttL) page 134. ☐ **[Freq. meter Alarm]** (FqLA): Measured speed threshold attained: [Pulse warning thd.] (FqL) page 135. See the multiple selection procedure on page 24 for the integrated display terminal, and page 15 for the graphic display terminal.		
A2C-	**[ALARM GRP2 DEFINITION]**		
	Identical to [ALARM GRP1 DEFINITION] (A1C-)		
A3C-	**[ALARM GRP3 DEFINITION]**		
	Identical to [ALARM GRP1 DEFINITION] (A1C-)		

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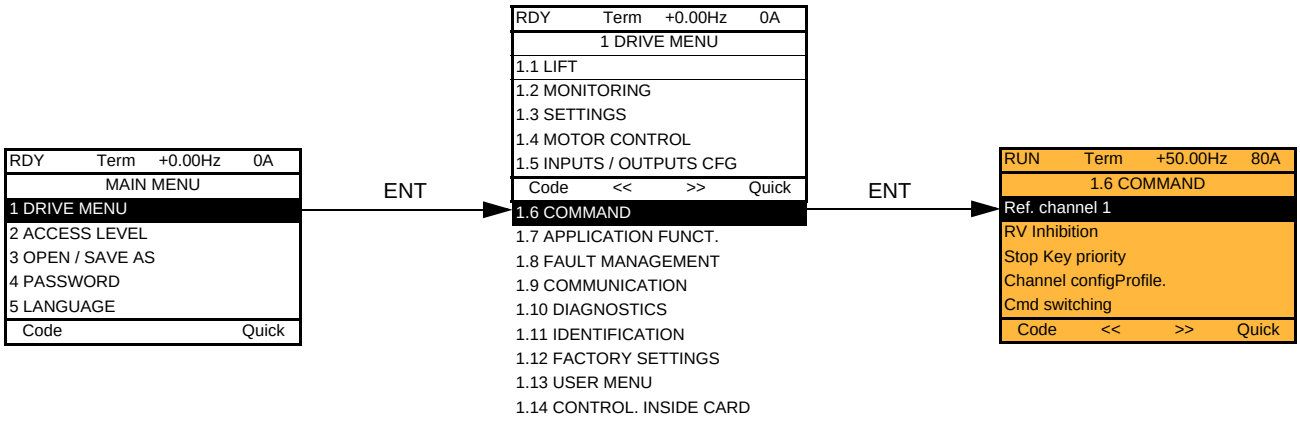
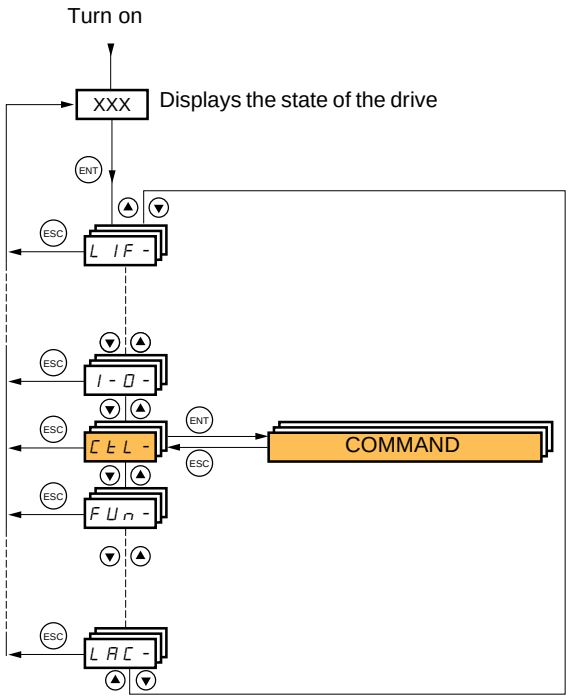
542 291 58 92 - 0 242 335 40 42

[1.6 COMMAND] (CtL-)

With graphic display terminal:



With integrated display terminal:



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542 291 58 92 - 0 242 335 40 42

[1.6 COMMAND] (CtL-)

The parameters in the [1.6 COMMAND] (CtL) menu can only be modified when the drive is stopped and no run command is present.

Command and reference channels

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

Control	Reference
• Terminals: Logic inputs LI • Graphic terminal • Integrated Modbus • Integrated CANopen • Communication card • Controller Inside card	• Terminals: Analog inputs AI, frequency input, encoder • Graphic terminal • Integrated Modbus • Integrated CANopen • Communication card • Controller Inside card • +/- speed via the terminals • +/- speed via the graphic display terminal

The behavior of the Altivar LIFT can be adapted according to requirements:

- [Not separ.] (SIM): Command and reference are sent via the same channel.
- [Separate] (SEP): Command and reference may be sent via different channels.

In these configurations, control via the communication bus is performed in accordance with the DRIVECOM standard with only 5 freely-assignable bits (see Communication Parameters Manual). The application functions cannot be accessed via the communication interface.

- [I/O profile] (IO): Command and reference may be sent via different channels. This configuration both simplifies and extends use via the communication interface.
  Commands may be sent via the logic inputs on the terminals or via the communication bus.
  When commands are sent via a bus, they are available on a word, which acts as virtual terminals containing only logic inputs.
  Application functions can be assigned to the bits in this word. More than one function can be assigned to the same bit.

☞ **Note:** Stop commands from the terminals remain active even if the terminals are not the active command channel.

☞ **Note:** The integrated Modbus channel has two physical communication ports:
- The Modbus network port
- The Modbus HMI port

The drive does not differentiate between these two ports, but recognizes the graphic display terminal irrespective of the port to which it is connected.

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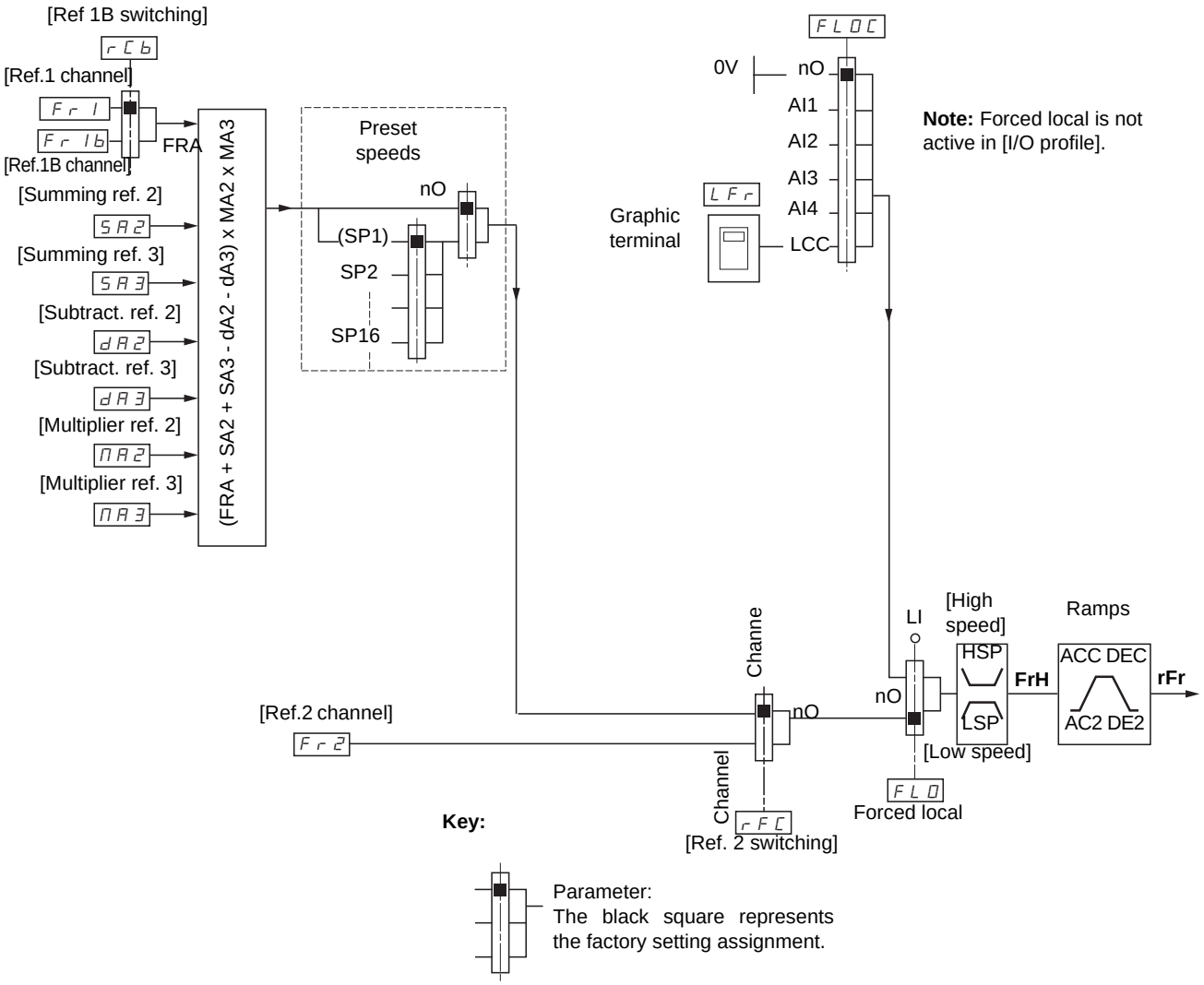
Reference channel for [Not separ.] (SIM), [Separate] (SEP) and [I/O profile] (IO) configurations



References

Fr1, SA2, SA3, dA2, dA3, MA2, MA3:

- Terminals, graphic display terminal, integrated Modbus, integrated CANopen, communication card, Controller Inside card

Fr1b, for SEP and IO:

- Terminals, graphic display terminal, integrated Modbus, integrated CANopen, communication card, Controller Inside card

Fr1b, for SIM:

- Terminals, only accessible if Fr1 = terminals

Fr2:

- Terminals, graphic display terminal, integrated Modbus, integrated CANopen, communication card, Controller Inside card

Note: [Ref.1B channel] (Fr1b) and [Ref 1B switching] (rCb) must be configured in the [1.7 APPLICATION FUNCT.] (Fun-) menu.

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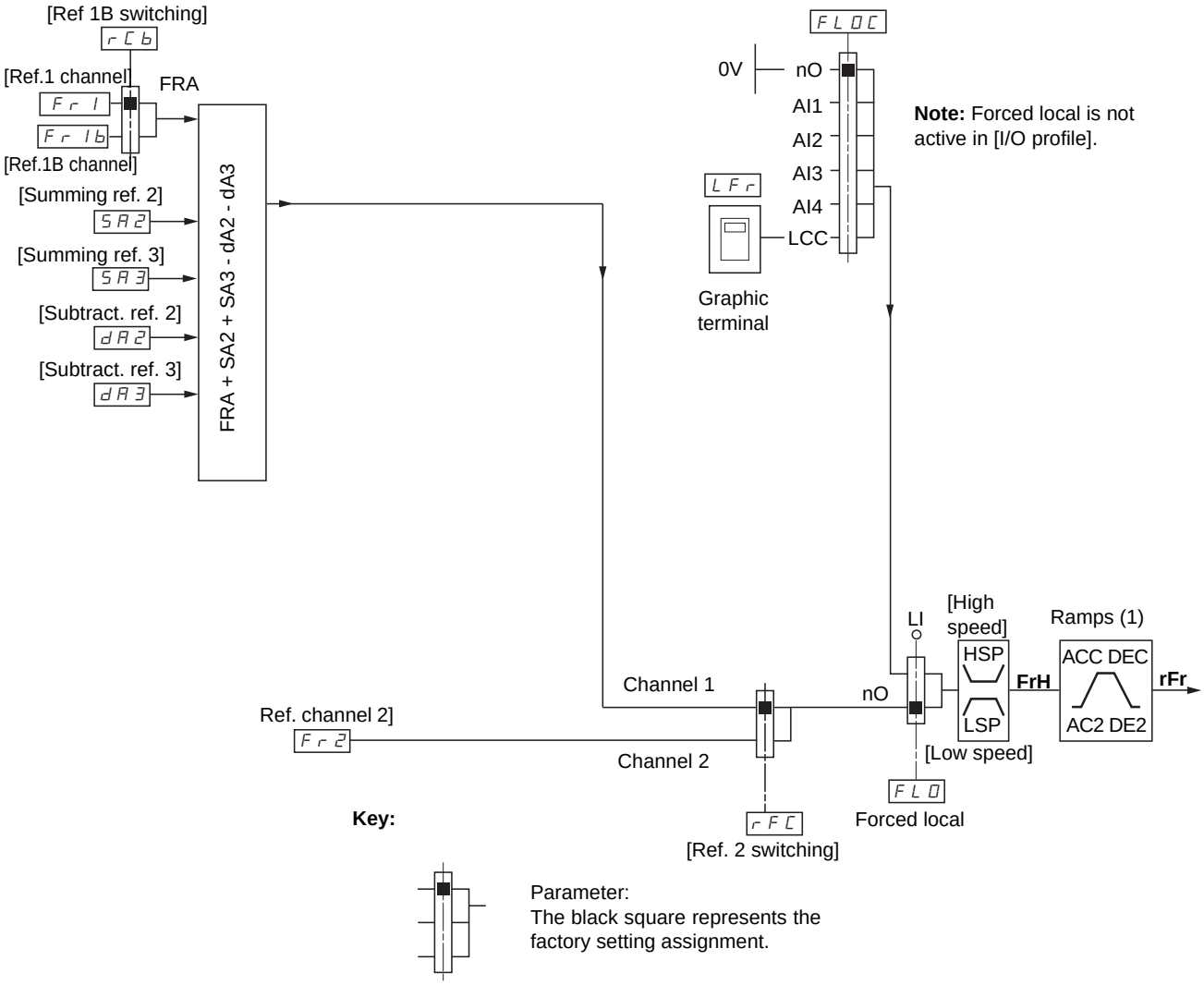
542 291 58 92 - 0 242 335 40 42

Reference channel for [Not separ.] (SIM), [Separate] (SEP) and [I/O profile] (IO) configurations



References

Fr1:

- Terminals, graphic display terminal, integrated Modbus, integrated CANopen, communication card, Controller Inside card

Fr1b, for SEP and IO:

- Terminals, graphic display terminal, integrated Modbus, integrated CANopen, communication card, Controller Inside card

Fr1b, for SIM:

- Terminals, only accessible if Fr1 = terminals

SA2, SA3, dA2, dA3:

- Terminals only

Fr2:

- Terminals, graphic display terminal, integrated Modbus, integrated CANopen, communication card, Controller Inside card

(1) Ramps not active if the PID function is active in automatic mode.

Note: [Ref.1B channel] (Fr1b) and [Ref 1B switching] (rCb) must be configured in the [1.7 APPLICATION FUNCT.] (Fun-) menu.

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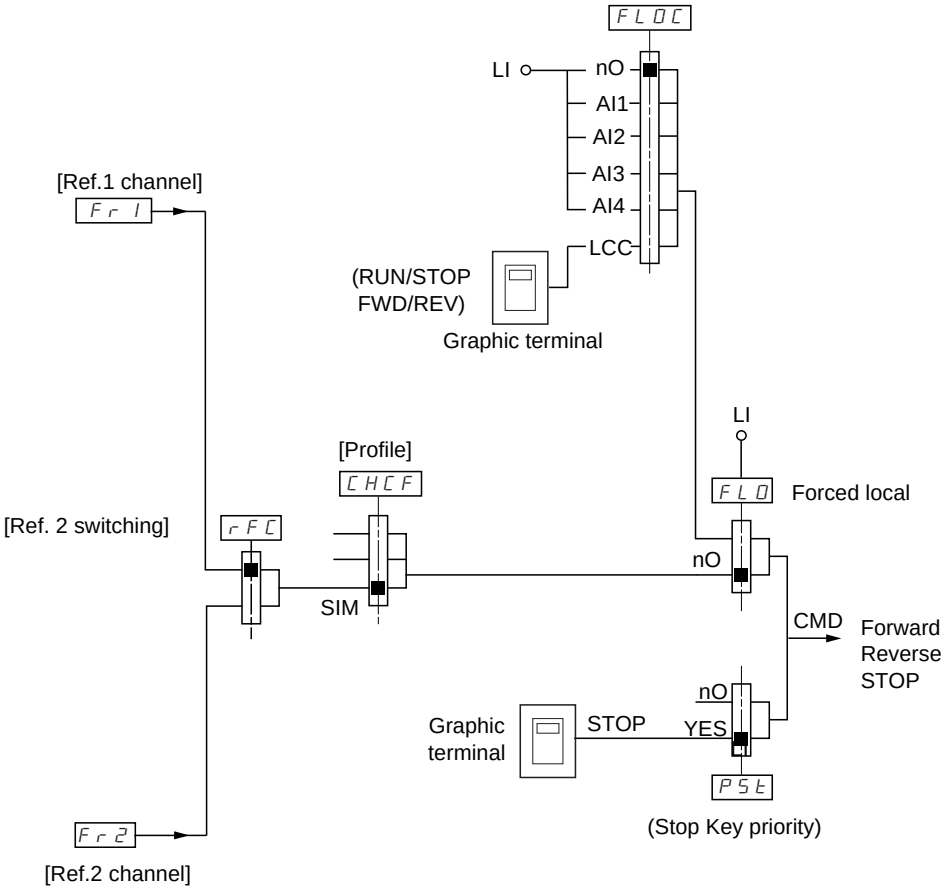
542 291 58 92 - 0 242 335 40 42

Command channel for [Not separ.] (SIM) configuration

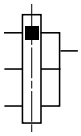
Reference and command, not separate

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

For example: If the reference is Fr1 = AI1 (analog input at the terminals), control is via LI (logic input at the terminals).



Key:



Parameter:
The black square represents
the factory setting assignment.

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542 291 58 92 - 0 242 335 40 42

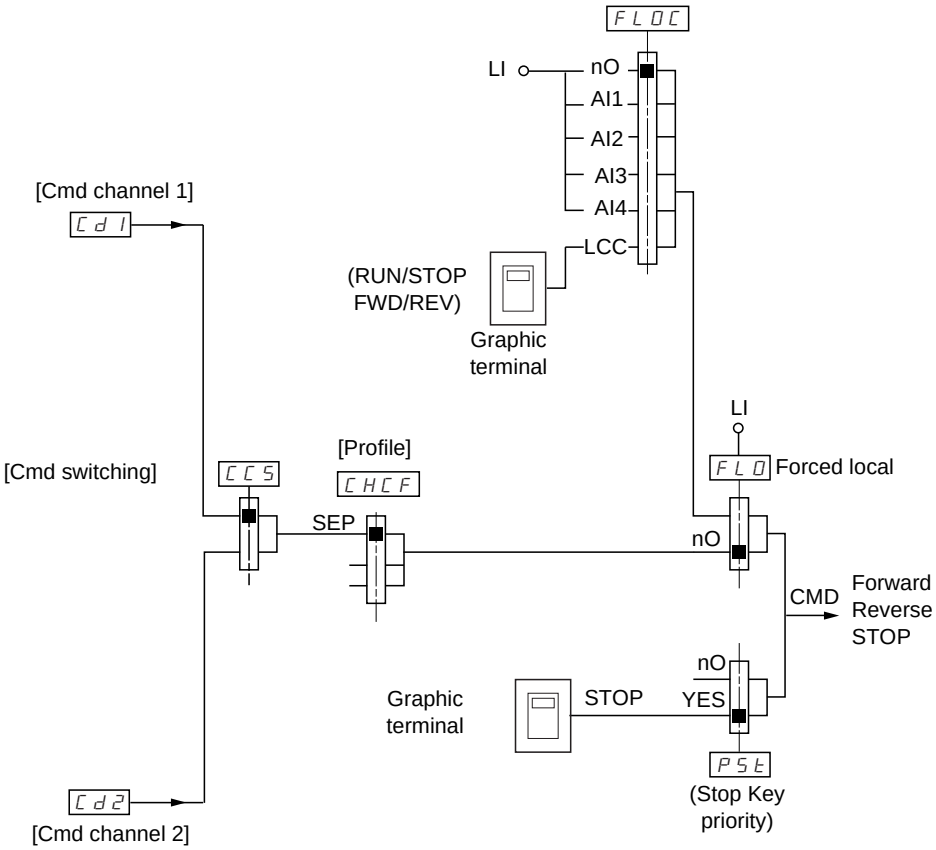
Command channel for [Separate] (SEP) configuration

Separate reference and command

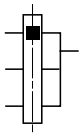
Parameters FLO and FLOC are common to reference and command.

E.g. If the reference is in forced local mode via AI1 (analog input at the terminals), command in forced local mode is via LI (logic input at the terminals).

The command channels Cd1 and Cd2 are independent of the reference channels Fr1, Fr1b and Fr2.



Key:



Parameter:
The black rectangle represents the factory setting assignment, except for [Profile].

Controls

Cd1, Cd2:

- Terminals, graphic display terminal, integrated Modbus, integrated CANopen, communication card, Controller Inside card

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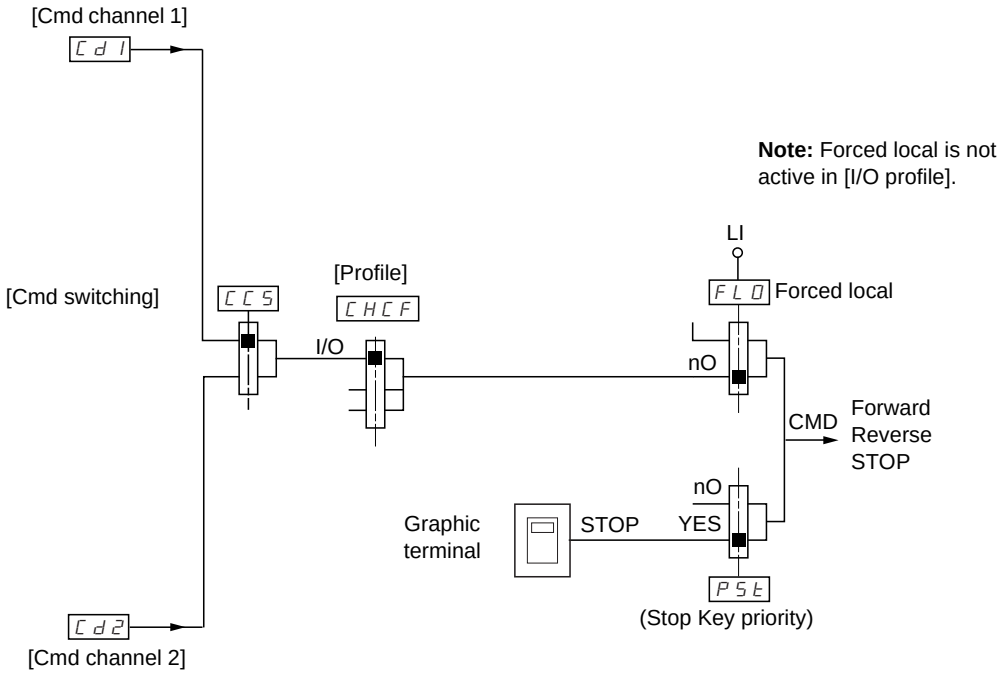
542 291 58 92 - 0 242 335 40 42

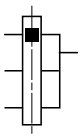
Command channel for [I/O profile] (IO)

Separate reference and command, as in [Separate] (SEP) configuration

The command channels Cd1 and Cd2 are independent of the reference channels Fr1, Fr1b and Fr2.



Key:



Parameter:
The black rectangle represents the factory setting assignment, except for [Profile].

Controls

Cd1, Cd2:

- Terminals, graphic display terminal, integrated Modbus, integrated CANopen, communication card, Controller Inside card

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542 291 58 92 - 0 242 335 40 42

Command channel for [I/O profile] (IO)

Selection of a command channel:

A command or an action can be assigned:

- To a fixed channel by selecting an LI input or a Cxxx bit:
  - By selecting e.g., LI3, this action will always be triggered by LI3 regardless of which command channel is switched.
  - By selecting e.g., C214, this action will always be triggered by integrated CANopen with bit 14 regardless of which command channel is switched.

- To a switchable channel by selecting a CDxx bit:
  - By selecting, e.g., CD11, this action will be triggered by
    LI12 if the terminals channel is active
    C111 if the integrated Modbus channel is active
    C211 if the integrated CANopen channel is active
    C311 if the communication card channel is active
    C411 if the Controller Inside card channel is active

If the active channel is the graphic display terminal, the functions and commands assigned to CDxx switchable internal bits are inactive.

Note:

- CD14 and CD15 can only be used for switching between 2 networks. They do not have equivalent logic inputs.

Terminals	Integrated Modbus	Integrated CANopen	Communication card	Controller Inside card	Internal bit, can be switched
					CD00
LI2 (1)	C101 (1)	C201 (1)	C301 (1)	C401 (1)	CD01
LI3	C102	C202	C302	C402	CD02
LI4	C103	C203	C303	C403	CD03
LI5	C104	C204	C304	C404	CD04
LI6	C105	C205	C305	C405	CD05
LI7	C106	C206	C306	C406	CD06
LI8	C107	C207	C307	C407	CD07
LI9	C108	C208	C308	C408	CD08
LI10	C109	C209	C309	C409	CD09
LI11	C110	C210	C310	C410	CD10
LI12	C111	C211	C311	C411	CD11
LI13	C112	C212	C312	C412	CD12
LI14	C113	C213	C313	C413	CD13
-	C114	C214	C314	C414	CD14
-	C115	C215	C315	C415	CD15

(1) If [2/3 wire control] (tCC) page 166 = [3 wire] (3C), LI2, C101, C201, C301, and C401 cannot be accessed.

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542 291 58 92 - 0 242 335 40 42

Assignment conditions for logic inputs and control bits

The following elements are available for every command or function that can be assigned to a logic input or a control bit:

[LI1] (LI1) to [LI6] (LI6)	Drive with or without option
[LI7] (LI7) to [LI10] (LI10)	With VW3A3201 logic I/O card
[LI11] (LI11) to [LI12] (LI12)	With VW3A3203 ESIM card
[LI11] (LI11) to [LI14] (LI14)	With VW3A3202 extended I/O card
[C101] (C101) to [C110] (C110)	With integrated Modbus in [I/O profile] (IO) configuration
[C111] (C111) to [C115] (C115)	With integrated Modbus regardless of configuration
[C201] (C201) to [C210] (C210)	With integrated CANopen in [I/O profile] (IO) configuration
[C211] (C211) to [C215] (C215)	With integrated CANopen regardless of configuration
[C301] (C301) to [C310] (C310)	With a communication card in [I/O profile] (IO) configuration
[C311] (C311) to [C315] (C315)	With a communication card regardless of configuration
[C401] (C401) to [C410] (C410)	With Controller Inside card in [I/O profile] (IO) configuration
[C411] (C411) to [C415] (C415)	With Controller Inside card regardless of configuration
[CD00] (Cd00) to [CD10] (Cd10)	In [I/O profile] (IO) configuration
[CD11] (Cd11) to [CD15] (Cd15)	Regardless of profile

Note: In [I/O profile] (IO) configuration, LI1 cannot be accessed and if [2/3 wire control] (tCC) page 166 = [3 wire] (3C), LI2, C101, C201, C301, and C401 cannot be accessed either.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Inactive communication channels are not monitored (no lock following malfunction in the event of a communication bus failure). Make sure that the commands and functions assigned to bits C101 to C415 will not pose a risk in the event of the failure of the associated communication bus.

Failure to follow this instruction can result in death or serious injury.

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542 291 58 92 - 0 242 335 40 42

[1.6 COMMAND] (CtL-)

Code	Name/Description	Adjustment range	Factory setting
Fr1	❏ **[Ref.1 channel]**		[AI1] (AI1)
AI1	☐ **[AI1]** (AI1): Analog input		
AI2	☐ **[AI2]** (AI2): Analog input		
AI3	☐ **[AI3]** (AI3): Analog input, if VW3A3202 extension card has been inserted		
AI4	☐ **[AI4]** (AI4): Analog input, if VW3A3202 extension card has been inserted		
LCC	☐ **[HMI]** (LCC): Graphic display terminal		
Mdb	☐ **[Modbus]** (Mdb): Integrated Modbus		
CAn	☐ **[CANopen]** (CAn): Integrated CANopen		
nEt	☐ **[Com. card]**(nEt): Communication card (if inserted)		
APP	☐ **[C.Insid. card]**(APP): Controller Inside card (if inserted)		
PI	☐ **[RP]** (PI): Frequency input, if VW3A3202 extension card has been inserted		
PG	☐ **[Encoder]** (PG): Encoder input, if encoder card has been inserted		
rIn	❏ **[RV Inhibition]**		[No] (nO)
nO	☐ **[No]** (nO)		
YES	☐ **[Yes]** (YES) Inhibition of movement in reverse direction, does not apply to direction requests sent by logic inputs. - Reverse direction requests sent by logic inputs are taken into account. - Reverse direction requests sent by the graphic display terminal are not taken into account. - Reverse direction requests sent by the line are not taken into account. - Any reverse speed reference originating from the PID, summing input, etc., is interpreted as a zero reference.		
PSt	❏ **[Stop Key priority]**		[Yes] (YES)
nO	☐ **[No]** (nO)		
YES	☐ **[Yes]** (YES): Gives priority to the STOP key on the graphic display terminal when the graphic display terminal is not enabled as the command channel. Press and hold down ENT for 2 seconds in order for any change in the assignment of [Stop Key priority] (PSt) to be taken into account. This will be a freewheel stop. If the active command channel is the graphic display terminal, the stop will be performed according to the [Type of stop] (Stt) page 221 irrespective of the configuration of [Stop Key priority] (PSt).		
CHCF	❏ **[Profile]**		[Not separ.] (SIM)
SIM	☐ **[Not separ.]** (SIM): Reference and command, not separate		
SEP	☐ **[Separate]** (SEP): Separate reference and command This assignment cannot be accessed in [I/O profile] (IO).		
IO	☐ **[I/O profile]** (IO): I/O profile When [I/O profile] (IO) is deselected, the drive automatically returns to the factory setting (this is mandatory). This factory setting only affects the [1 DRIVE MENU] menu. It does not affect either [1.9 COMMUNICATION] or [1.14 CONTROL INSIDE CARD]. - With the graphic display terminal, a screen appears to perform this operation. Follow the instructions on the screen. - With the integrated display terminal, press ENT and hold it down (for 2 s). This will save the selection and return to the factory setting.		

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542 291 58 92 - 0 242 335 40 42

[1.6 COMMAND] (CtL-)

Code	Name/Description	Adjustment range	Factory setting
CCS	❏ **[Cmd switching]**		[ch1 active] (Cd1)
	This parameter can be accessed if [Profile] (CHCF) = [Separate] (SEP) or [I/O profile] (IO)		
Cd1	☐ **[ch1 active]** (Cd1): [Cmd channel 1] (Cd1) active (no switching)		
Cd2	☐ **[ch2 active]** (Cd2): [Cmd channel 2] (Cd2) active (no switching)		
LI1	☐ **[LI1]** (LI1)		
-	:		
-	:		
-	☐ **[...]** (...): See the assignment conditions on page 204 (not CDOO to CD14).		
	If the assigned input or bit is at inactive state, channel [Cmd channel 1] (Cd1) is active. If the assigned input or bit is at active state, channel [Cmd channel 2] (Cd2) is active.		
Cd1	❏ **[Cmd channel 1]**		[Terminals] (tEr)
tEr	☐ **[Terminals]** (tEr): Terminals		
LCC	☐ **[HMI]** (LCC): Graphic display terminal		
Mdb	☐ **[Modbus]** (Mdb): Integrated Modbus		
CAn	☐ **[CANopen]** (CAn): Integrated CANopen		
nEt	☐ **[Com. card]** (nEt): Communication card (if inserted)		
APP	☐ **[C.Insid. card]** (APP): Controller Inside card (if inserted)		
	The parameter is available if [Profile] (CHCF) = [Separate] (SEP) or [I/O profile] (IO).		
Cd2	❏ **[Cmd channel 2]**		[Modbus] (Mdb)
tEr	☐ **[Terminals]** (tEr): Terminals		
LCC	☐ **[HMI]** (LCC): Graphic display terminal		
Mdb	☐ **[Modbus]** (Mdb): Integrated Modbus		
CAn	☐ **[CANopen]** (CAn): Integrated CANopen		
nEt	☐ **[Com. card]** (nEt): Communication card (if inserted)		
APP	☐ **[C.Insid. card]** (APP): Controller Inside card (if inserted)		
	The parameter is available if [Profile] (CHCF) = [Separate] (SEP) or [I/O profile] (IO).		
rFC	❏ **[Ref. 2 switching]**		[ch1 active](Fr1)
Fr1	☐ **[ch1 active]** (Fr1): No switching, [Ref.1 channel] (Fr1) active		
Fr2	☐ **[ch2 active]** (Fr2): No switching, [Ref.2 channel] (Fr2) active		
LI1	☐ **[LI1]** (LI1)		
-	:		
-	:		
-	☐ **[...]** (...): See the assignment conditions on page 204 (not CDOO to CD14).		
	If the assigned input or bit is at inactive state, channel [Ref.1 channel] (Fr1) is active. If the assigned bit or input is at active sate, channel [Ref. 2 channel] (Fr2) is active.		
Fr2	❏ **[Ref.2 channel]**		[No] (nO)
nO	☐ **[No]** (nO): Not assigned If [Profile] (CHCF) = [Not separ.] (SIM), command is at the terminals with a zero reference. If [Profile] (CHCF) = [Separate] (SEP) or [I/O profile] (IO) , the reference is zero.		
AI1	☐ **[AI1]** (AI1): Analog input		
AI2	☐ **[AI2]** (AI2): Analog input		
AI3	☐ **[AI3]** (AI3): Analog input, if VW3A3202 extension card has been inserted		
AI4	☐ **[AI4]** (AI4): Analog input, if VW3A3202 extension card has been inserted		
UPdt	☐ **[+/- Speed]** (UPdt): +/-Speed command		
LCC	☐ **[HMI]** (LCC): Graphic display terminal		
Mdb	☐ **[Modbus]** (Mdb): Integrated Modbus		
CAn	☐ **[CANopen]** (CAn): Integrated CANopen		
nEt	☐ **[Com. card]**(nEt): Communication card (if inserted)		
APP	☐ **[C.Insid. card]**(APP): Controller Inside card (if inserted)		
PI	☐ **[RP]** (PI): Frequency input, if VW3A3202 extension card has been inserted		
PG	☐ **[Encoder]** (PG): Encoder input, if encoder card has been inserted		

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542 291 58 92 - 0 242 335 40 42

Code	Name/Description	Adjustment range	Factory setting
COP	❏ **[Copy channel 1 <> 2]**		[No] (nO)

Can be used to copy the current reference and/or the command by means of switching, in order to avoid speed surges, for example.
If [Profile] (CHCF) page 205 = [Not separ.] (SIM) or [Separate] (SEP), copying will only be possible from channel 1 to channel 2.
If [Profile] (CHCF) = [I/O profile] (IO), copying will be possible in both directions.

nO ☐ **[No]** (nO): No copy
SP ☐ **[Reference]** (SP): Copy reference
Cd ☐ **[Command]** (Cd): Copy command
ALL ☐ **[Cmd + ref.]** (ALL): Copy command and reference

- A reference or a command cannot be copied to a channel on the terminals.
- The reference copied is FrH (before ramp) unless the destination channel reference is set via +/- speed. In this case, the reference copied is rFr (after ramp).

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Copying the command and/or reference can change the direction of rotation.
Check that this is safe.
Failure to follow this instruction can result in death or serious injury.

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542 291 58 92 - 0 242 335 40 42

[1.6 COMMAND] (CtL-)

As the graphic display terminal may be selected as the command and/or reference channel, its action modes can be configured.
The parameters on this page can only be accessed on the graphic display terminal, and not on the integrated display terminal.

Comments:

- The display terminal command/reference is only active if the command and/or reference channels from the terminal are active with the exception of [T/K] (command via the display terminal), which takes priority over these channels. Press [T/K] (command via the display terminal) again to revert control to the selected channel.
- Command and reference via the display terminal are impossible if the latter is connected to more than one drive.
- The preset speed function can only be accessed if [Profile] (CHCF) = [Not separ.] (SIM).
- The [T/K] function (command via the display terminal) can be accessed regardless of the [Profile] (CHCF).

Code	Name/Description	Adjustment range	Factory setting
F N 1	❏ **[F1 key assignment]**		[No] (nO)
n O	☐ **[No]**: Not assigned,		
F P S 1	☐ **[Preset spd2]**: Press the key to run the drive at the 2nd preset speed [Preset speed 2] (SP2) page 226. Press STOP to stop the drive.		
F P S 2	☐ **[Preset spd3]**: Press the key to run the drive at the 3rd preset speed [Preset speed 3] (SP3) page 226. Press STOP to stop the drive.		
F t	☐ **[T/K]**: Control via the display terminal: Takes priority over [Cmd switching] (CCS) and over [Ref. 2 switching] (rFC).		
F N 2	❏ **[F2 key assignment]**		[No] (nO)
	Identical to [F1 key assignment].		
F N 3	❏ **[F3 key assignment]**		[No] (nO)
	Identical to [F1 key assignment].		
F N 4	❏ **[F4 key assignment]**		[No] (nO)
	Identical to [F1 key assignment].		
b M P	❏ **[HMI cmd.]**		[Stop] (StOP)
	When the [T/K] function is assigned to a key and that function is active, this parameter defines the behavior at the moment when control returns to the graphic display terminal.		
S t O P	☐ **[Stop]**: Stops the drive (although the controlled direction of operation and reference of the previous channel are copied (to be taken into account on the next RUN command)).		
b U M P	☐ **[Bumpless]**: Does not stop the drive (the controlled direction of operation and the reference of the previous channel are copied).		

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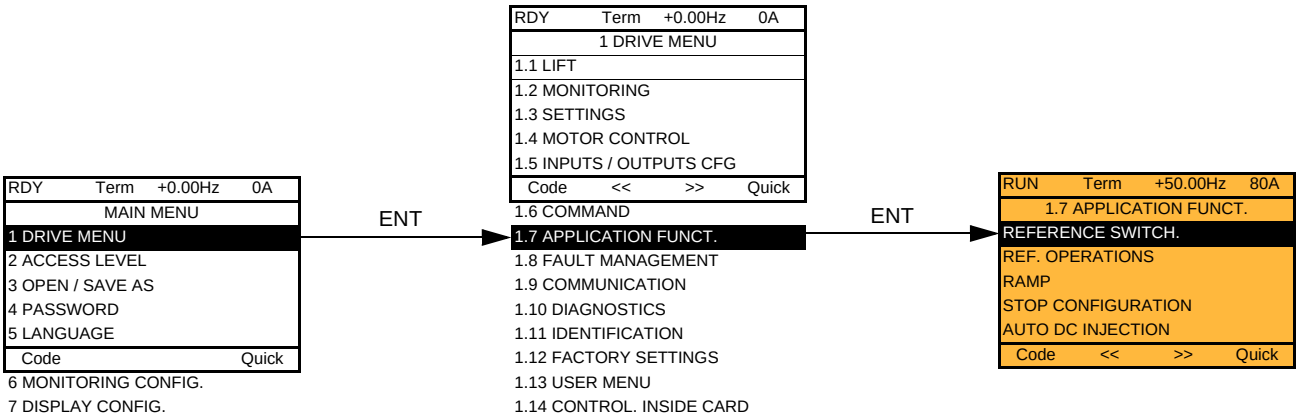
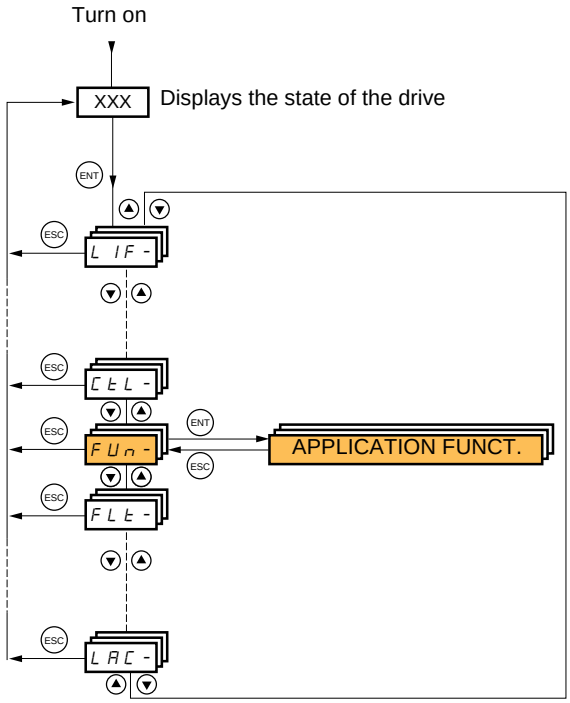
542 291 58 92 - 0 242 335 40 42

[1.7 APPLICATION FUNCT.] (FUn-)

With graphic display terminal:



With integrated display terminal:



Summary of functions:

Code	Name	Page
rEF-	[REFERENCE SWITCH.]	215
OAI-	[REF. OPERATIONS]	216
rPt-	[RAMP]	217
Stt-	[STOP CONFIGURATION]	221
AdC-	[AUTO DC INJECTION]	223
PSS-	[PRESET SPEEDS]	225
LSt-	[LIMIT SWITCHES]	228
bLC-	[BRAKE LOGIC CONTROL]	233
rbN-	[ROLLBACK MGT]	238
ELN-	[EXTERNAL WEIGHT MEAS.]	239
tOr-	[TORQUE CONTROL]	241
tOL-	[TORQUE LIMITATION]	244
CLI-	[2nd CURRENT LIMIT.]	246
LLC-	[LINE CONTACTOR COMMAND]	248
OCC-	[OUTPUT CONTACTOR CMD]	250
nLP-	[PARAM. SET SWITCHING]	252
nnC-	[MULTIMOTORS/CONFIG.]	256
ISP-	[INSPECTION MODE]	257
rFt-	[EVACUATION]	258
HFF-	[HALF FLOOR]	258
dCO-	[DC BUS SUPPLY]	259
tOP-	[TOP Z MANAGEMENT]	260

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542 291 58 92 - 0 242 335 40 42

[1.7 APPLICATION FUNCT.] (FUn-)

The parameters in the [1.7 APPLICATION FUNCT.] (FUn-) menu can only be modified when the drive is stopped and there is no run command, except for parameters with a ↻ symbol in the code column, which can be modified with the drive running or stopped.

☞ **Note: Compatibility of functions**
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 that are not listed in the table below are fully compatible.
If there is an incompatibility between functions, the first function configured will prevent the others being configured.

Each of the functions on the following pages can be assigned to one of the inputs or outputs.
A single input can activate several functions at the same time (reverse and 2nd ramp, for example). **The user must therefore ensure that these functions can be used at the same time**. It is only possible to assign one input to several functions at [Advanced] (AdU) and [Expert] (EPr) level.

Before assigning a command, reference or function to an input or output, the user must make sure that this input or output has not already been assigned and that another input or output has not been assigned to an incompatible or undesirable function.
The drive factory setting or macro configurations automatically configure functions, **which may prevent other functions being assigned. It may be necessary to unconfigure one or more functions in order to be able to enable another.** Check the compatibility table below.

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542 291 58 92 - 0 242 335 40 42

Compatibility table

	Reference operations (page 216)	Management of limit switches (page 228)	Preset speeds (page 225)	Brake logic control (page 233)	DC injection stop (page 221)	Fast stop (page 221)	Freewheel stop (page 221)	Stop on TDC (page 260)	Torque control (page 241)	Load sharing (page 162)	Open-loop synchronous motor (page 148)	Closed-loop synchronous motor (page 150)	Measurement of motor/encoder phase shift (page 151)
Reference operations (page 216)			↑						●(1)				
Management of limit switches (page 228)													
Preset speeds (page 225)	←								●(1)				
Brake logic control (page 233)					●				●		●		●(4)
DC injection stop (page 221)				●		●(2)	↑	●(2)			●	●	
Fast stop (page 221)					●(2)		↑	●(2)					
Freewheel stop (page 221)					←	←		←					
Stop on TDC (page 260)					●(2)	●(2)	↑						
Torque control (page 241)	●(1)		●(1)	●						●	●		
Load sharing (page 162)									●				
Open-loop synchronous motor (page 148)				●	●				●				
Closed-loop synchronous motor (page 150)					●								
Measurement of motor/encoder phase shift (page 151)				●(4)									

(1) Torque control and these functions are only incompatible while torque control mode is active.
(2) Priority is given to the first of these two stop modes to be activated.
(3) Excluding special application with reference channel Fr2 (see diagrams on pages 198 and 199).
(4) These two functions are incompatible only if [Angle setting type] (ASt) = [W/o load] (nLd).

● Incompatible functions Compatible functions Not applicable

Priority functions (functions, which cannot be active at the same time):

← ↑ 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.

Note: This compatibility table does not affect commands that can be assigned to the keys of the graphic display terminal (see page 208).

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542 291 58 92 - 0 242 335 40 42

[1.7 APPLICATION FUNCT.] (FUn-)

Incompatible functions

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

Automatic restart

This is only possible for control type [2/3 wire control] (tCC) = [2 wire] (2C) and [2 wire type] (tCt) = [Level] (LEL) or [Fwd priority] (PFO).
See page 166.

The SUP- monitoring menu (page 115) can be used to display the functions assigned to each input in order to check their compatibility.

When a function is assigned, a ✓ appears on the graphic display terminal, as illustrated in the example below:

RDY	Term	+0.00Hz	0A
1.7 APPLICATION FUNCT.			
REFERENCE SWITCH.			
REF. OPERATIONS			
RAMP			✓
STOP CONFIGURATION			
AUTO DC INJECTION			
Code	<<	>>	Quick

PSS

If you attempt to assign a function that is incompatible with another function that has already been assigned, an alarm message will appear:

With the graphic display terminal:

RDY	Term	+0.00Hz	0A
INCOMPATIBILITY			
The function can't be assigned because an incompatible function is already selected. See programming book.			
ENT or ESC to continue			

With the integrated display terminal:
COMP flashes until ENT or ESC is pressed.

When you assign a logic input, an analog input, a reference channel or a bit to a function, pressing the HELP button will display the functions that may already have been activated by this input, bit or channel.

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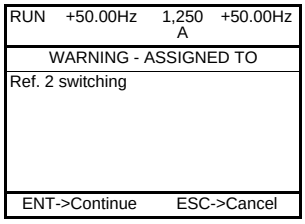
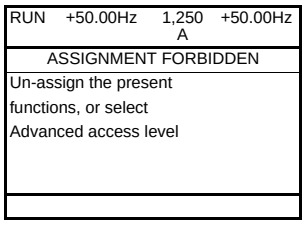
542 291 58 92 - 0 242 335 40 42

When a logic input, an analog input, a reference channel or a bit that has already been assigned is assigned to another function, the following screens appear:

With the graphic display terminal:



If the access level permits this new assignment, pressing ENT confirms the assignment.
If the access level does not permit this new assignment, pressing ENT results in the following display:



With the integrated display terminal:

The code for the first function, which is already assigned, is displayed flashing.
If the access level permits this new assignment, pressing ENT confirms the assignment.
If the access level does not permit this new assignment, pressing ENT has no effect, and the message continues to flash. It is only possible to exit by pressing ESC.

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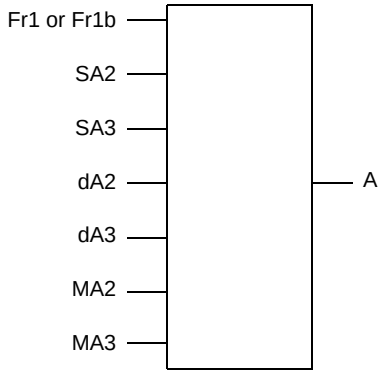
542 291 58 92 - 0 242 335 40 42

Summing input/Subtracting input/Multiplier



A = (Fr1 or Fr1b + SA2 + SA3 - dA2 - dA3) x MA2 x MA3

- If SA2, SA3, dA2, dA3 are not assigned, they are set to 0.
- If MA2, MA3 are not assigned, they are set to 1.
- A is limited by the minimum LSP and maximum HSP parameters.
- For multiplication, the signal on MA2 or MA3 is interpreted as a %; 100% corresponds to the maximum value of the corresponding input. If MA2 or MA3 is sent via the communication bus or graphic display terminal, an MFr multiplication variable (see page 121) must be sent via the bus or graphic display terminal.
- Reversal of the direction of operation in the event of a negative result can be inhibited (see page 205).

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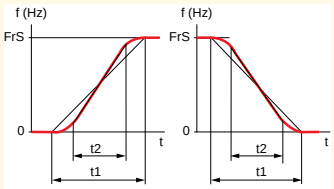
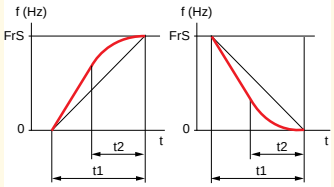
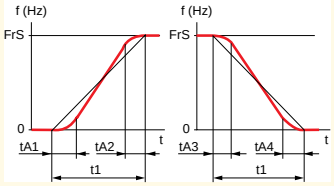
542 291 58 92 - 0 242 335 40 42

Code	Name/Description	Adjustment range	Factory setting
rEF-	**[REFERENCE SWITCH.]**		
rCb	❏ **[Ref 1B switching]** See the diagrams on pages 198 and 199. ☐ **[ch1 active]** (Fr1): No switching, [Ref.1 channel] (Fr1) active ☐ **[ch1B active]** (Fr1b): No switching, [Ref.1B channel] (Fr1b) active ☐ **[LI1]** (LI1) : : ☐ **[...]** (...): See the assignment conditions on page 204 (not CDOO to CD14). • If the assigned input or bit is at inactive state, [Ref.1 channel] (Fr1) is active (see page 205). • If the assigned input or bit is at active state, [Ref.1B channel] (Fr1b) is active. [Ref 1B switching] (rCb) is forced to [ch1 active] (Fr1) if [Profile] (CHCF) = [Not separ.] (SIM) with [Ref.1 channel] (Fr1) assigned via the terminals (analog inputs, encoder, pulse input); see page 205.		[ch1 active] (Fr1)
Fr1b	❏ **[Ref.1B channel]** ☐ **[No]** (nO): Not assigned ☐ **[AI1]** (AI1): Analog input ☐ **[AI2]** (AI2): Analog input ☐ **[AI3]** (AI3): Analog input, if VW3A3202 extension card has been inserted ☐ **[AI4]** (AI4): Analog input, if VW3A3202 extension card has been inserted ☐ **[HMI]** (LCC): Graphic display terminal ☐ **[Modbus]** (Mdb): Integrated Modbus ☐ **[CANopen]** (CAn): Integrated CANopen ☐ **[Com. card]** (nEt): Communication card (if inserted) ☐ **[C.Insid. card]** (APP): Controller Inside card (if inserted) ☐ **[RP]** (PI): Frequency input, if VW3A3202 extension card has been inserted ☐ **[Encoder]** (PG): Encoder input, if encoder card has been inserted **Note:** In the following instances, only assignments via the terminals are possible: - [Profile] (CHCF) = [Not separ.] (SIM) with [Ref.1 channel] (Fr1) assigned via the terminals (analog inputs, encoder, pulse input); see page 205. - PID configured with PID references via the terminals		[No] (nO)

Code	Name/Description	Adjustment range	Factory setting
dA1-	**[REF. OPERATIONS]** Reference = (Fr1 or Fr1b + SA2 + SA3 - dA2 - dA3) x MA2 x MA3. See the diagrams on pages 198 and 199. **Note:** This function cannot be used with certain other functions. Follow the instructions on page 210.		
SA2	❑ **[Summing ref. 2]** Selection of a reference to be added to [Ref.1 channel] (Fr1) or [Ref.1B channel] (Fr1b). ☐ **[No]** (nO): No source assigned ☐ **[AI1]** (AI1): Analog input ☐ **[AI2]** (AI2): Analog input ☐ **[AI3]** (AI3): Analog input, if VW3A3202 extension card has been inserted ☐ **[AI4]** (AI4): Analog input, if VW3A3202 extension card has been inserted ☐ **[HMI]** (LCC): Graphic display terminal ☐ **[Modbus]** (Mdb): Integrated Modbus ☐ **[CANopen]** (CAn): Integrated CANopen ☐ **[Com. card]** (nEt): Communication card (if inserted) ☐ **[C.Insid. card]** (APP): Controller Inside card (if inserted) ☐ **[RP]** (PI): Frequency input, if VW3A3202 extension card has been inserted ☐ **[Encoder]** (PG): Encoder input, if encoder card has been inserted ☐ **[Network AI]** (AIU1): Virtual input via communication bus, to be configured via [AI net. channel] (AIC1) page 175. **⚠ WARNING** **UNINTENDED EQUIPMENT OPERATION** If the equipment switches to forced local mode (see page 286), the virtual input remains frozen at the last value transmitted. Do not use the virtual input and forced local mode in the same configuration. **Failure to follow this instruction can result in death or serious injury.**	[No] (nO)	
nO			
AI1			
AI2			
AI3			
AI4			
LCC			
Mdb			
CAn			
nEt			
APP			
PI			
PG			
AIU1			
SA3	❑ **[Summing ref. 3]** Selection of a reference to be added to [Ref.1 channel] (Fr1) or [Ref.1B channel] (Fr1b). • Possible assignments are identical to [Summing ref. 2] (SA2) above.	[No] (nO)	
dA2	❑ **[Subtract. ref. 2]** Selection of a reference to be subtracted from [Ref.1 channel] (Fr1) or [Ref.1B channel] (Fr1b). • Possible assignments are identical to [Summing ref. 2] (SA2) above.	[No] (nO)	
dA3	❑ **[Subtract. ref. 3]** Selection of a reference to be subtracted from [Ref.1 channel] (Fr1) or [Ref.1B channel] (Fr1b). • Possible assignments are identical to [Summing ref. 2] (SA2) above.	[No] (nO)	
MA2	❑ **[Multiplier ref. 2]** Selection of a multiplier reference [Ref.1 channel] (Fr1) or [Ref.1B channel] (Fr1b). • Possible assignments are identical to [Summing ref. 2] (SA2) above.	[No] (nO)	
MA3	❑ **[Multiplier ref. 3]** Selection of a multiplier reference [Ref.1 channel] (Fr1) or [Ref.1B channel] (Fr1b). • Possible assignments are identical to [Summing ref. 2] (SA2) above.	[No] (nO)	

Code	Name/Description	Adjustment range	Factory setting
rPt-	**[RAMP]**		
rPt LIn S U CUS	❏ **[Ramp type]** ☐ **[Linear]** (LIn) ☐ **[S ramp]** (S) ☐ **[U ramp]** (U) ☐ **[Customized]** (CUS) S ramps  The rounding coefficient is fixed, where t2 = 0.6 x t1 and t1 = set ramp time. U ramps  The rounding coefficient is fixed, where t2 = 0.5 x t1 and t1 = set ramp time. Customized ramps  tA1: adjustable from 0 to 100% tA2: adjustable from 0 to (100% - tA1) tA3: adjustable from 0 to 100% tA4: adjustable from 0 to (100% - tA3) As a % of t1, where t1 = set ramp time		[Linear] (LIn)
Inr 0.01 0.1 1	❏ **[Ramp increment]** (1) ☐ **[0.01]**: Ramp up to 99.99 seconds ☐ **[0.1]**: Ramp up to 999.9 seconds ☐ **[1]**: Ramp up to 6000 seconds This parameter is valid for [Acceleration] (ACC), [Deceleration] (dEC), [Acceleration 2] (AC2) and [Deceleration 2] (dE2).		[0.1] (0.1)
ACC	❏ **[Acceleration]** (1) Time to accelerate from 0 to the [Rated motor freq.] (FrS) (page 143) or [Nominal freq sync.] (FrSS) page 149. Make sure that this value is compatible with the inertia being driven.	0.01 to 6000 s (2)	3.0 s
dEC	❏ **[Deceleration]** (1) Time to decelerate from the [Rated motor freq.] (FrS) (page 143) or [Nominal freq sync.] (FrSS) page 149 to 0. Make sure that this value is compatible with the inertia being driven.	0.01 to 6000 s (2)	3.0 s

(1) Parameter can also be accessed in the [1.3 SETTINGS] (SEt-) menu.
(2) Range 0.01 to 99.99 s or 0.1 to 999.9 s or 1 to 6000 s according to [Ramp increment] (Inr).

Parameter that can be modified during operation or when stopped.

Code	Name/Description	Adjustment range	Factory setting
	[RAMP] (continued)		
tA1 ( )	❑ **[Begin Acc round]** (1) - Rounding of start of acceleration ramp as a % of the [Acceleration] (ACC) or [Acceleration 2] (AC2) ramp time. - Can be set between 0 and 100% - This parameter can be accessed if the [Ramp type] (rPt) is [Customized] (CUS).	0 to 100%	10%
tA2 ( )	❑ **[End Acc round]** (1) - Rounding of end of acceleration ramp as a % of the [Acceleration] (ACC) or [Acceleration 2] (AC2) ramp time. - Can be set between 0 and (100% - [Begin Acc round] (tA1)). - This parameter can be accessed if the [Ramp type] (rPt) is [Customized] (CUS).		10%
tA3 ( )	❑ **[Begin Dec round]** (1) - Rounding of start of deceleration ramp as a % of the [Deceleration] (dEC) or [Deceleration 2] (dE2) ramp time. - Can be set between 0 and 100%. - This parameter can be accessed if the [Ramp type] (rPt) is [Customized] (CUS).	0 to 100%	10%
tA4 ( )	❑ **[End Dec round]** (1) - Rounding of end of deceleration ramp as a % of the [Deceleration] (dEC) or [Deceleration 2] (dE2) ramp time. - Can be set between 0 and (100% - [Begin Dec round] (tA3). - This parameter can be accessed if the [Ramp type] (rPt) is [Customized] (CUS).		10%

(1) Parameter can also be accessed in the [1.3 SETTINGS] (SEt-) menu.

( ) Parameter that can be modified during operation or when stopped.

Code	Name/Description	Adjustment range	Factory setting
	[RAMP] (continued)		
Frt	❏ **[Ramp 2 threshold]**	0 to 500 or 1,600 Hz according to rating	0 Hz
	Ramp switching threshold The 2nd ramp is switched if the value of Frt is not 0 (0 deactivates the function) and the output frequency is greater than Frt. Threshold ramp switching can be combined with [Ramp switch ass.] (rPS) switching as follows:		

LI or bit	Frequency	Ramp
0	<Frt	ACC, dEC
0	>Frt	AC2, dE2
1	<Frt	AC2, dE2
1	>Frt	AC2, dE2

rPS nO LI1 - - -	❏ **[Ramp switch ass.]** ☐ **[No]** (nO): Not assigned. ☐ **[LI1]** (LI1) : : ☐ **[...]** (...): See the assignment conditions on page 204. - ACC and dEC are enabled when the assigned input or bit is at inactive state. - AC2 and dE2 are enabled when the assigned input or bit is at active state.		[No] (nO)
AC2 ( )	❏ **[Acceleration 2]** (1) Time to accelerate from 0 to [Rated motor freq.] (FrS) or [Nominal freq sync.] (FrSS) page 149. Make sure that this value is compatible with the inertia being driven. The parameter can be accessed if [Ramp 2 threshold] (Frt) > 0 or if [Ramp switch ass.] (rPS) is assigned.	0.01 to 6000 s (2)	5.0 s
dE2 ( )	❏ **[Deceleration 2]** (1) Time to decelerate from [Rated motor freq.] (FrS) or [Nominal freq sync.] (FrSS) page 149 to 0. Make sure that this value is compatible with the inertia being driven. This parameter can be accessed if [Ramp 2 threshold] (Frt) > 0 or if [Ramp switch ass.] (rPS) assigned.	0.01 to 6000 s (2)	5.0 s

(1) Parameter can also be accessed in the [1.3 SETTINGS] (SEt-) and [1.1 LIFT] (LIF-) menus.
(2) Range 0.01 to 99.99 s or 0.1 to 999.9 s or 1 to 6000 s according to [Ramp increment] (Inr) page 217.

( ) Parameter that can be modified during operation or when stopped.

Code	Name/Description	Adjustment range	Factory setting
	[RAMP] (continued)		
brA	❏ **[Dec ramp adapt.]**		[Yes] (YES)

Activating this function automatically adapts the deceleration ramp, if this has been set at too low a value for the inertia of the load, which can cause an overvoltage fault.

nO ☐ **[No]** (nO): Function inactive.

YES ☐ **[Yes]** (YES): Function active, for applications that do not require strong deceleration.

The following selections appear depending on the rating of the drive and [Motor control type] (Ctt) page 137. They enable stronger deceleration to be obtained than with [Yes] (YES). Use comparative testing to determine your selection.

dYnA ☐ **[High torq. A]** (dYnA)

dYnb ☐ **[High torq. B]** (dYnb)

dYnC ☐ **[High torq. C]** (dYnC)

[Dec ramp adapt.] (brA) is forced to [No] (nO) if brake control [Brake assignment] (bLC) is assigned (page 233), or if [Braking balance] (bbA) page 162 = [Yes] (YES). The factory setting changes to [High torq. A] (dYnA) with certain ratings if [Sinus filter] (OFI) page 139 = [Yes] (YES).

The function is incompatible with applications requiring:

- Positioning on a ramp
- The use of a braking resistor (the resistor would not operate correctly)

CAUTION

Do not use [High torqu. B] (dYnB) or [High torq. C] (dYnC) if the motor is a permanent magnet synchronous motor, as it will be demagnetized.

Failure to follow this instruction can result in equipment damage.

Code	Name/Description	Adjustment range	Factory setting
StP-	**[STOP CONFIGURATION]** **Note:** Some types of stop cannot be used with all other functions. Follow the instructions on page 210.		
Stt	**[Type of stop]** Stop mode on disappearance of the run command or appearance of a stop command. ☐ **[Ramp stop]** (rMP): On ramp ☐ **[Fast stop]** (FSt): Fast stop ☐ **[Freewheel]** (nSt): Freewheel stop ☐ **[DC injection]** (dCI): DC injection stop **Note:** If the "brake logic function" on page 233 has been enabled, or if [Lift Speed Mgt] (LSM) page 36 is different from [No] (nO), only ramp type stops may be configured.		[Ramp stop] (rMP)
FFt	**[Freewheel stop Thd]** (1) This parameter supports switching from a ramp stop or a fast stop to a freewheel stop below a low speed threshold. It can be accessed if [Type of stop] (Stt) = [Fast stop] (FSt) or [Ramp stop] (rMP). ☐ 0.0: Does not switch to freewheel stop ☐ 0.1 to 1,600 Hz: Speed threshold below which the motor will switch to freewheel stop	0.0 to 1,600 Hz	0.0
nSt	**[Freewheel stop ass.]** ☐ **[No]** (nO): Not assigned ☐ **[LI1]** (LI1) to **[LI6]** (LI6) ☐ **[LI7]** (LI7) to **[LI10]** (LI10): If VW3A3201 logic I/O card has been inserted ☐ **[LI11]** (LI11) to **[LI12]** (LI12): If VW3A3203 ESIM card has been inserted ☐ **[LI11]** (LI11) to **[LI14]** (LI14): If VW3A3202 extended I/O card has been inserted ☐ **[C101]** (C101) to **[C115]** (C115): With integrated Modbus in [I/O profile] (IO) ☐ **[C201]** (C201) to **[C215]** (C215): With integrated CANopen in [I/O profile] (IO) ☐ **[C301]** (C301) to **[C315]** (C315): With a communication card in [I/O profile] (IO) ☐ **[C401]** (C401) to **[C415]** (C415): With a Controller Inside card in [I/O profile] (IO) ☐ **[CD00]** (Cd00) to **[CD13]** (Cd13): In [I/O profile] (IO) can be switched with possible logic inputs ☐ **[CD14]** (Cd14) to **[CD15]** (Cd15): In [I/O profile] (IO) can be switched without logic inputs The stop is activated when the input or bit is at inactive state. If the input returns to active state and the run command is still active, the motor will only restart if [2/3 wire control] (tCC) page 166 = [2 wire] (2C) and [2 wire type] (tCt) = [Level] (LEL) or [Fwd priority] (PFO). If not, a new run command must be sent.		[No] (nO)
FSt	**[Fast stop assign.]** **Note:** This function cannot be used with certain other functions. Follow the instructions on page 210. ☐ **[No]** (nO): Not assigned ☐ **[LI1]** (LI1) ☐ **[...]** (...): See the assignment conditions on page 204. The stop is activated when the input changes to inactive state or the bit changes to active state (bit in [I/O profile] (IO) at 0). If the input returns to active state and the run command is still active, the motor will only restart if [2/3 wire control] (tCC) page 166 = [2 wire] (2C) and [2 wire type] (tCt) = [Level] (LEL) or [Fwd priority] (PFO). If not, a new run command must be sent.		[No] (nO)
dCF	**[Ramp divider]** (1) The parameter can be accessed if [Type of stop] (Stt) = [Fast stop] (FSt) and if [Fast stop assign.] (FSt) is not [No] (nO). The ramp that is enabled (dEC or dE2) is then divided by this coefficient when stop requests are sent. Value 0 corresponds to a minimum ramp time.	0 to 10	4

(1) Parameter can also be accessed in the [1.3 SETTINGS] (SEt-) menu.

Parameter that can be modified during operation or when stopped.

Code	Name/Description	Adjustment range	Factory setting
	[STOP CONFIGURATION] (continued)		
dC I	❏ **[DC injection assign.]**		[No] (nO)
	☞ **Note:** This function cannot be used with certain other functions. Follow the instructions on page 210.		
nO	☐ **[No]** (nO): Not assigned		
LI1 - - -	☐ **[LI1]** (LI1) : : ☐ **[...]** (...): See the assignment conditions on page 204.		
	DC injection braking is initiated when the assigned input or bit changes to state 1. If the input returns to state 1 and the run command is still active, the motor will only restart if [2/3 wire control] (tCC) page 166 = [2 wire] (2C) and [2 wire type] (tCt) = [Level] (LEL) or [Fwd priority] (PFO). If not, a new run command must be sent.		
IdC ( )	❏ **[DC inject. level 1]** (1) (3)	0.1 to 1.41 In (2)	0.64 In (2)
	Level of DC injection braking current activated via logic input or selected as stop mode. This parameter can be accessed if [Type of stop] (Stt) = [DC injection] (dCI) or if [DC injection assign.] (dCI) is not [No] (nO).		
	CAUTION Check that the motor will withstand this current without overheating. **Failure to follow this instruction can result in equipment damage.**		
tdI ( )	❏ **[DC injection time 1]** (1) (3)	0.1 to 30 s	0.5 s
	Maximum current injection time [DC inject. level 1] (IdC). After this time the injection current becomes [DC inject. level 2] (IdC2). This parameter can be accessed if [Type of stop] (Stt) = [DC injection] (dCI) or if [DC injection assign.] (dCI) is not [No] (nO).		
IdC2 ( )	❏ **[DC inject. level 2]** (1) (3)	0.1 In (2) to [DC inject. level 1] (IdC)	0.5 In (2)
	Injection current activated by logic input or selected as stop mode, once period of time [DC injection time 1] (tdI) has elapsed. This parameter can be accessed if [Type of stop] (Stt) = [DC injection] (dCI) or if [DC injection assign.] (dCI) is not [No] (nO).		
	CAUTION Check that the motor will withstand this current without overheating. **Failure to follow this instruction can result in equipment damage.**		
tdC ( )	❏ **[DC injection time 2]** (1) (3)	0.1 to 30 s	0.5 s
	Maximum injection time [DC inject. level 2] (IdC2) for injection, selected as stop mode only. This parameter can be accessed if [Type of stop] (Stt) = [DC injection] (dCI).		

(1) Parameter can also be accessed in the [1.3 SETTINGS] (SEt-) menu.
(2) In corresponds to the rated drive current indicated in the Installation Manual and on the drive nameplate.
(3) Note: These settings are independent of the [AUTO DC INJECTION] (AdC-) function.

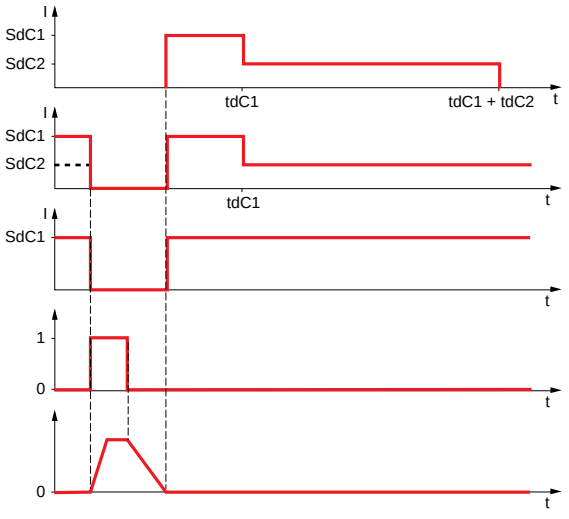
( ) Parameter that can be modified during operation or when stopped.

Code	Name/Description	Adjustment range	Factory setting
AdC-	**[AUTO DC INJECTION]**		
AdC ()	❏ **[Auto DC injection]** Automatic current injection on stopping (at the end of the ramp). ☐ **[No]** (nO): No injection ☐ **[Yes]** (YES): Adjustable injection time ☐ **[Continuous]** (Ct): Continuous standstill injection **Warning**: There is an interlock between this function and [Motor fluxing] (FLU) page 153. If [Motor fluxing] (FLU) = [Continuous] (FCt), [Auto DC injection] (Adc) must be [No] (nO). ☞ **Note:** This parameter gives rise to the injection of current even if a run command has not been sent. It can be accessed with the drive running.		[Yes] (YES)
SdC1 ()	❏ **[Auto DC inj. level 1]** (1) Level of standstill DC injection current. This parameter can be accessed if [Auto DC injection] (AdC) is not [No] (nO) and cannot be accessed if [Motor control type] (Ctt) page 137 = [FVC] (FUC) or [Sync.CL] (FSY). This parameter is forced to 0 if [Motor control type] (Ctt) page 137 = [Sync. mot.] (SYn). **CAUTION** Check that the motor will withstand this current without overheating. **Failure to follow this instruction can result in equipment damage.**	0 to 1.2 In (2)	0.7 In (2)
tdC1 ()	❏ **[Auto DC inj. time 1]** (1) Standstill injection time. This parameter can be accessed if [Auto DC injection] (AdC) is not [No] (nO). If [Motor control type] (Ctt) page 137 = [FVC] (FUC) or [Sync. mot.] (SYn) or [Sync.CL] (FSY) this time corresponds to the zero speed maintenance time.	0.1 to 30 s	0.5 s
SdC2 ()	❏ **[Auto DC inj. level 2]** (1) 2nd level of standstill DC injection current. This parameter can be accessed if [Auto DC injection] (AdC) is not [No] (nO) and cannot be accessed if [Motor control type] (Ctt) page 137 = [FVC] (FUC) or [Sync.CL] (FSY). This parameter is forced to 0 if [Motor control type] (Ctt) page 137 = [Sync. mot.] (SYn). **CAUTION** Check that the motor will withstand this current without overheating. **Failure to follow this instruction can result in equipment damage.**	0 to 1.2 In (2)	0.5 In (2)

(1) Parameter can also be accessed in the [1.3 SETTINGS] (SEt-) menu.
(2) In corresponds to the rated drive current indicated in the Installation Manual and on the drive nameplate.

() Parameter that can be modified during operation or when stopped.

Code	Name/Description	Adjustment range	Factory setting
	[AUTO DC INJECTION] (continued)		
tdC2	❑ **[Auto DC inj. time 2]** (1) 2nd standstill injection time. This parameter can be accessed if [Auto DC injection] (AdC) = [Yes] (YES.)	0 to 30 s	0 s

AdC	SdC2	Operation
YES	x	
Ct	≠ 0	
Ct	= 0	
Run command		
speed		

Note: When [Motor control type] (Ctt) page 137 = [FVC] (FUC) or [Sync.CL] (FSY), [Auto DC inj. level 1] (SdC1), [Auto DC inj. level 2] (SdC2) and [Auto DC inj. time 2] (tdC2) cannot be accessed, and only [Auto DC inj. time 1] (tdC1) can be accessed. This then corresponds to a zero speed maintenance time.

(1) Parameter can also be accessed in the [1.3 SETTINGS] (SEt-) menu.

Parameter that can be modified during operation or when stopped.

Code	Name/Description	Adjustment range	Factory setting
PSS-	**[PRESET SPEEDS]** **Note:** This function cannot be used with certain other functions. Follow the instructions on page 210. For details of this function, see page 107.		
PS2 nO LI1 -	❏ **[2 preset speeds]** ☐ **[No]** (nO): Function inactive ☐ **[LI1]** (LI1) ☐ **[...]** (...): See the assignment conditions on page204.		[No] (nO)
PS4 nO LI1 -	❏ **[4 preset speeds]** ☐ **[No]** (nO): Function inactive ☐ **[LI1]** (LI1) ☐ **[...]** (...): See the assignment conditions on page 204. To obtain 4 speeds you must also configure 2 speeds.		[No] (nO)
PS8 nO LI1 -	❏ **[8 preset speeds]** ☐ **[No]** (nO): Function inactive ☐ **[LI1]** (LI1) ☐ **[...]** (...): See the assignment conditions on page 204. To obtain 8 speeds you must also configure 2 and 4 speeds.		[No] (nO)
PS16 nO LI1 -	❏ **[16 preset speeds]** ☐ **[No]** (nO): Function inactive ☐ **[LI1]** (LI1) ☐ **[...]** (...): See the assignment conditions on page 204. To obtain 16 speeds you must also configure 2, 4 and 8 speeds.		[No] (nO)

Code	Name/Description		Adjustment range	Factory setting
	[PRESET SPEEDS] (continued)			
SP2 ( )	❑ [Preset speed 2]	(1)	0 to 1600 Hz	10 Hz
SP3 ( )	❑ [Preset speed 3]	(1)		15 Hz
SP4 ( )	❑ [Preset speed 4]	(1)		20 Hz
SP5 ( )	❑ [Preset speed 5]	(1)		25 Hz
SP6 ( )	❑ [Preset speed 6]	(1)		30 Hz
SP7 ( )	❑ [Preset speed 7]	(1)		35 Hz
SP8 ( )	❑ [Preset speed 8]	(1)		40 Hz
SP9 ( )	❑ [Preset speed 9]	(1)		45 Hz
SP10 ( )	❑ [Preset speed 10]	(1)		50 Hz
SP11 ( )	❑ [Preset speed 11]	(1)		55 Hz
SP12 ( )	❑ [Preset speed 12]	(1)		60 Hz
SP13 ( )	❑ [Preset speed 13]	(1)		70 Hz
SP14 ( )	❑ [Preset speed 14]	(1)		80 Hz
SP15 ( )	❑ [Preset speed 15]	(1)		90 Hz
SP16 ( )	❑ [Preset speed 16]	(1)		100 Hz
	The appearance of these [Preset speed x] (SPx) parameters is determined by the number of speeds configured.			

(1) Parameter can also be accessed in the [1.3 SETTINGS] (SEt-) menu.

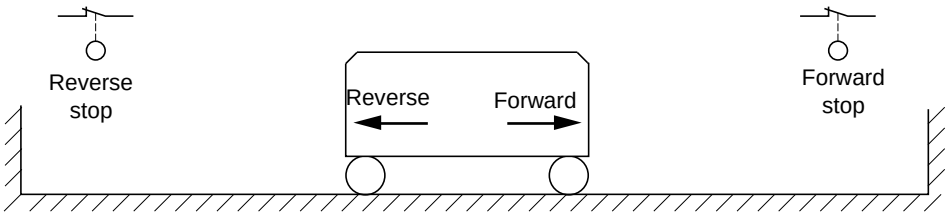
( ) Parameter that can be modified during operation or when stopped.

Limit switch management

This function can be used to manage trajectory limits using limit switches.

The stop mode is configurable.
When the stop contact is activated, startup in the other direction is authorized.

E.g.



The stop is activated when the input is at inactive state (contact open).

Code	Name/Description	Adjustment range	Factory setting
LSt-	**[LIMIT SWITCHES]** **Note:** This function cannot be used with certain other functions. Follow the instructions on page 210.		
LAF	❏ **[Stop FW limit sw.]**		[No] (nO)
nO	☐ **[No]** (nO): Function inactive		
LI1	☐ **[LI1]** (LI1) to **[LI6]** (LI6)		
-	☐ **[LI7]** (LI7) to **[LI10]** (LI10): If VW3A3201 logic I/O card has been inserted		
-	☐ **[LI11]** (LI11) to **[LI12]** (LI12): If VW3A3203 ESIM card has been inserted		
-	☐ **[LI11]** (LI11) to **[LI14]** (LI14): If VW3A3202 extended I/O card has been inserted		
C101	☐ **[C101]** (C101) to **[C115]** (C115): With integrated Modbus in [I/O profile] (IO)		
-	☐ **[C201]** (C201) to **[C215]** (C215): With integrated CANopen in [I/O profile] (IO)		
-	☐ **[C301]** (C301) to **[C315]** (C315): With a communication card in [I/O profile] (IO)		
-	☐ **[C401]** (C401) to **[C415]** (C415): With a Controller Inside card in [I/O profile] (IO)		
Cd00	☐ **[CD00]** (Cd00) to **[CD13]** (Cd13): In [I/O profile] (IO) can be switched with possible logic inputs		
-	☐ **[CD14]** (Cd14) to **[CD15]** (Cd15): In [I/O profile] (IO) can be switched without logic inputs		
LAr	❏ **[Stop RV limit sw.]** Same assignments possible as for [Stop FW limit sw.] (LAF) below.		[No] (nO)
LAS	❏ **[Stop type]**		[Freewheel] (nSt)
rMP	☐ **[Ramp stop]** (rMP)		
FSt	☐ **[Fast stop]** (FSt)		
nSt	☐ **[Freewheel]** (nSt) When the assigned input changes to 0, the stop is controlled in accordance with the selected type. Restarting is only authorized for the other operating direction once the motor has stopped. If the two inputs [Stop FW limit sw.] (LAF) and [Stop RV limit sw.] (LAr) are assigned and at state 0, restarting will be impossible. This parameter can be accessed if [Stop FW limit sw.] (LAF) or [Stop RV limit sw.] (LAr) is assigned.		

Brake logic control

Used to control an electromagnetic brake by the drive, for horizontal and vertical hoisting applications, and for unbalanced machines.

Principle:

Vertical hoisting movement:

Maintain motor torque in the driving load holding direction during brake opening and closing, in order to hold the load, start smoothly when the brake is released and stop smoothly when the brake is engaged.

Horizontal hoisting movement:

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

Recommended settings for brake logic control for a vertical hoisting application:

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Check that the selected settings and configurations will not result in the dropping or loss of control of the load being lifted.

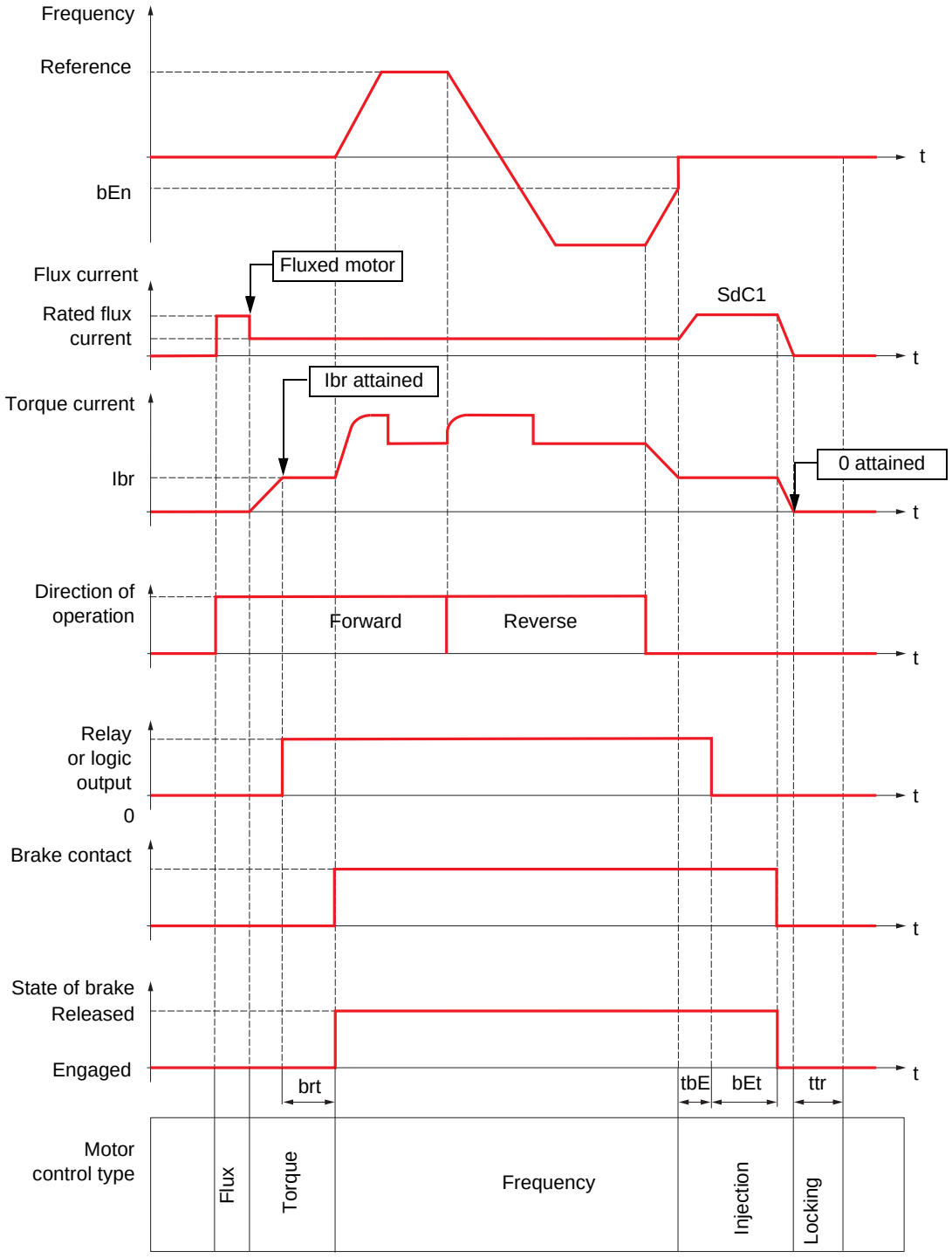
Failure to follow this instruction can result in death or serious injury.

1. Brake impulse (bIP): YES. Ensure that the direction of rotation FW corresponds to lifting the load.
   For applications in which the load being lowered is very different from the load being lifted, set BIP = 2 Ibr (e.g., ascent always with a load and descent always without a load).
2. Brake release current (Ibr and Ird if BIP = 2 Ibr): Adjust the brake release current to the rated current indicated on the motor.
   During testing, adjust the brake release current in order to hold the load smoothly.
3. Acceleration time: For hoisting applications it is advisable to set the acceleration ramps to more than 0.5 seconds. Ensure that the drive does not exceed the current limit.
   The same recommendation applies for deceleration.
   Reminder: For a hoisting movement, a braking resistor should be used.
4. Brake release time (brt): Set according to the type of brake. It is the time required for the mechanical brake to release.
5. Brake release frequency (bIr), in open-loop mode only: Leave in [Auto], adjust if necessary.
6. Brake engage frequency (bEn): Leave in [Auto], adjust if necessary.
7. Brake engage time (bEt): Set according to the type of brake. It is the time required for the mechanical brake to engage.

Recommended settings for brake logic control for a horizontal hoisting application:

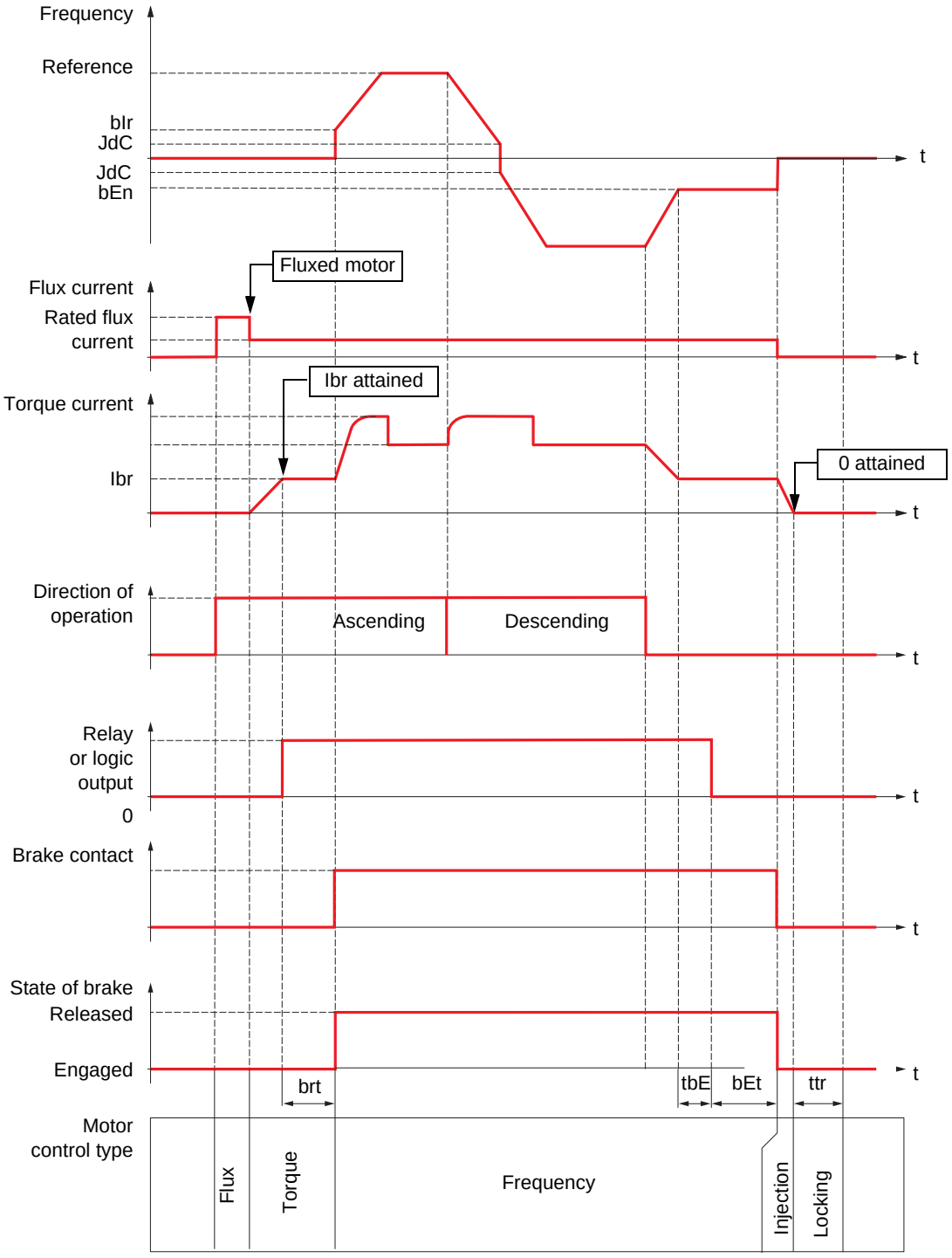
1. Brake impulse (bIP): No
2. Brake release current (Ibr): Set to 0.
3. Brake release time (brt): Set according to the type of brake. It is the time required for the mechanical brake to release.
4. Brake engage frequency (bEn), in open-loop mode only: Leave in [Auto], adjust if necessary.
5. Brake engage time (bEt): Set according to the type of brake. It is the time required for the mechanical brake to engage.

Brake logic control, horizontal movement in open-loop mode



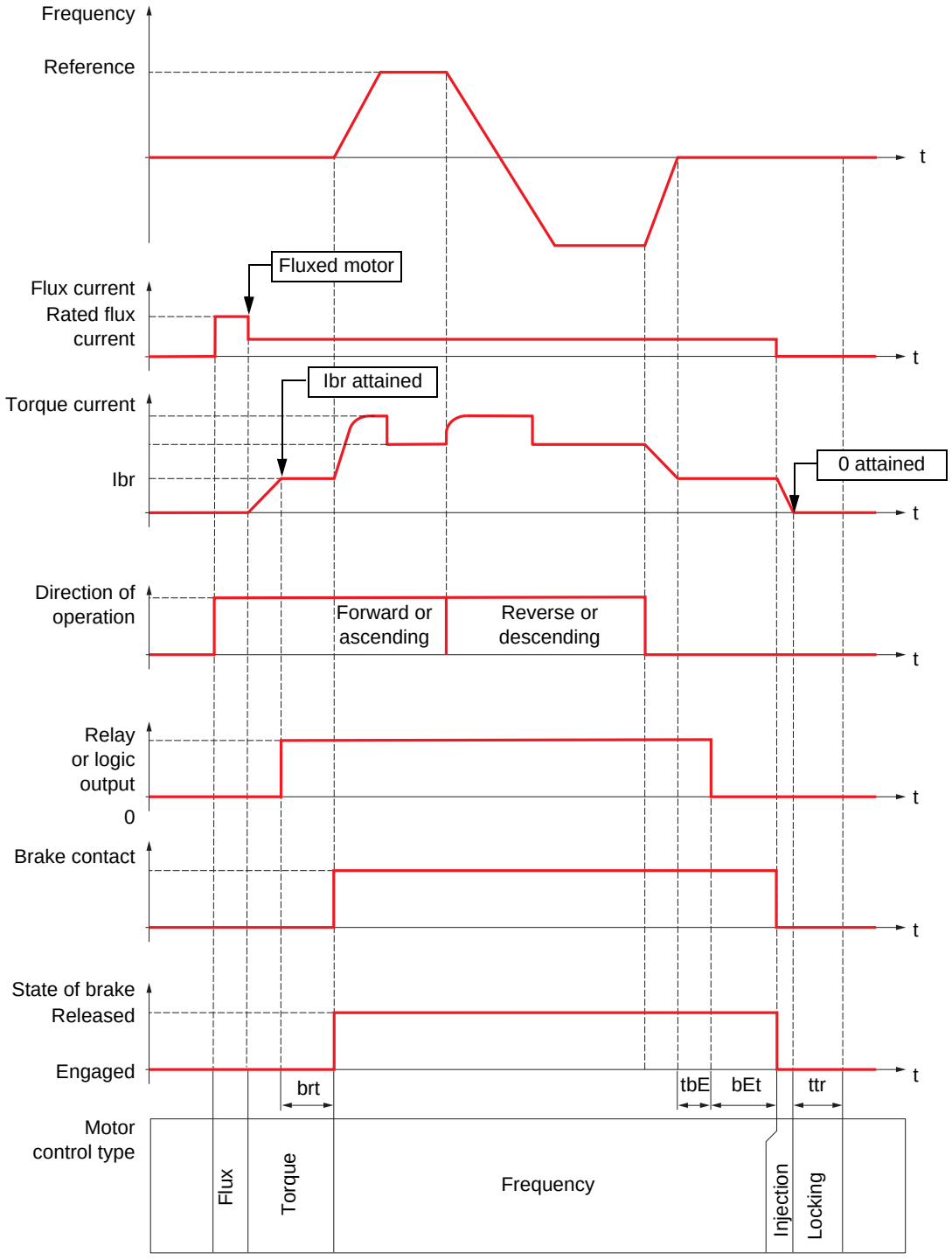
Key:
- (bEn): [Brake engage freq]
- (bEt): [Brake engage time]
- (brt): [Brake Release time]
- (Ibr): [Brake release I FW]
- (SdC1): [Auto DC inj. level 1]
- (tbE): [Brake engage delay]
- (ttr): [Time to restart]

Brake logic control, vertical movement in open-loop mode



Key:
- (bEn): [Brake engage freq]
- (bEt): [Brake engage time]
- (blr): [Brake release freq]
- (brt): [Brake Release time]
- (Ibr): [Brake release I FW]
- (JdC): [Jump at reversal]
- (tbE): [Brake engage delay]
- (ttr): [Time to restart]

Brake logic control, vertical or horizontal movement in closed-loop mode



Key:
- (bEt): [Brake engage time]
- (brt): [Brake Release time]
- (Ibr): [Brake release I FW]
- (tbE): [Brake engage delay]
- (ttr): [Time to restart]

Code	Name/Description	Adjustment range	Factory setting
bLC-	**[BRAKE LOGIC CONTROL]** **Note:** This function cannot be used with certain other functions. Follow the instructions on page 210.		
bLC	❏ **[Brake assignment]** **Note: If the brake is assigned, only a ramp stop is possible.** Check the [Type of stop] (Stt) page 221. Brake logic control can only be assigned if [Motor control type] (Ctt) page 137 = [SVC V] (UUC), [SVC I] (CUC), [FVC] (FUC) or [Sync.CL] (FSY). Logic output or control relay ☐ **[No]** (nO): Function not assigned (in this case, none of the function's parameters can be accessed) ☐ **[R2]** (r2) to **[R5]** (r5): Relay (selection extended to R3, R4 or R5 if I/O or ESIM cards have been inserted) ☐ **[LO1]** (LO1) to **[LO4]** (LO4): Logic output (if one or two I/O cards have been inserted, LO1 to LO2 or LO4 can be selected) ☐ **[dO1]** (dO1): Analog output AO1 functioning as a logic output. Selection can be made if [AO1 assignment] (AO1) page 191 = [No] (nO).		[R2] (R2)
bSt	❏ **[Movement type]** ☐ **[Traveling]** (HOr): Resistive-load movement (translational motion of overhead crane, for example). ☐ **[Hoisting]** (UEr): Driving-load movement (hoisting winch, for example). If [Weight sensor ass.] (PES) page 239 is not [No] (nO) [Movement type] (bSt) is forced to [Hoisting] (UEr).		[Hoisting] (UEr)
bCI	❏ **[Brake contact]** If the brake has a monitoring contact (closed for released brake). ☐ **[No]** (nO): Function inactive ☐ **[LI1]** (LI1) : : ☐ **[...]** (...): See the assignment conditions on page 204.		[No] (nO)
bIP ( )	❏ **[Brake impulse]** This parameter can be accessed if [Weight sensor ass.] (PES) = [No] (nO) (see page 239) and if [Movement type] (bSt) = [Hoisting] (UEr). ☐ **[No]** (nO): The motor torque is given in the required operating direction, at current Ibr. ☐ **[Yes]** (YES): The motor torque is always Forward (check that this direction corresponds to ascending), at current Ibr. ☐ **[2 IBR]** (2Ibr): The torque is in the required direction, at current Ibr for Forward and Ird for Reverse, for certain specific applications.		[Yes] (YES)
Ibr ( )	❏ **[Brake release I FW]** (1) Brake release current threshold for Ascending or Forward movement. This parameter can be accessed if [Weight sensor ass.] (PES) = [No] (nO) (see page 239).	-1.32 In to 1.32 In (2)	0
Ird ( )	❏ **[Brake release I Rev]** (1) Brake release current threshold for descending or reverse movement This parameter can be accessed if [Brake impulse] (bIP) = [2 IBR] (2Ibr).	0 to 1.32 In (2)	0

(1) Parameter can also be accessed in the [1.3 SETTINGS] (SEt-) menu.
(2) In corresponds to the rated drive current indicated in the Installation Manual and on the drive nameplate.

( ) Parameter that can be modified during operation or when stopped.

Code	Name/Description	Adjustment range	Factory setting
	[BRAKE LOGIC CONTROL] (continued)		
brt	❏ **[Brake Release time]** (1) Brake release time delay	0.00 to 5.00 s	0.50 s
blr	❏ **[Brake release freq]** (1) Brake release frequency threshold (initialization of acceleration ramp). This parameter can be accessed if [Motor control type] (Ctt) page 137 is not [FVC] (FUC) or [Sync.CL] (FSY) and if [Movement type] (bSt) page 233 is [Hoisting] (UEr). AUtO ☐ **[Auto]** (AUtO): The drive takes a value equal to the nominal motor slip, calculated using the drive parameters. - ☐ **0 to 10 Hz**: Manual setting		[Auto] (AUtO)
bEn	❏ **[Brake engage freq]** (1) Brake engage frequency threshold This parameter can be accessed if [Motor control type] (Ctt) page 137 is not [FVC] (FUC) or [Sync.CL] (FSY). AUtO ☐ **[Auto]** (AUtO): The drive takes a value equal to the nominal motor slip, calculated using the drive parameters. - ☐ **0 to 10 Hz**: Manual setting		[Auto] (AUtO)
bECd	❏ **[Brake engage at 0]** Brake engages at regulated zero speed. This parameter can be accessed if [Motor control type] (Ctt) page 137 = [FVC] (FUC) or [Sync.CL] (FSY). Can be used to engage the brake at zero speed in closed-loop mode with speed regulation. This parameter can be used to adjust the brake engage delay once zero speed has been reached. If a speed other than zero is then required, the command to release the brake is sent following torque application. nO ☐ **[No]** (nO): Brake does not engage at regulated zero speed. - ☐ **0.0 to 30.0 s**: Brake engage delay once zero speed is reached.		[No] (nO)
tbE	❏ **[Brake engage delay]** (1) Time delay before request to engage brake. To delay brake engagement, if you wish the brake to be engaged when the drive comes to a complete stop.	0 to 5.00 s	0
bEt	❏ **[Brake engage time]** (1) Brake engage time (brake response time)	0.00 to 5.00 s	0.30 s
SdC1	❏ **[Auto DC inj. level 1]** (1) Level of standstill DC injection current. **Note:** This parameter can be accessed if [Motor control type] (Ctt) page 137 is not [FVC] (FUC) or [Sync.CL] (FSY) and if [Movement type] (bSt) page 233 is [Traveling] (HOr). . **CAUTION** Check that the motor will withstand this current without overheating. **Failure to follow this instruction can result in equipment damage.**	0 to 1.2 In (2)	0.7 In (2)

(1) Parameter can also be accessed in the [1.3 SETTINGS] (SEt-) menu.
(2) In corresponds to the rated drive current indicated in the Installation Manual and on the drive nameplate.

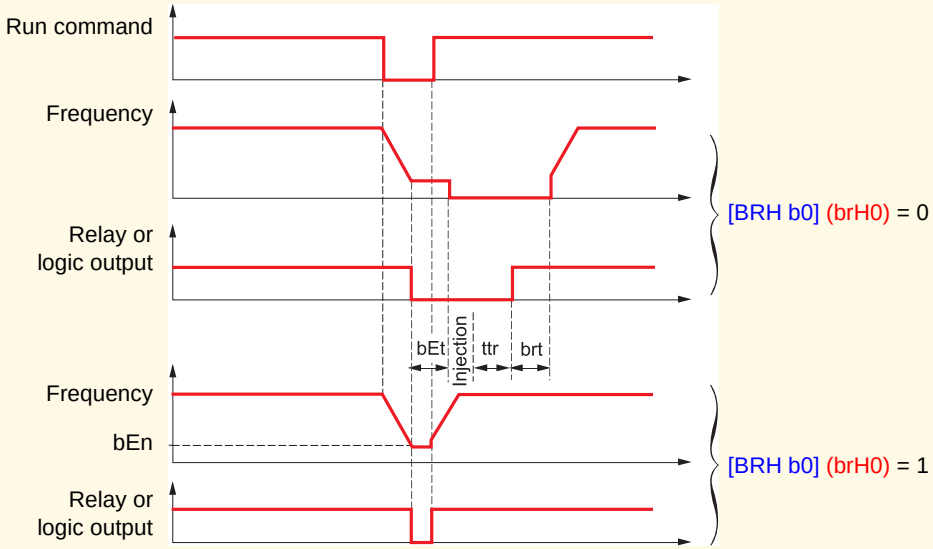
Parameter that can be modified during operation or when stopped.

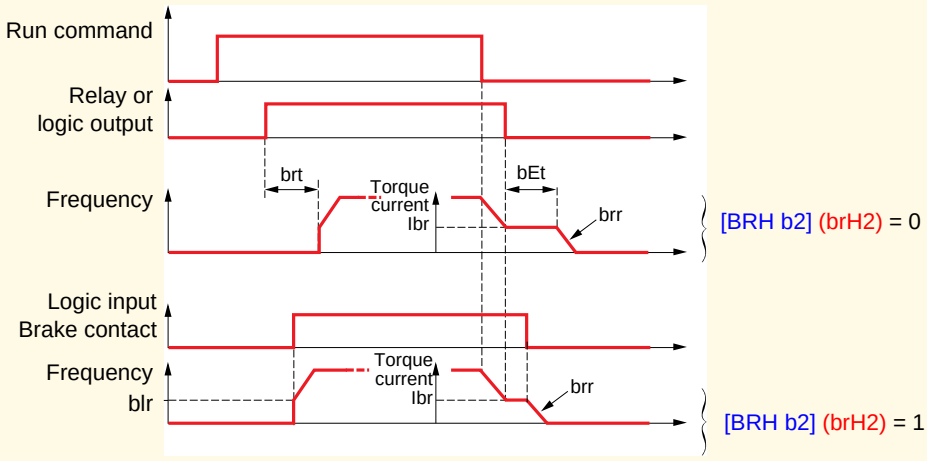
Code	Name/Description	Adjustment range	Factory setting
	[BRAKE LOGIC CONTROL] (continued)		
bEd ↻	❏ **[Engage at reversal]**		[No] (nO)
nO YES	☐ **[No]** (nO): The brake does not engage. ☐ **[Yes]** (YES): The brake engages. Can be used to select whether or not the brake engages on transition to zero speed when the operating direction is reversed.		
JdC ↻	❏ **[Jump at reversal]** (1)	0 to 10.0 Hz	[Auto] (AUtO)
AUtO -	This parameter can be accessed if [Motor control type] (Ctt) page 137 is not [FVC] (FUC) or [Sync.CL] (FSY) and if [Movement type] (bSt) page 233 is [Hoisting] (UEr). ☐ **[Auto]** (AUtO): The drive takes a value equal to the nominal motor slip, calculated using the drive parameters. ☐ **0 to 10 Hz**: Manual setting When the reference direction is reversed, this parameter can be used to avoid loss of torque (and consequential release of load) on transition to zero speed. Parameter is not applicable if [Engage at reversal] (bEd) = [Yes] (YES).		
tbr ↻	❏ **[Time to restart]** (1)	0 to 5.00 s	0
	Time between the end of a brake engage sequence and the start of a brake release sequence.		

(1) Parameter can also be accessed in the [1.3 SETTINGS] (SEt-) menu.

↻ Parameter that can be modified during operation or when stopped.

Brake control logic expert parameters

Code	Name/Description	Adjustment range	Factory setting
brH0	❏ [BRH_b0]		0
0	☐ **[0]** (0): The engage/release sequence is executed in full.		
1	☐ **[1]** (1): The brake is released immediately.		
	Use in open-loop and closed-loop mode. • A run command may be requested during the brake engagement phase. Whether or not the brake release sequence is executed depends on the value selected for [BRH b0] (brH0).		
			
	Note: If a run command is requested during the "ttr" phase, the complete brake control sequence is initialized.		
brH1	❏ [BRH_b1]		0
0	☐ **[0]** (0): The brake contact in steady state fault is active (fault if the contact is open during operation). The brF brake contact fault is monitored in all operating phases.		
1	☐ **[1]** (1): The brake contact in steady state fault is inactive. The brF brake contact fault is only monitored during the brake release and engage phases.		

Code	Name/Description	Adjustment range	Factory setting
brH2	❏ **[BRH_b2]**		0
	Taking the brake contact into account for the brake control sequence.		
0	☐ **[0]** (0): The brake contact is not taken into account.		
1	☐ **[1]** (1): The brake contact is taken into account.		
	Use in open-loop and closed-loop mode.		
	• If a logic input is assigned to the brake contact. [BRH b2] (brH2) = 0: During the brake release sequence, the reference is enabled at the end of the time [Brake Release time] (brt). During the brake engage sequence, the current changes to 0 according to the ramp [Current ramp time] (brr) at the end of the [Brake engage time] (bEt). [BRH b2] (brH2) = 1: When the brake is released, the reference is enabled when the logic input changes to 1. When the brake is engaged, the current changes to 0 according to the ramp [Current ramp time] (brr) when the logic input changes to 0.		
			
brH3	❏ **[BRH_b3]**		0
	In closed-loop mode only. Management of the absence of brake contact response, if it is assigned.		
0	☐ **[0]** (0): During the brake engage sequence, the brake contact must be open before the end of [Brake engage time] (bEt), otherwise the drive locks in a brF brake contact fault.		
1	☐ **[1]** (1): During the brake engage sequence, the brake contact must be open before the end of [Brake engage time] (bEt), otherwise a bCA brake contact alarm is triggered and zero speed is maintained.		
brH4	❏ **[BRH_b4]**		0
	In closed-loop mode only. Activation of the speed loop at zero if a movement for which no command has been given occurs (measurement of a speed greater than a fixed min. threshold).		
0	☐ **[0]** (0): No action in the event of a movement for which no command has been given.		
1	☐ **[1]** (1): If a movement occurs for which no command has been given, the drive switches to zero speed regulation, with no brake release command, and a bSA alarm is triggered.		
brr	❏ **[Current ramp time]**	0 to 5.00 s	0.3 s
	Torque current ramp time (increase and decrease) for a current variation equal to [Brake release I FW] (Ibr).		

Parameter that can be modified during operation or when stopped.

[1.7 APPLICATION FUNCT.] (FUn-)

See page 88 for the details of this function.

Code	Name/Description	Adjustment range	Factory setting
rbM-	**[ROLLBACK MGT]** Menu accessible: - If [Motor control type] (Ctt) page 137 = [Sync.CL] (FSY) or [FVC] (FUC) - If brake logic control [Brake assignment] (bLC) page 233 has been assigned.		
rbM nO YES	❏ **[Rollback MGT]** Activation of Rollback MGT function ☐ **[No]** (nO) ☐ **[Yes]** (YES)		[No] (nO)
rbC ( )	❏ **[Rbk Compensation]** This parameter can be accessed if [Rollback MGT] (rbM) = [Yes] (YES) Rollback compensation gain.	0 to 1,000 %	20 %
rbd ( )	❏ **[Rbk Damping]** This parameter can only be accessed when [ACCESS LEVEL] = [Expert] and if [Rollback MGT] (rbM) = [Yes] (YES). Rollback coefficient damping.	0 to 1,000 %	50 %

( ) Parameter that can be modified during operation or when stopped.

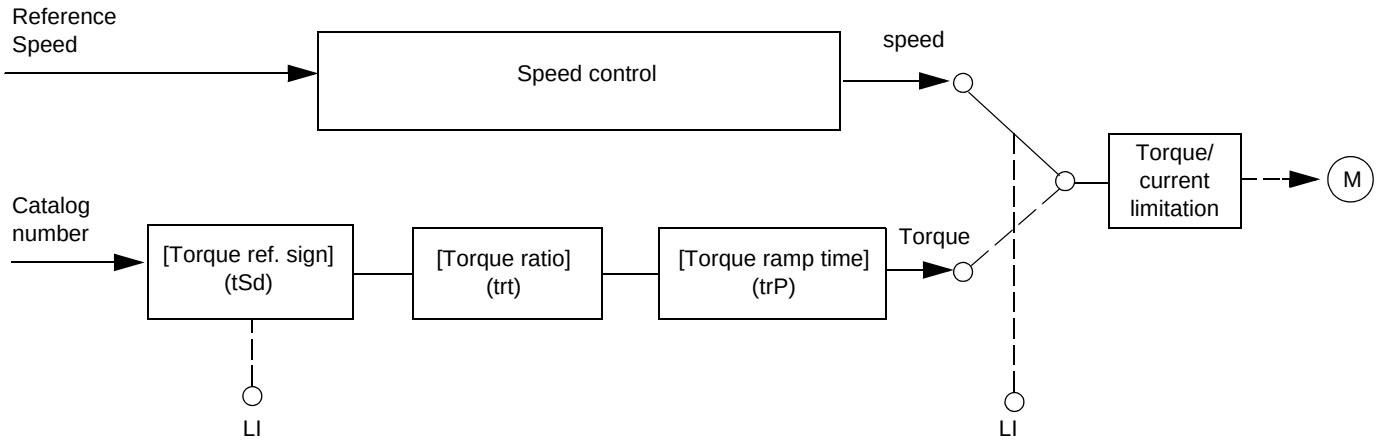
See page 92 for more details of this function.

Code	Name/Description	Adjustment range	Factory setting
ELM-	**[EXTERNAL WEIGHT MEAS.]**		
PES	❏ **[Weight sensor ass.]**		[No] (nO)
	This function can be accessed if brake logic control has been assigned (see page 233). If [Weight sensor ass.] (PES) is not [No] (nO), [Movement type] (bSt) page 233 is forced to [Hoisting] (UEr). ☐ **[No]** (nO): Function inactive ☐ **[AI1]** (AI1): Analog input ☐ **[AI2]** (AI2): Analog input ☐ **[AI3]** (AI3): Analog input, if VW3A3202 extension card has been inserted ☐ **[AI4]** (AI4): Analog input, if VW3A3202 extension card has been inserted ☐ **[RP]** (PI): Frequency input, if VW3A3202 extension card has been inserted ☐ **[Encoder]** (PG): Encoder input, if encoder card has been inserted ☐ **[Network AI]** (AIU1): Virtual input via communication bus, to be configured via [AI net channel] (AIC1) page 175. **⚠ WARNING** **UNINTENDED EQUIPMENT OPERATION** If the equipment switches to forced local mode (see page 286), the virtual input remains frozen at the last value transmitted. Do not use the virtual input and forced local mode in the same configuration. **Failure to follow this instruction can result in death or serious injury.**		
LP1	❏ **[Point 1 X]**	0 to 99.99 %	0
	0 to 99.99% of signal on the assigned input. [Point 1x] (LP1) must be less than [Point 2x] (LP2). This parameter can be accessed if [Weight sensor ass.] (PES) has been assigned.		
CP1	❏ **[Point 1Y]**	-1.36 to +1.36 In (1)	- In
	Current corresponding to the load [Point 1 X] (LP1), in A. This parameter can be accessed if [Weight sensor ass.] (PES) has been assigned.		
LP2	❏ **[Point 2X]**	0.01 to 100 %	50 %
	0.01 to 100 % of signal on the assigned input. [Point 2x] (LP2) must be greater than [Point 1x] (LP1). This parameter can be accessed if [Weight sensor ass.] (PES) has been assigned.		
CP2	❏ **[Point 2Y]**	-1.36 to +1.36 In (1)	0
	Current corresponding to the load [Point 2x] (LP2), in A. This parameter can be accessed if [Weight sensor ass.] (PES) has been assigned.		
IbrA	❏ **[Ibr 4-20 mA loss]**	0 to 1.36 In (1)	0
	Brake release current in the event of the loss of the weight sensor information. This parameter can be accessed if the weight sensor has been assigned to an analog current input and the 4-20 mA loss fault is deactivated. Recommended settings: - 0 for lifts - Rated motor current for a hoisting application		

(1) In corresponds to the rated drive current indicated in the Installation Manual and on the drive nameplate.

Parameter that can be modified during operation or when stopped.

Torque regulation



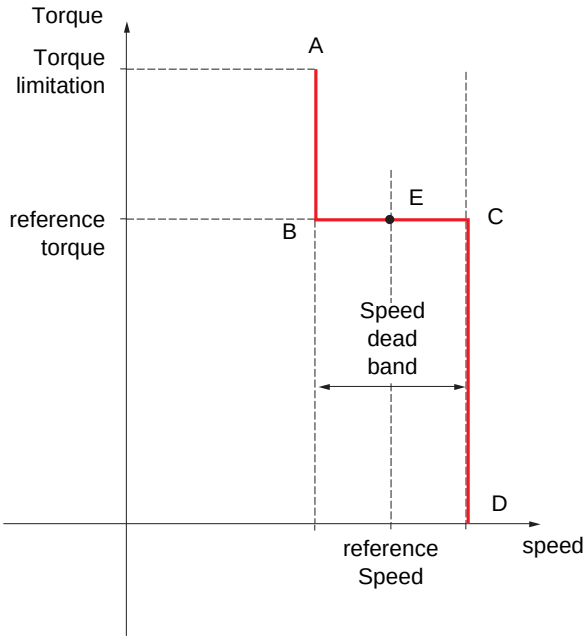
The function can be used to switch between operation in speed regulation mode and operation in torque control mode.
In torque control mode, the speed may vary within a configurable "deadband". When it reaches a lower or upper limit, the drive automatically reverts to speed regulation mode (fallback) and remains at this limit speed. The regulated torque is therefore no longer maintained and two scenarios may occur.

- If the torque returns to the required value, the drive will return to torque control mode.
- If the torque does not return to the required value at the end of a configurable period of time, the drive will switch to fault or alarm mode.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Check that the changes in the behavior of the motor do not present any danger.
Failure to follow this instruction can result in death or serious injury.



- AB and CD: "Fallback" to speed regulation
- BC: Torque control zone
- E: Ideal operating point

The torque sign and value can be transmitted via a logic output and an analog output.

Code	Name/Description	Adjustment range	Factory setting
tOr-	**[TORQUE CONTROL]** This function can only be accessed for [Motor control type] (Ctt) = [SVC I] (CUC), [FVC] (FUC) or [Sync.CL] (FSY). **Note:** This function cannot be used with certain other functions. Follow the instructions on page 210.		
tSS nO YES LI1 - - -	❏ **[Trq/spd switching]** ☐ **[No]** (nO): Function inactive, thereby preventing access to other parameters. ☐ **[Yes]** (YES): Permanent torque control ☐ **[LI1]** (LI1) : : ☐ **[...]** (...): See the assignment conditions on page 204. If the assigned input or bit is at active state: Torque control If the assigned input or bit is at inactive state: Speed regulation		[No] (nO)
trI nO AI1 AI2 AI3 AI4 LCC Mdb CAn nEt APP PI PG	❏ **[Torque ref. channel]** ☐ **[No]** (nO): Not assigned (zero torque reference). ☐ **[AI1]** (AI1): Analog input ☐ **[AI2]** (AI2): Analog input ☐ **[AI3]** (AI3): Analog input, if VW3A3202 I/O card has been inserted ☐ **[AI4]** (AI4): Analog input, if VW3A3202 I/O card has been inserted ☐ **[HMI]** (LCC): Graphic display terminal ☐ **[Modbus]** (Mdb): Integrated Modbus ☐ **[CANopen]** (CAn): Integrated CANopen ☐ **[Com. card]** (nEt): Communication card (if inserted) ☐ **[C.Insid. card]** (APP): Controller Inside card (if inserted) ☐ **[RP]** (PI): Frequency input, if VW3A3202 I/O card has been inserted ☐ **[Encoder]** (PG): Encoder input, if encoder card has been inserted 100% of the reference corresponds to 300% of the rated torque.		[No] (nO)
tSd nO LI1 - - -	❏ **[Torque ref. sign]** ☐ **[No]** (nO): Function inactive ☐ **[LI1]** (LI1) : : ☐ **[...]** (...): See the assignment conditions on page 204. If the assigned input or bit is at inactive state, the torque sign is the same as the reference. If the assigned input or bit is at active state, the torque sign is the opposite of the reference.		[No] (nO)
trt ( )	❏ **[Torque ratio]** Coefficient applied to [Torque reference] (tr1).	0 to 1,000 %	100 %
trP ( )	❏ **[Torque ramp time]** Rise and fall time for a variation of 100% of the rated torque.	0 to 99.99 s	3 s
tSt SPd YES SPn	❏ **[Torque control stop]** ☐ **[Speed]** (SPd): Speed regulation stop, in accordance with the type of stop configuration (see page 221). ☐ **[Freewheel]** (YES): Freewheel stop ☐ **[Spin]** (SPn): Zero torque stop, but maintaining the flux in the motor. This type of operation is only possible if [Motor control type] (Ctt) = [FVC] (FUC) or [Sync.CL] (FSY).		[Speed] (SPd)

( ) Parameter that can be modified during operation or when stopped.

Code	Name/Description	Adjustment range	Factory setting
	[TORQUE CONTROL] (continued)		
SPt	❑ **[Spin time]** This parameter can be accessed if [Torque control stop] (tSt) = [Spin] (SPn) Spin time following stop, in order to remain ready to restart quickly.	0 to 3600 s	1
dbP	❑ **[Positive deadband]** Positive deadband. Value added algebraically to the speed reference. Example for dbP = 10: • If reference = +50 Hz: + 50 + 10 = 60 • If reference = - 50 Hz: - 50 + 10 = - 40	0 to 2 x [Max frequency] (tFr)	10 Hz
dbn	❑ **[Negative deadband]** Negative deadband. Value subtracted algebraically from the speed reference. Example for dbn = 10: • If reference = +50 Hz: + 50 - 10 = 40 • If reference = - 50 Hz: - 50 - 10 = - 60	0 to 2 x [Max frequency] (tFr)	10 Hz
rtO	❑ **[Torque ctrl time out]** Time following automatic exit of torque control mode in the event of a fault or alarm.	0 to 999.9 s	60
tOb ALrM FLt	❑ **[Torq. ctrl fault mgt]** Response of drive once time [Torque ctrl time out] (rtO) has elapsed. ☐ **[Alarm]** (ALrM) ☐ **[Fault]** (FLt): Fault with freewheel stop		[Alarm] (ALrM)

Note: If the motor is equipped with an encoder assigned to speed feedback, the "torque control" function will trigger a [Load slipping] (AnF) fault. One of the following solutions should be applied:
- Set [Load slip detection] (Sdd) page 277 = [No] (nO).
- Set both [Positive deadband] (dbP) and [Negative deadband] (dbn) to a value less than 10% of the rated motor frequency.

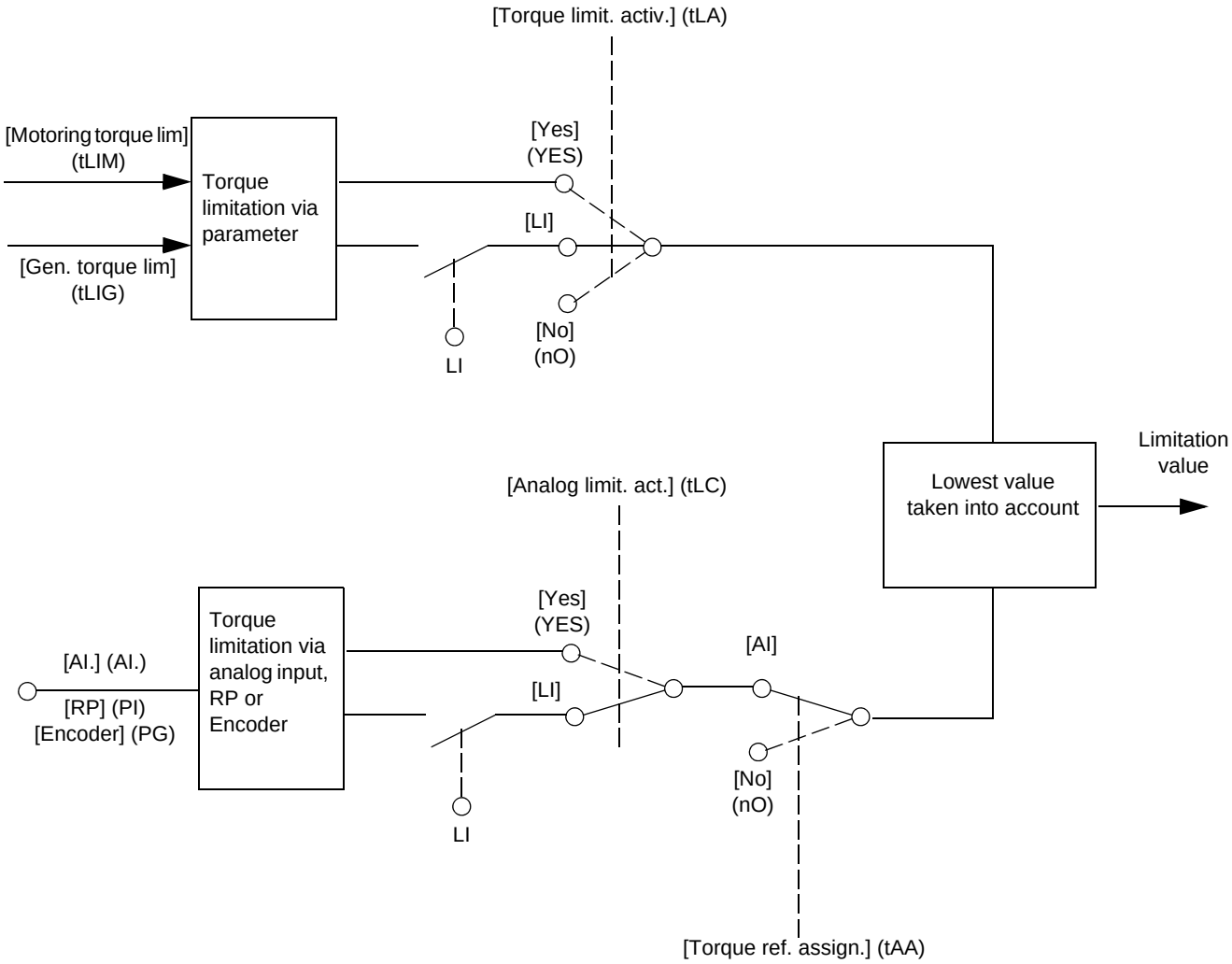
Parameter that can be modified during operation or when stopped.

Torque limitation

There are two types of torque limitation:

- With a value that is fixed by a parameter
- With a value that is set by an analog input (AI, pulse or encoder)

If both types are enabled, the lowest value is taken into account. The two types of limitation can be configured or switched remotely using a logic input or via the communication bus.



Code	Name/Description	Adjustment range	Factory setting
tOL-	**[TORQUE LIMITATION]** This function cannot be accessed in V/F profile mode.		
tLA nO YES LI1 - - -	❏ **[Torque limit. activ.]** ☐ **[No]** (nO): Function inactive ☐ **[Yes]** (YES): Function always active ☐ **[LI1]** (LI1) : : ☐ **[...]** (...): See the assignment conditions on page 204. If the assigned input or bit is at inactive state, the function is inactive. If the assigned input or bit is at active state, the function is active.		[No] (nO)
IntP 0.1	❏ **[Torque increment]** The parameter cannot be accessed if [Torque limit. activ.] (tLA) = [No] (nO). Selection of units for the [Motoring torque lim] (tLIM) and [Gen. torque lim] (tLIG) parameters. ☐ **[0.1%]** (0.1): 0.1% unit ☐ **[1%]** (1): 1% unit		[1 %] (1)
tLIN ↻	❏ **[Motoring torque lim]** (1) The parameter cannot be accessed if [Torque limit. activ.] (tLA) = [No] (nO). Torque limitation in motor mode, as a whole % or in 0.1% increments of the rated torque in accordance with the [Torque increment] (IntP) parameter.	0 to 300 %	100 %
tLIG ↻	❏ **[Gen. torque lim]** (1) The parameter cannot be accessed if [Torque limit. activ.] (tLA) = [No] (nO). Torque limitation in generator mode, as a whole % or in 0.1% increments of the rated torque in accordance with the [Torque increment] (IntP) parameter.	0 to 300 %	100 %
tAA nO AI1 - AI4 PI PG AIU1	❏ **[Torque ref. assign.]** If the function is assigned, the limitation varies between 0% and 300% of the rated torque on the basis of the 0% to 100% signal applied to the assigned input. Examples include: - 12 mA on a 4-20 mA input results in limitation to 150% of the rated torque. - 2.5 V on a 10 V input results in 75% of the rated torque. ☐ **[No]** (nO): Not assigned (function inactive) ☐ **[AI1]** (AI1) to **[AI4]** (AI4): Analog input, if VW3A3202 I/O card has been inserted ☐ **[RP]** (PI): Frequency input, if VW3A3202 I/O card has been inserted ☐ **[Encoder]** (PG): Encoder input, if encoder card has been inserted ☐ **[Network AI]** (AIU1): Virtual input via communication bus, to be configured via [AI net channel] (AIC1) page 175. **⚠ WARNING** **UNINTENDED EQUIPMENT OPERATION** If the equipment switches to forced local mode (see page 286), the virtual input remains frozen at the last value transmitted. Do not use the virtual input and forced local mode in the same configuration. **Failure to follow this instruction can result in death or serious injury.**		[No] (nO)

(1) Parameter can also be accessed in the [1.3 SETTINGS] (SEt-) menu.

↻ Parameter that can be modified during operation or when stopped.

Code	Name/Description	Adjustment range	Factory setting
	[TORQUE LIMITATION] (continued)		
tLC	❏ **[Analog limit. act.]**		[Yes] (YES)

This parameter can be accessed if [Torque ref. assign.] (tAA) is not [No] (nO).

YES	☐ **[Yes]** (YES): The limitation depends on the input assigned by [Torque ref. assign.] (tAA).
LI1	☐ **[LI1]** (LI1)
-	:
-	:
-	☐ **[...]** (...): See the assignment conditions on page 204.

If the assigned input or bit is at inactive state:
- The limitation is specified by the [Motoring torque lim] (tLIM) and [Gen. torque lim] (tLIG) parameters if [Torque limit. activ.] (tLA) is not [No] (nO).
- No limitation if [Torque limit. activ.] (tLA) = [No] (nO).

If the assigned input or bit is at active state:
- The limitation depends on the input assigned by [Torque ref. assign.] (tAA).

Note: If [Torque limitation] (tLA) and [Torque ref. assign.] (tAA) are enabled at the same time, the lowest value will be taken into account.

Code	Name/Description	Adjustment range	Factory setting
CLI-	**[2nd CURRENT LIMIT.]**		
LC2 nO LI1 - - -	**❏ [Current limit 2]** ☐ **[No]** (nO): Function inactive ☐ **[LI1]** (LI1) : : ☐ **[...]** (...): See the assignment conditions on page 204. If the assigned input or bit is at inactive state, the first current limitation is active. If the assigned input or bit is at active state, the second current limitation is active.		[No] (nO)
CL2	**❏ [I Limit. 2 value]** (1) Second current limitation This parameter can be accessed if [Current limit 2] (LC2) is not [No] (nO). **Note:** If the setting is less than 0.25 In, the drive may lock in [Output Phase Loss] (OPF) fault mode if this has been enabled (see page 268). If it is less than the no-load motor current, the limitation no longer has any effect. **CAUTION** Check that the motor will withstand this current, particularly in the case of permanent magnet synchronous motors, which are susceptible to demagnetization. **Failure to follow this instruction can result in equipment damage.**	0 to 1.36 In (2)	1.36 In (2)
CLI	**❏ [Current Limitation]** (1) First current limitation The adjustment range is limited to 1.36 In if [Switching freq.] (SFr) page 106 is less than 2.5 kHz. **Note:** If the setting is less than 0.25 In, the drive may lock in [Output Phase Loss] (OPF) fault mode if this has been enabled (see page 268). If it is less than the no-load motor current, the limitation no longer has any effect. **CAUTION** Check that the motor will withstand this current, particularly in the case of permanent magnet synchronous motors, which are susceptible to demagnetization. **Failure to follow this instruction can result in equipment damage.**	0 to 1.36 In (2)	1.36 In (2)

(1) Parameter can also be accessed in the [1.3 SETTINGS] (SEt-) menu.
(2) In corresponds to the rated drive current indicated in the Installation Manual and on the drive nameplate.

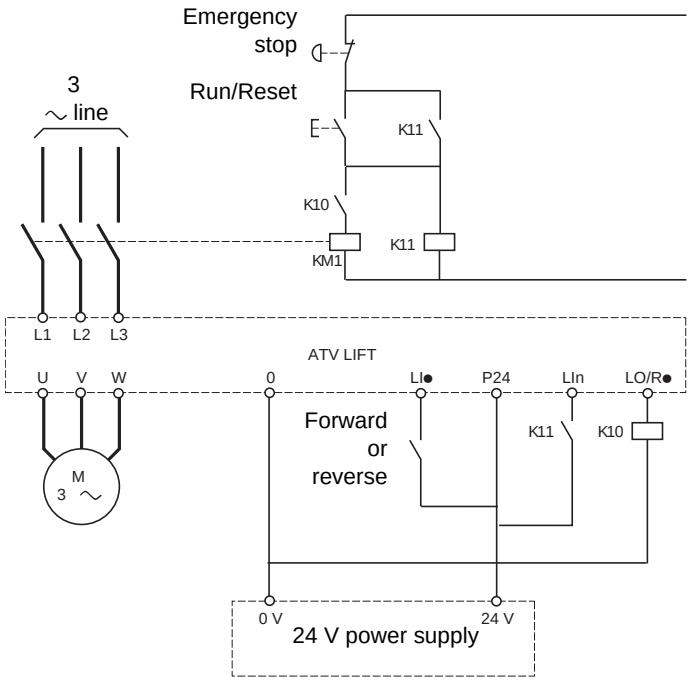
Parameter that can be modified during operation or when stopped.

Line contactor command

The line contactor closes every time a run command (forward or reverse) is sent and opens after every stop, as soon as the drive is locked. For example, if the stop mode is stop on ramp, the contactor will open when the motor reaches zero speed.

Note: The drive control power supply must be provided via an external 24 V source.

Example circuit:



Note: The "Run/Reset" button must be pressed once the "Emergency stop" button has been released.

LI● = Run command [Forward] or [Reverse]
LO/R● → [Line contactor ass.] (LLC)
LIn = [Drive lock] (LES)

CAUTION
This function can only be used for a small number of consecutive operations with a cycle time longer than 60 s (in order to avoid premature aging of the filter capacitor charging circuit). **Failure to follow this instruction can result in equipment damage.**

Code	Name/Description	Adjustment range	Factory setting
LLC-	**[LINE CONTACTOR COMMAND]**		
LLC	❏ **[Line contactor ass.]**		[No] (nO)
	Logic output or control relay ☐ **[No]** (nO): Function not assigned (in this case, none of the function parameters can be accessed). ☐ **[LO1]** (LO1) to **[LO4]** (LO4): Logic output (if one or two I/O cards have been inserted, LO1 to LO2 or LO4 can be selected). **[R2]** (r2) to **[R5]** (r5): Relay (selection of R2 extended to R3, R4 or R5 if I/O or ESIM cards have been inserted). ☐ **[dO1]** (dO1): Analog output AO1 functioning as a logic output. Selection can be made if [AO1 assignment] (AO1) page 191 = [No] (nO).		
LES	❏ **[Drive lock]**		[No] (nO)
	☐ **[No]** (nO): Function inactive ☐ **[LI1]** (LI1) : : ☐ **[...]** (...): See the assignment conditions on page 204. The drive locks when the assigned input or bit changes to 0.		
LCt	❏ **[Mains V. time out]**	5 to 999 s	5 s
	Monitoring time for closing of line contactor. If, once this time has elapsed, there is no voltage on the drive power circuit, the drive will lock with a "Line contactor" fault (LCF).		

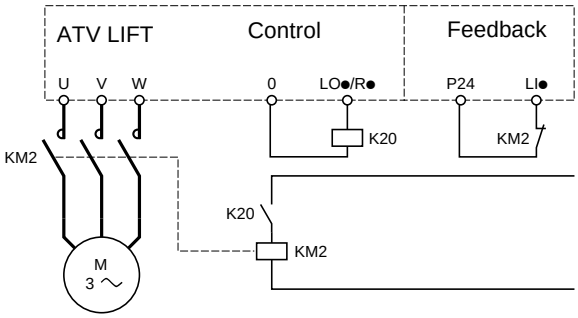
Output contactor command

This allows the drive to control a contactor located between the drive and the motor. The request for the contactor to close is made when a run command is sent. The request for the contactor to open is made when there is no longer any current in the motor.

CAUTION
If a DC injection braking function has been configured it should not be left operating too long in stop mode, as the contactor only opens at the end of braking. **Failure to follow this instruction can result in equipment damage.**

Output contactor feedback

The corresponding logic input should be at active state when there is no run command and at inactive state during operation.
In the event of an inconsistency, the drive trips on an FCF2 fault if the output contactor fails to close (LIx at 1) and on an FCF1 fault if it is stuck (LIx at 0).
The parameter [Delay to motor run] (dbS) can be used to delay tripping in fault mode when a run command is sent and the [Delay to open cont.] (dAS) parameter delays the fault when a stop command is set.



The [Out. contactor ass.] (OCC) and [Output contact. fdbk] (rCA) functions can be used individually or together.

Code	Name/Description	Adjustment range	Factory setting
OCC-	**[OUTPUT CONTACTOR CMD]**		
OCC	❏ **[Out. contactor ass.]**		[dO1] (dO1)
	Logic output or control relay ☐ **[No]** (nO): Function not assigned (in this case, none of the function's parameters can be accessed) ☐ **[LO1]** (LO1) to **[LO4]** (LO4): Logic output (if one or two I/O cards have been inserted, LO1 to LO2 or LO4 can be selected) **[R1]** (r1) to **[R5]** (r5): Relay (selection of R1 extended to R3, R4 or R5 if I/O or ESIM cards have been inserted) ☐ **[dO1]** (dO1): Analog output AO1 functioning as a logic output. Selection can be made if [AO1 assignment] (AO1) page 191 = [No] (nO).		
rCA	❏ **[Output contact. fdbk]**		[No] (nO)
	☐ **[No]** (nO): Function inactive. ☐ **[LI1]** (LI1) : : ☐ **[...]** (...): See the assignment conditions on page 204. The motor starts up when the assigned input or bit changes to inactive state.		
dbS	❏ **[Delay to motor run]**	0.05 to 60 s	0.15
	Time delay for: • Motor control following the sending of a run command. • Output contactor fault monitoring, if the feedback has been assigned. If the contactor fails to close at the end of the set time, the drive will lock in FCF2 fault mode. This parameter can be accessed if [Out. contactor ass.] (OCC) has been assigned or if [Output contact. fdbk] (rCA) has been assigned. The time delay must be greater than the closing time of the output contactor.		
dAS	❏ **[Delay to open cont.]**	0 to 5.00 s	0.10
	Time delay for output contactor opening command following motor stop. This parameter can be accessed if [Output contact. fdbk] (rCA) has been assigned. The time delay must be greater than the opening time of the output contactor. If it is set to 0, the fault will not be monitored. If the contactor fails to open at the end of the set time, the drive will lock in FCF1 fault mode.		

Parameter that can be modified during operation or when stopped.

Parameter set switching [PARAM. SET SWITCHING]

A set of 1 to 15 parameters from the [1.3 SETTINGS] (SEt-) menu on page 124 can be selected and 2 or 3 different values assigned. These 2 or 3 sets of values can then be switched using 1 or 2 logic inputs or control word bits. This switching can be performed during operation (motor running).
It can also be controlled on the basis of one or two frequency thresholds, whereby each threshold acts as a logic input (0 = threshold not attained, 1 = threshold attained).

	Values 1	Values 2	Values 3
Parameter 1 Parameter 2 Parameter 3 Parameter 4 Parameter 5 Parameter 6 Parameter 7 Parameter 8 Parameter 9 Parameter 10 Parameter 11 Parameter 12 Parameter 13 Parameter 14 Parameter 15	Parameter 1 Parameter 2 Parameter 3 Parameter 4 Parameter 5 Parameter 6 Parameter 7 Parameter 8 Parameter 9 Parameter 10 Parameter 11 Parameter 12 Parameter 13 Parameter 14 Parameter 15	Parameter 1 Parameter 2 Parameter 3 Parameter 4 Parameter 5 Parameter 6 Parameter 7 Parameter 8 Parameter 9 Parameter 10 Parameter 11 Parameter 12 Parameter 13 Parameter 14 Parameter 15	Parameter 1 Parameter 2 Parameter 3 Parameter 4 Parameter 5 Parameter 6 Parameter 7 Parameter 8 Parameter 9 Parameter 10 Parameter 11 Parameter 12 Parameter 13 Parameter 14 Parameter 15
Input LI or bit or frequency threshold 2 values	0	1	0 or 1
Input LI or bit or frequency threshold 3 values	0	0	1

Note: Do not modify the parameters in the [1.3 SETTINGS] (SEt-) menu, because any modifications made in this menu [1.3 SETTINGS] (SEt-)) will be lost on the next power-up. The parameters can be adjusted during operation in the [PARAM. SET SWITCHING] (MLP-) menu, on the active configuration.

Note: Parameter set switching cannot be configured from the integrated display terminal.
Parameters can only be adjusted on the integrated display terminal if the function has been configured previously via the graphic display terminal, by PowerSuite or via the bus or communication network. If the function has not been configured, the **MLP-** menu and the **PS1-**, **PS2-**, **PS3-** submenus will not appear.

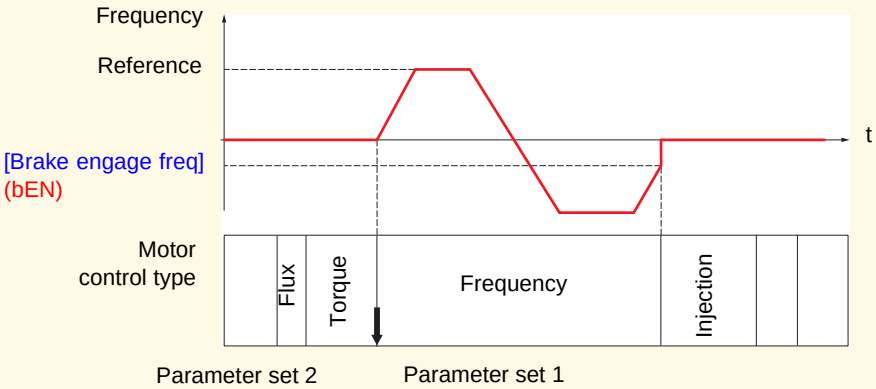
Code	Name/Description	Adjustment range	Factory setting

nLP- [PARAM. SET SWITCHING]

CHA1 ❏ [2 Parameter sets]

[No] (nO)

- ☐ **[No]** (nO): Function inactive.
- ☐ **[Freq.Th.att.]** (FtA): Switching via [Freq. threshold] (Ftd) page 135.
- ☐ **[Freq. Th. 2 attain.]** (F2A): Switching via [Freq. threshold 2] (Ftd) page 135.
- ☐ **[Ramp Mode]** (tAP): Switching during the brake sequence. This new assignment can be used, for example, to set high gains on brake release before starting the ramp (useful in lift applications).



nO
FtA
F2A
tAP

LI1
-
-
-

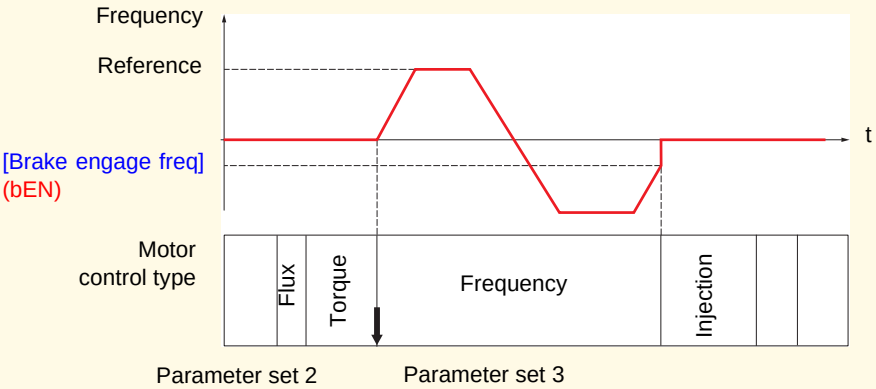
- ☐ **[LI1]** (LI1)
  :
  :
- ☐ **[...]** (...): See the assignment conditions on page 204.

Switching 2 parameter sets

CHA2 ❏ [3 Parameter sets]

[No] (nO)

- ☐ **[No]** (nO): Function inactive
- ☐ **[Freq.Th.att.]** (FtA): Switching via [Freq. threshold] (Ftd) page 135
- ☐ **[Freq. Th. 2 attain.]** (F2A): Switching via [Freq. threshold 2] (Ftd) page 135
- ☐ **[Ramp Mode]** (tAP): Switching during the brake sequence. This new assignment can be used, for example, to set high gains on brake release before starting the ramp (useful in lift applications).



nO
FtA
F2A
tAP

LI1
-
-
-

- ☐ **[LI1]** (LI1)
  :
  :
- ☐ **[...]** (...): See the assignment conditions on page 204.

Switching 3 parameter sets

Note: In order to obtain 3 parameter sets, [2 parameter sets] must also be configured.

Code	Name/Description	Adjustment range	Factory setting

[PARAM. SET SWITCHING] (continued)

SPS

☐ [PARAMETER SELECTION]

This parameter can only be accessed on the graphic display terminal if [2 parameter sets] is not [No].
Making an entry in this parameter opens a window containing all the adjustment parameters that can be accessed.
Select 1 to 15 parameters using ENT (a tick then appears next to the parameter). Parameter(s) can also be deselected using ENT.
E.g.

PARAMETER SELECTION	
1.3 SETTINGS	
Ramp increment	☑
---------	☐
---------	☐
---------	☑

PS1-

❑ [SET 1]

This parameter can be accessed if at least 1 parameter has been selected in [PARAMETER SELECTION].
Making an entry in this parameter opens a settings window containing the selected parameters **in the order in which they were selected**.
With the graphic display terminal: :

RDY	Term	+0.00Hz	0A
SET1			
Acceleration:		9.51 s	
Deceleration:		9.67 s	
Acceleration 2:		12.58 s	
Deceleration 2 :		13.45 s	
Begin Acc round:		2.3 s	
Code		Quick	

ENT →

RDY	Term	+0.00Hz	0A
Acceleration			
9.51 s			
Min = 0.1		Max = 999.9	
	<<	>>	Quick

With the integrated display terminal:
Proceed as in the Settings menu using the parameters that appear.

PS2-

❑ [SET 2]

This parameter can be accessed if at least 1 parameter has been selected in [PARAMETER SELECTION].
Procedure identical to [SET 1] (PS1-).

PS3-

❑ [SET 3]

This parameter can be accessed if [3 parameter sets] is not [No] and if at least 1 parameter has been selected in [PARAMETER SELECTION].
Procedure identical to [SET 1] (PS1-).

☞ **Note: We recommend that a parameter set switching test is carried out while stopped and a check is made to ensure that it has been performed correctly.**
Some parameters are interdependent and in this case may be restricted at the time of switching.

Interdependencies between parameters must be respected, even between different sets.

For example: The highest [Low speed] (LSP) must be below the lowest [High speed] (HSP).

[1.7 APPLICATION FUNCT.] (FUn-)

Motor or configuration switching [MULTIMOTORS/CONFIG.]

The drive may contain up to 3 configurations, which can be saved using the [1.12 FACTORY SETTINGS] (FCS-) menu, page 291.
Each of these configurations can be activated remotely, enabling adaptation to:

- 2 or 3 different motors or mechanisms (multimotor mode)
- 2 or 3 different configurations for a single motor (multiconfiguration mode)

The two switching modes cannot be combined.

Note: The following conditions MUST be observed:

•Switching may only take place when stopped (drive locked). If a switching request is sent during operation, it will not be executed until the next stop.

•In the event of motor switching, the following additional conditions apply:

-When the motors are switched, the power and control terminals concerned must also be switched as appropriate.

-The maximum power of the drive must not be exceeded by any of the motors.

•All the configurations to be switched must be set and saved in advance in the same hardware configuration, this being the definitive configuration (option and communication cards). Failure to follow this instruction can cause the drive to lock on an [Incorrect config.] (CFF) fault.

Menu and parameters switched in multimotor mode

- [1.3 SETTINGS] (SEt-)
- [1.4 MOTOR CONTROL] (drC-)
- [1.5 INPUTS / OUTPUTS CFG] (I-O-)
- [1.6 COMMAND] (CtL-)
- [1.7 APPLICATION FUNCT.] (FUn-) with the exception of the [MULTIMOTORS/CONFIG.] function (to be configured once only)
- [1.8 FAULT MANAGEMENT] (FLt)
- [1.13 USER MENU]
- [USER CONFIG.]: The name of the configuration specified by the user in the [1.12 FACTORY SETTINGS] (FCS-) menu

Menu and parameters switched in multiconfiguration mode

As in multimotor mode, except for the motor parameters that are common to the three configurations:

- Rated current
- Thermal current
- Rated voltage
- Rated frequency
- Rated speed
- Rated power
- IR compensation
- Slip compensation
- Synchronous motor parameters
- Type of thermal protection
- Thermal state
- The auto-tuning parameters and motor parameters that can be accessed in Expert mode
- Type of motor control

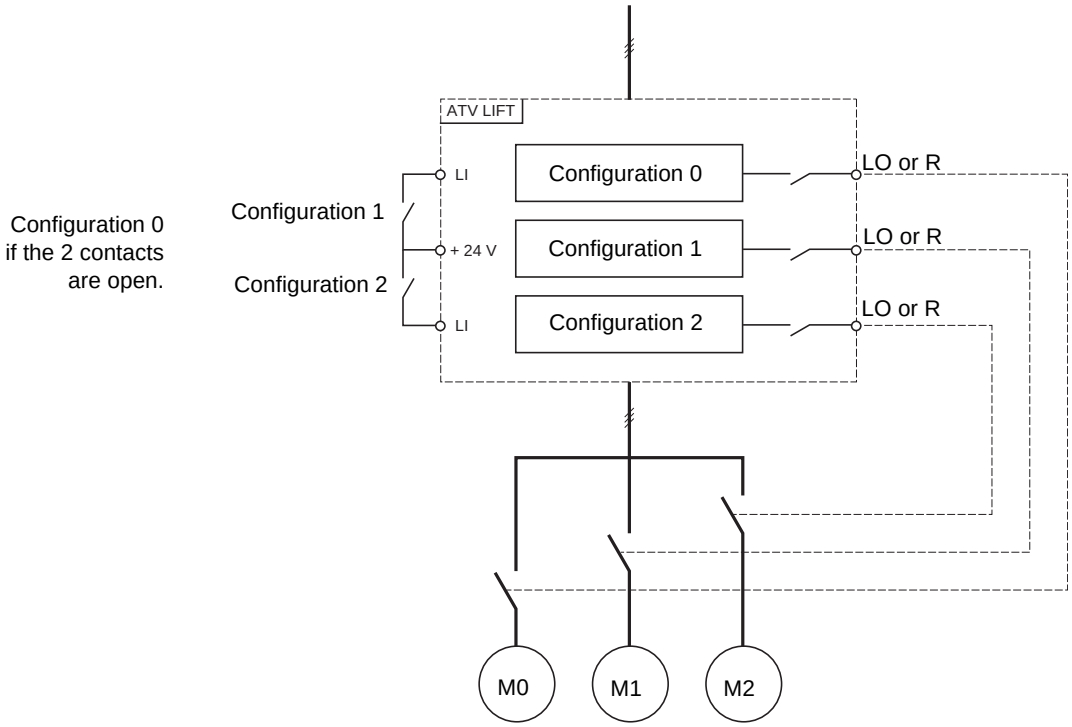
Note: No other menus or parameters can be switched.

Switching command

Depending on the number of motors or selected configuration (2 or 3), the switching command is sent using one or two logic inputs.
The table below lists the possible combinations.

LI 2 motors or configurations	LI 3 motors or configurations	Number of configuration or active motor
0	0	0
1	0	1
0	1	2
1	1	2

Schematic diagram for multimotor mode



Auto-tuning in multimotor mode

This auto-tuning can be performed:

- Manually using a logic input when the motor changes
- Automatically each time the motor is activated for the 1st time after turning on the drive, if the [Automatic autotune] (AUt) parameter on page 154 = [Yes] (YES).

Motor thermal states in multimotor mode:

The drive protects the three motors individually. Each thermal state takes into account all stop times, including drive shutdowns.
It is, therefore, not necessary to perform auto-tuning every time the power is turned on. It is sufficient to auto-tune each motor at least once.

Configuration information output

In the [1.5 INPUTS / OUTPUTS CFG] (I-O-) menu, a logic output can be assigned to each configuration or motor (2 or 3) for remote information transmission.

Note: As the [1.5 INPUTS / OUTPUTS CFG] (I-O-) menu is switched, these outputs must be assigned in all configurations in which information is required.

Code	Name/Description	Adjustment range	Factory setting
nnC-	**[MULTIMOTORS/CONFIG.]**		
CHn nO YES	**❑ [Multimotors]** ☐ **[No]** (nO): Multiconfiguration possible ☐ **[Yes]** (YES): Multimotor possible ☞ **Note:** At each multi-motor configuration switching, the drive performs an automatic measurement of the phase-shift angle at next run order.		[No] (nO)
CnF1 nO LI1 - - - C111 - - -	**❑ [2 Configurations]** ☐ **[No]** (nO): No switching. ☐ **[LI1]** (LI1) to **[LI6]** (LI6) ☐ **[LI7]** (LI7) to **[LI10]** (LI10): If VW3A3201 logic I/O card has been inserted ☐ **[LI11]** (LI11) to **[LI12]** (LI12): If VW3A3203 ESIM card has been inserted ☐ **[LI11]** (LI11) to **[LI14]** (LI14): If VW3A3202 extended I/O card has been inserted ☐ **[C111]** (C111) to **[C115]** (C115): With integrated Modbus ☐ **[C211]** (C211) to **[C215]** (C215): With integrated CANopen ☐ **[C311]** (C311) to **[C315]** (C315): With a communication card ☐ **[C411]** (C411) to **[C415]** (C415): With a Controller Inside card Switching of 2 motors or 2 configurations		[No] (nO)
CnF2 nO LI1 - - - C111 - - -	**❑ [3 Configurations]** ☐ **[No]** (nO): No switching ☐ **[LI1]** (LI1) to **[LI6]** (LI6) ☐ **[LI7]** (LI7) to **[LI10]** (LI10): If VW3A3201 logic I/O card has been inserted ☐ **[LI11]** (LI11) to **[LI12]** (LI12): If VW3A3203 ESIM card has been inserted ☐ **[LI11]** (LI11) to **[LI14]** (LI14): If VW3A3202 extended I/O card has been inserted ☐ **[C111]** (C111) to **[C115]** (C115): With integrated Modbus ☐ **[C211]** (C211) to **[C215]** (C215): With integrated CANopen ☐ **[C311]** (C311) to **[C315]** (C315): With a communication card ☐ **[C411]** (C411) to **[C415]** (C415): With a Controller Inside card Switching of 3 motors or 3 configurations **Note:** In order to obtain 3 motors or 3 configurations, [2 Configurations] (CnF1) must also be configured.		[No] (nO)

Code	Name/Description	Adjustment range	Factory setting
ISP-	**[INSPECTION MODE]** See details page 95		
ISP nO LI1 - - LI14	❏ **[Inspection]** This parameter can be accessed if brake logic control [Brake assignment] (bLC) page 233 has been assigned. ☐ **[No]** (nO): Function not assigned ☐ **[LI1]** (LI1) to **[LI6]** (LI6) ☐ **[LI7]** (LI7) to **[LI10]** (LI10): If VW3A3201 logic I/O card has been inserted ☐ **[LI11]** (LI11) to **[LI12]** (LI11): If VW3A3203 ESIM card has been inserted ☐ **[LI11]** (LI11) to **[LI14]** (LI14): If VW3A3202 extended I/O card has been inserted. Inspection mode is activated when the assigned input changes to active state.		[LI5] (LI5)
ISrF ↻	❏ **[Inspection speed]** Value of the "inspection" mode frequency reference. This parameter can be accessed if [Inspection] (ISP) is not [No] (nO).	0 to 25 Hz	According to drive rating

↻ Parameter that can be modified during operation or when stopped.

Code	Name/Description	Adjustment range	Factory setting
rFt-	**[EVACUATION]** For details of this function, see page 97.		
rFt nO LI1 - - LI14	❏ **[Evacuation assign.]** ☐ **[No]** (nO): Function not assigned ☐ **[LI1]** (LI1) to **[LI6]** (LI6) ☐ **[LI7]** (LI7) to **[LI10]** (LI10): If VW3A3201 logic I/O card has been inserted ☐ **[LI11]** (LI11) to **[LI12]** (LI12): If VW3A3203 ESIM card has been inserted ☐ **[LI11]** (LI11) to **[LI14]** (LI14): If VW3A3202 extended I/O card has been inserted Evacuation is activated when the assigned input is at active state, if the drive is stationary. Evacuation is activated when the assigned input is at inactive state, as soon as the drive stops.		[No] (nO)
rSU	❏ **[Evacuation Input V.]** Minimum permissible AC voltage value of the emergency power supply. This parameter can be accessed if [Evacuation assign.] (rFt) is not [No] (nO).	220 to 320 V	220 V
rSP ( )	❏ **[Evacuation freq.]** Value of the "evacuation" mode frequency reference. This parameter can be accessed if [Evacuation assign.] (rFt) is not [No] (nO). The adjustment range is determined by the [Low speed] (LSP) (page 126), [Rated motor freq.] (FrS) page 143 for an asynchronous motor or [Nominal freq sync.] (FrSS) page 149 for a synchronous motor and [Rated motor volt.] (UnS) (page 143) parameters and by [Evacuation Input V.] (rSU) above. Example with an asynchronous motor: • If LSP < (FrS x rSU/UnS): rSP min. = LSP, rSP max. = (Frs x rSU/UnS) • If LSP ⩾ (FrS x rSU/UnS): rSP = (Frs x rSU/UnS) With a synchronous motor: Same formula using FrSS in place of FrS and 400 V in place of UnS.		5 Hz

( ) Parameter that can be modified during operation or when stopped.

Code	Name/Description	Adjustment range	Factory setting
HFF-	**[HALF FLOOR]** For details of this function, see page 99.		
HLS nO -	❏ **[Half-floor speed]** Activation and adjustment of the "half floor" function. This function has priority over all speed reference functions (preset speeds, for example) with the exception of those generated via fault monitoring (fallback speed, for example). ☐ **[No]** (nO): Function inactive. ☐ **0.1 Hz to 500.0 Hz**: Activation of the function by adjusting the motor frequency to be reached prior to slowing down.		[No] (nO)

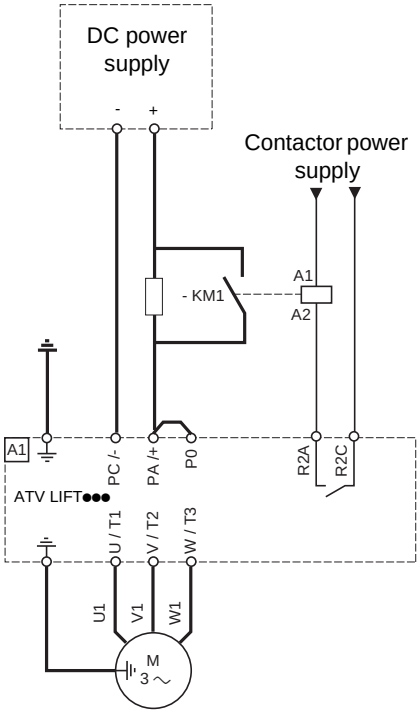
Direct power supply via DC bus

This function is only accessible for ATV71LD48N4Z drives.

Direct power supply via the DC bus requires a protected direct current source with adequate power and voltage as well as a suitably dimensioned resistor and capacitor precharging contactor. Consult Schneider Electric for information about specifying these components.

The "direct power supply via DC bus" function can be used to control the precharging contactor via a relay or a logic input on the drive.

Example circuit using R2 relay:



Code	Name/Description	Adjustment range	Factory setting
dCO-	**[DC BUS SUPPLY]** This function is only accessible for ATV71LD48N4Z drives.		
dCO	❏ **[Precharge cont. ass.]**		[No] (nO)
	Logic output or control relay		
nO	☐ **[No]** (nO): Function not assigned		
LO1	☐ **[LO1]** (LO1)		
-	to		
LO4	**[LO4]** (LO4): Logic output (if one or two I/O cards have been inserted, LO1 to LO2 or LO4 can be selected).		
r1	**[R1]** (r1)		
-	to		
r5	**[R5]** (r5): Relay (selection of R1 extended to R3, R4 or R5 if I/O or ESIM cards have been inserted).		
dO1	☐ **[dO1]** (dO1): Analog output AO1 functioning as a logic output. Selection can be made if [AO1 assignment] (AO1) page 191 = [No] (nO).		

Top Z management

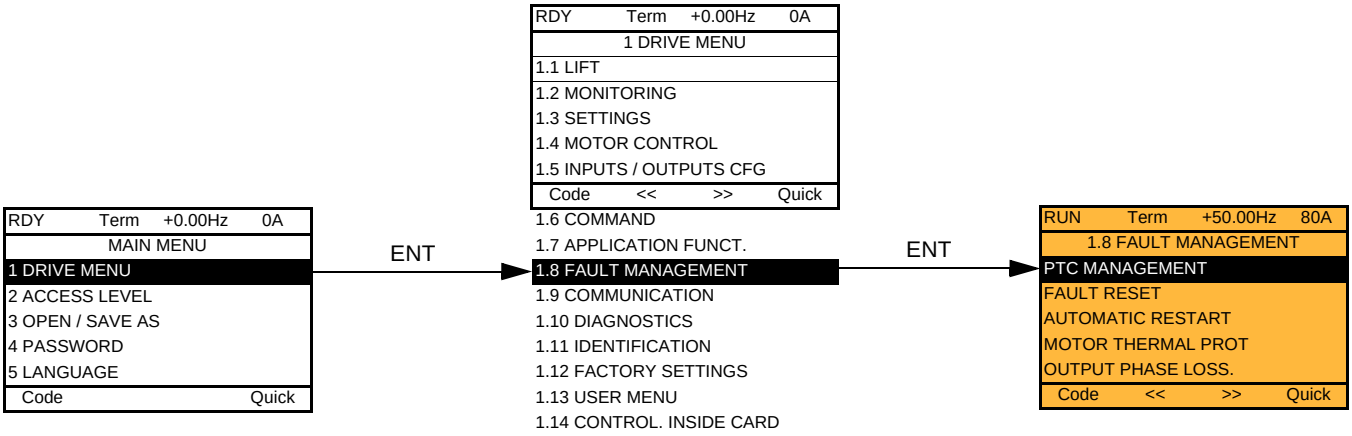
This function can be accessed only if a VW3 A3 411 card has been inserted and if [Encoder type] (EnS) = [AABB] (AAbb).

This function can be used for homing, but the leveling speed must be low, or the drive will trigger an overbraking fault [Overbraking] (ObF).

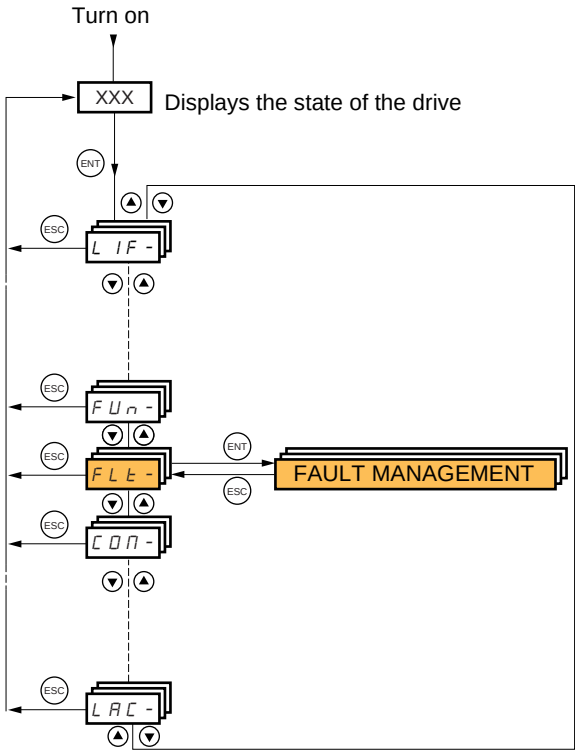
Code	Name/Description	Adjustment range	Factory setting
tOP-	**[TOP Z MANAGEMENT]** This function can be accessed only if a VW3 A3 411 card has been inserted and if [Encoder type] (EnS) = [AABB] (AAbb).		
tOSt	❏ **[Stop on top Z]**		[No] (nO)
	Note: This function cannot be used with certain other functions. Follow the instructions on page 210.		
nO LI1 - - -	☐ **[No]** (nO): Not assigned ☐ **[LI1]** (LI1) : : ☐ **[...]** (...): See the assignment conditions on page 204. The fast stop is activated when the input changes to 1 or the bit changes to 1 and after the detection of the next Top Z. If the input returns to state 0 and the run command is still active, the motor will only restart if [2/3 wire control] (tCC) page 166 = [2 wire] (2C) and the [2 wire type] (tCt) = [Level] (LEL) or [Fwd priority] (PFO). If not, a new run command must be sent.		

[1.8 FAULT MANAGEMENT] (FLt-)

With graphic display terminal:



With integrated display terminal:



Contents

Code	Name	Page
PtC-	[PTC MANAGEMENT]	263
rSt-	[FAULT RESET]	264
Atr-	[AUTOMATIC RESTART]	265
tHt-	[MOTOR THERMAL PROT.]	267
OPL-	[OUTPUT PHASE LOSS]	268
IPL-	[INPUT PHASE LOSS]	268
OHL-	[DRIVE OVERHEAT]	269
SAt-	[THERMAL ALARM STOP]	270
EtF-	[EXTERNAL FAULT]	271
USb-	[UNDERVOLTAGE MGT]	272
t It-	[IGBT TESTS]	273
LFL-	[4-20mA LOSS]	274
InH-	[FAULT INHIBITION]	275
CLL-	[COM. FAULT MANAGEMENT]	276
Sdd-	[ENCODER FAULT]	277
t Id-	[TORQUE OR I LIM. DETECT]	277
F9F-	[FREQUENCY METER]	279
brP-	[DB RES. PROTECTION]	280
tnF-	[AUTO TUNING FAULT]	280
PPI-	[CARDS PAIRING]	281
LFF-	[FALLBACK SPEED]	282
FSt-	[RAMP DIVIDER]	282
dCI-	[DC INJECTION]	282

[1.8 FAULT MANAGEMENT] (FLt-)

The parameters in the [1.8 FAULT MANAGEMENT] (FLt-) menu can only be modified when the drive is stopped and there is no run command, except for parameters with a ↻ symbol in the code column, which can be modified with the drive running or stopped.

PTC probes

3 sets of PTC probes can be managed by the drive in order to protect the motors:

- 1 on logic input LI6 converted for this use by switch "**SW2**" on the control card.
- 1 on each of the 2 option cards VW3A3201 and VW3A3202.

Each of these sets of PTC probes is monitored for the following faults:

- Motor overheating.
- Sensor break fault.
- Sensor short-circuit fault.

Protection via PTC probes does not disable protection via I^2t calculation performed by the drive (the two types of protection can be combined).

Code	Name/Description	Adjustment range	Factory setting
PtC-	**[PTC MANAGEMENT]**		
PtCL	❏ **[LI6 = PTC probe]**		[No] (nO)
	Can be accessed if switch **SW2** on the control card is set to PTC.		
nO	☐ **[No]** (nO): Not used		
AS	☐ **[Always]** (AS): "PTC probe" faults are monitored permanently, even if the power supply is not connected (as long as the control remains connected to the power supply).		
rdS	☐ **[Power ON]** (rdS): "PTC probe" faults are monitored while the drive power supply is connected.		
rS	☐ **[Motor ON]** (rS): "PTC probe" faults are monitored while the motor power supply is connected.		
PtC1	❏ **[PTC1 probe]**		[No] (nO)
	Can be accessed if a VW3A3201 option card has been inserted.		
nO	☐ **[No]** (nO): Not used		
AS	☐ **[Always]** (AS): "PTC probe" faults are monitored permanently, even if the power supply is not connected (as long as the control remains connected to the power supply).		
rdS	☐ **[Power ON]** (rdS): "PTC probe" faults are monitored while the drive power supply is connected.		
rS	☐ **[Motor ON]** (rS): "PTC probe" faults are monitored while the motor power supply is connected.		
PtC2	❏ **[PTC2 probe]**		[No] (nO)
	Can be accessed if a VW3A3202 option card has been inserted.		
nO	☐ **[No]** (nO): Not used		
AS	☐ **[Always]** (AS): "PTC probe" faults are monitored permanently, even if the power supply is not connected (as long as the control remains connected to the power supply).		
rdS	☐ **[Power ON]** (rdS): "PTC probe" faults are monitored while the drive power supply is connected.		
rS	☐ **[Motor ON]** (rS): "PTC probe" faults are monitored while the motor power supply is connected.		

Code	Name/Description	Adjustment range	Factory setting
rSt-	**[FAULT RESET]**		
rSF	**❏ [Fault reset]**		[No] (nO)

Manual fault reset

nO	☐ **[No]** (nO): Function inactive.
LI1	☐ **[LI1]** (LI1) to **[LI6]** (LI6)
-	☐ **[LI7]** (LI7) to **[LI10]** (LI10): If VW3A3201 logic I/O card has been inserted
-	☐ **[LI11]** (LI11) to **[LI12]** (LI12): If VW3A3203 ESIM card has been inserted
-	☐ **[LI11]** (LI11) to **[LI14]** (LI14): If VW3A3202 extended I/O card has been inserted
C101	☐ **[C101]** (C101) to **[C115]** (C115): With integrated Modbus in [I/O profile] (IO)
-	☐ **[C201]** (C201) to **[C215]** (C215): With integrated CANopen in [I/O profile] (IO)
-	☐ **[C301]** (C301) to **[C315]** (C315): With a communication card in [I/O profile] (IO)
-	☐ **[C401]** (C401) to **[C415]** (C415): With a Controller Inside card in [I/O profile] (IO)
Cd00	☐ **[CD00]** (Cd00) to **[CD13]** (Cd13): In [I/O profile] (IO) can be switched with possible logic inputs
-	☐ **[CD14]** (Cd14) to **[CD15]** (Cd15): In [I/O profile] (IO) can be switched without logic inputs

Faults are reset when the assigned input or bit changes to active state, if the cause of the fault has disappeared.
The STOP/RESET button on the graphic display terminal performs the same function.
See pages 311 to 315 for a list of faults that can be reset manually.

rP	**❏ [Product reset]**	[No] (nO)

Parameter can only be accessed in [ACCESS LEVEL] = [Expert] mode.
Drive reinitialization. Can be used to reset all faults without having to disconnect the drive from the power supply.

nO	☐ **[No]** (nO): Function inactive
YES	☐ **[Yes]** (YES): Reinitialization. Press and hold down the "ENT" key for 2 s. The parameter changes back to [No] (nO) automatically as soon as the operation is complete. The drive can only be reinitialized when locked.

CAUTION

Make sure that the cause of the fault that led to the drive locking has been removed before reinitializing.
Failure to follow this instruction can result in equipment damage.

rPA	**❏ [Product reset assig.]**	[No] (nO)

Parameter can only be modified in [ACCESS LEVEL] = [Expert] mode.
Drive reinitialization via logic input. Can be used to reset all faults without having to disconnect the drive from the power supply. The drive is reinitialized on a rising edge (change from 0 to 1) of the assigned input. The drive can only be reinitialized when locked.

nO	☐ **[No]** (nO): Function inactive
LI1	☐ **[LI1]** (LI1) to **[LI6]** (LI6)
-	☐ **[LI7]** (LI7) to **[LI10]** (LI10): If VW3A3201 logic I/O card has been inserted
-	☐ **[LI11]** (LI11) to **[LI12]** (LI12): If VW3A3203 ESIM card has been inserted
LI14	☐ **[LI11]** (LI11) to **[LI14]** (LI14): If VW3A3202 extended I/O card has been inserted
	☐ **[LI11]** (LI11) to **[LI14]** (LI14): If VW3A3202 extended I/O card has been inserted

To assign reinitialization, press and hold down the "ENT" key for 2 s.

CAUTION

Make sure that the cause of the fault that led to the drive locking has been removed before reinitializing.
Failure to follow this instruction can result in equipment damage.

Code	Name/Description	Adjustment range	Factory setting
AtR-	**[AUTOMATIC RESTART]**		
AtR	❏ **[Automatic restart]**		[No] (nO)
nO	☐ **[No]** (nO): Function inactive		
YES	☐ **[Yes]** (YES): Automatic restart, after locking on a fault, if the fault has disappeared and the other operating conditions permit the restart. The restart is performed by a series of automatic attempts separated by increasingly longer waiting periods: 1 s, 5 s, 10 s, then 1 minute for the following attempts. The drive fault relay remains activated if this function is active. The speed reference and the operating direction must be maintained. Use 2-wire control ([2/3 wire control] (tCC) = [2 wire] (2C) and [2 wire type] (tCt) = [Level] (LEL) see page 166). **⚠ WARNING** **UNINTENDED EQUIPMENT OPERATION** **Check that an automatic restart will not endanger personnel or equipment in any way.** **Failure to follow this instruction can result in death or serious injury.** If the restart has not taken place once the configurable time tAr has elapsed, the procedure is aborted and the drive remains locked until it is turned off and then on again. The faults, which permit this function, are listed on page 314:		
tAr	❏ **[Max. restart time]**		[5 min] (5)
5	☐ **[5 min]** (5): 5 minutes		
10	☐ **[10 min]** (10): 10 minutes		
30	☐ **[30 min]** (30): 30 minutes		
1h	☐ **[1 hour]** (1h): 1 hour		
2h	☐ **[2 hours]** (2h): 2 hours		
3h	☐ **[3 hours]** (3h): 3 hours		
Ct	☐ **[Unlimited]** (Ct): Unlimited This parameter appears if [Automatic restart] (Atr) = [Yes] (YES). It can be used to limit the number of consecutive restarts on a recurrent fault.		

Motor thermal protection

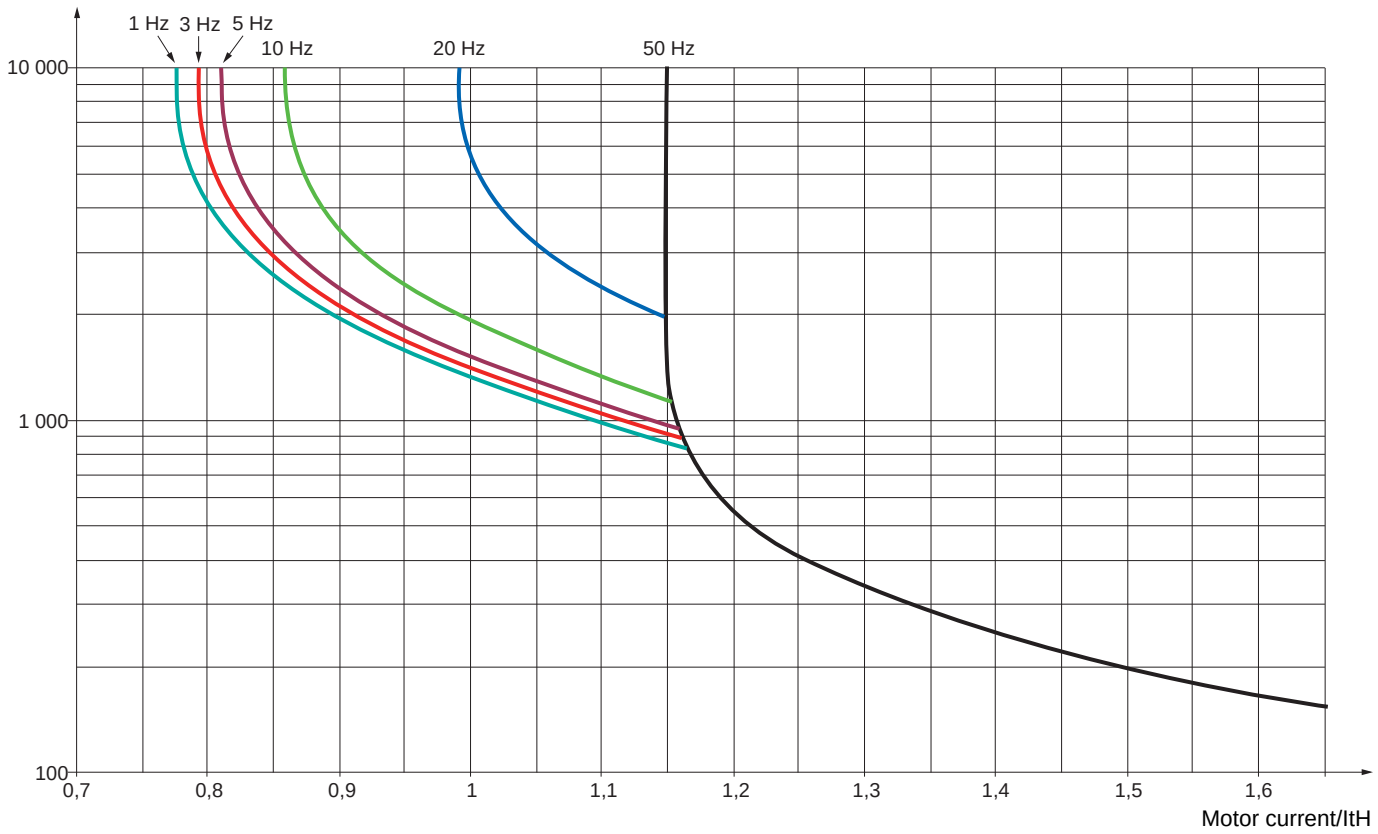
Function:

Thermal protection by calculating the I^2t.

Note: The memory of the motor thermal state is saved when the drive is switched off. The power-off time is used to recalculate the thermal state the next time the drive is turned on.

- Naturally-cooled motors:
  The tripping curves depend on the motor frequency.
- Force-cooled motors:
  Only the 50 Hz tripping curve needs to be considered, regardless of the motor frequency.

Trip time in seconds



Code	Name/Description	Adjustment range	Factory setting
tHt-	**[MOTOR THERMAL PROT.]**		
tHt	❏ **[Motor protect. type]** ☐ **[No]** (nO): No protection. ☐ **[Self cooled]** (ACL): For self-cooled motors ☐ **[Force-cool]** (FCL): For force-cooled motors **Note:** A fault trip will occur when the thermal state reaches 118% of the rated state and reactivation will occur when the state falls back below 100 %.		[Self cooled] (ACL)
ttd	❏ **[Motor therm. level]** (1) Trip threshold for motor thermal alarm (logic output or relay)	0 to 118 %	100 %
ttd2	❏ **[Motor2 therm. level]** Trip threshold for motor 2 thermal alarm (logic output or relay)	0 to 118 %	100 %
ttd3	❏ **[Motor3 therm. level]** Trip threshold for motor 3 thermal alarm (logic output or relay)	0 to 118 %	100 %
OLL	❏ **[Overload fault mgt]** Type of stop in the event of a motor thermal fault. ☐ **[Ignore]** (nO): Fault ignored. ☐ **[Freewheel]** (YES): Freewheel stop ☐ **[Per STT]** (Stt): Stop according to configuration of [Type of stop] (Stt) page 221, without fault tripping. In this case the fault relay does not open and the drive is ready to restart as soon as the fault disappears, according to the restart conditions of the active command channel (e.g. according to [2/3 wire control] (tCC) and [2 wire type] (tCt) page 166 if control is via the terminals). It is advisable to configure an alarm for this fault (assigned to a logic output, for example) in order to indicate the cause of the stop. ☐ **[fallback spd]** (LFF): Change to fallback speed, maintained as long as the fault persists and the run command has not been removed (2). ☐ **[Spd maint.]** (rLS): The drive maintains the speed being applied when the fault occurred, as long as the fault is present and the run command has not been removed (2). ☐ **[Ramp stop]** (rMP): Stop on ramp. ☐ **[Fast stop]** (FSt): Fast stop ☐ **[DC injection]** (dCI): DC injection stop. This type of stop cannot be used with certain other functions. See table on page 210.		[Freewheel] (YES)

(1) Parameter can also be accessed in the [1.3 SETTINGS] (SEt-) menu.
(2) Because, in this case, the fault does not trigger a stop, it is essential to assign a relay or logic output to its indication.

Parameter that can be modified during operation or when stopped.

Code	Name/Description	Adjustment range	Factory setting
OPL-	**[OUTPUT PHASE LOSS]**		
OPL	❏ **[Output Phase Loss]** ☐ **[No]** (nO): Function inactive. ☐ **[Yes]** (YES): Tripping on OPF fault with freewheel stop. ☐ **[Output cut]** (OAC): No fault triggered, but management of the output voltage in order to avoid an overcurrent when the link with the motor is re-established. **Note:** [Output Phase Loss] (OPL) is forced to [No] (nO) if [Motor control type] (Ctt) page 137 = [Sync. mot.] (SYn) or [Sync.CL] (FSY).		[Yes] (YES)
nO YES OAC			
Odt ( )	❏ **[OutPh time detect]** Time delay for taking the [Output Phase Loss] (OPL) fault into account.	0.5 to 10 s	0.5 s
IPL-	**[INPUT PHASE LOSS]**		
IPL	❏ **[Input phase loss]** ☐ **[Ignore]** (nO): Fault ignored, to be used when the drive is supplied via a single-phase supply or by the DC bus. ☐ **[Freewheel]** (YES): Fault, with freewheel stop. If one phase disappears, the drive switches to fault mode [Input phase loss] (IPL), but if 2 or 3 phases disappear, the drive continues to operate until it trips on an undervoltage fault.		[Freewheel] (YES)
nO YES			

( ) Parameter that can be modified during operation or when stopped.

Code	Name/Description	Adjustment range	Factory setting
OHL-	**[DRIVE OVERHEAT]**		
OHL	❏ **[Overtemp fault mgt]**		[Freewheel] (YES)
	Behavior in the event of the drive overheating ☐ **[Ignore]** (nO): Fault ignored. **CAUTION** **RISK OF DAMAGE TO EQUIPMENT** Inhibiting faults results in the drive not being protected. This invalidates the warranty. Check that the possible consequences do not present any risk. **Failure to follow this instruction can result in equipment damage.** ☐ **[Freewheel]** (YES): Freewheel stop ☐ **[Per STT]** (Stt): Stop according to configuration of [Type of stop] (Stt) page 221, without fault tripping. In this case the fault relay does not open and the drive is ready to restart as soon as the fault disappears, according to the restart conditions of the active command channel (e.g. according to [2/3 wire control] (tCC) and [2 wire type] (tCt) page 166 if control is via the terminals). It is advisable to configure an alarm for this fault (assigned to a logic output, for example) in order to indicate the cause of the stop. ☐ **[fallback spd]** (LFF): Change to fallback speed, maintained as long as the fault persists and the run command has not been removed (1). ☐ **[Spd maintain.]** (rLS): The drive maintains the speed being applied when the fault occurred, as long as the fault is present and the run command has not been removed (1). ☐ **[Ramp stop]** (rMP): Stop on ramp. ☐ **[Fast stop]** (FSt): Fast stop ☐ **[DC injection]** (dCI): DC injection stop. This type of stop cannot be used with certain other functions. See table on page 210. **Note:** A fault trip will occur when the thermal state reaches 118% of the rated state and reactivation will occur when the state falls back below 90%.		
tHA	❏ **[Drv therm. state al]** Trip threshold for drive thermal alarm (logic output or relay)	0 to 118 %	100 %

Parameter that can be modified during operation or when stopped.

(1) Because, in this case, the fault does not trigger a stop, it is essential to assign a relay or logic output to its indication.

Deferred stop on thermal alarm

This function is designed in particular for elevator applications. It prevents the elevator stopping between two floors if the drive or motor overheats, by authorizing operation until the next stop. At the next stop, the drive is locked until the thermal state falls back to a value, which undershoots the set threshold by 20%. E.g. A trip threshold set at 80% enables reactivation at 60%.
One thermal state threshold must be defined for the drive, and one thermal state threshold for the motor(s), which will trip the deferred stop.

Code	Name/Description	Adjustment range	Factory setting
SAt -	**[THERMAL ALARM STOP]**		
SAt nO YES	❏ **[Thermal alarm stop]** ☐ **[No]** (nO): Function inactive (in this case, the following parameters cannot be accessed) ☐ **[Yes]** (YES): Freewheel stop on drive or motor thermal alarm **CAUTION** **The drive and motor are no longer protected in the event of thermal alarm stops.** **This invalidates the warranty.** Check that the possible consequences do not present any risk. **Failure to follow this instruction can result in equipment damage.**		[No] (nO)
tHA ( )	❏ **[Drv therm. state al]** Thermal state threshold of the drive tripping the deferred stop.	0 to 118 %	100 %
ttd ( )	❏ **[Motor therm. level]** Thermal state threshold of the motor tripping the deferred stop.	0 to 118 %	100 %
ttd2 ( )	❏ **[Motor2 therm. level]** Thermal state threshold of the motor 2 tripping the deferred stop.	0 to 118 %	100 %
ttd3 ( )	❏ **[Motor3 therm. level]** Thermal state threshold of the motor 3 tripping the deferred stop.	0 to 118 %	100 %

( ) Parameter that can be modified during operation or when stopped.

Code	Name/Description	Adjustment range	Factory setting
EtF-	**[EXTERNAL FAULT]**		
EtF	❏ **[External fault ass.]**		[No] (nO)
nO	☐ **[No]** (nO): Function inactive.		
LI1	☐ **[LI1]** (LI1)		
-	:		
-	:		
-	☐ **[...]** (...): See the assignment conditions on page 204. If the assigned bit is at inactice state, there is no external fault. If the assigned bit is at active state, there is an external fault. Logic can be configured via [External fault config] (LEt) if a logic input has been assigned.		
LEt	❏ **[External fault config]**		[Active high] (HIG)
	Parameter can be accessed if the external fault has been assigned to a logic input. It defines the positive or negative logic of the input assigned to the fault.		
LO	☐ **[Active low]** (LO): Fault on falling edge (change from 1 to 0) of the assigned input		
HIG	☐ **[Active high]** (HIG): Fault on rising edge (change from 0 to 1) of the assigned input		
EPL	❏ **[External fault mgt]**		[Freewheel] (YES)
	Type of stop in the event of an external fault		
nO	☐ **[Ignore]** (nO): Fault ignored.		
YES	☐ **[Freewheel]** (YES): Freewheel stop		
Stt	☐ **[Per STT]** (Stt): Stop according to configuration of [Type of stop] (Stt) page 221, without fault tripping. In this case the fault relay does not open and the drive is ready to restart as soon as the fault disappears, according to the restart conditions of the active command channel (e.g. according to [2/3 wire control] (tCC) and [2 wire type] (tCt) page 166 if control is via the terminals). It is advisable to configure an alarm for this fault (assigned to a logic output, for example) in order to indicate the cause of the stop.		
LFF	☐ **[fallback spd]** (LFF): Change to fallback speed, maintained as long as the fault persists and the run command has not been removed (1).		
rLS	☐ **[Spd maint.]** (rLS): The drive maintains the speed being applied when the fault occurred, as long as the fault is present and the run command has not been removed (1).		
rMP	☐ **[Ramp stop]** (rMP): Stop on ramp.		
FSt	☐ **[Fast stop]** (FSt): Fast stop		
dCI	☐ **[DC injection]** (dCI): DC injection stop. This type of stop cannot be used with certain other functions. See table on page 210.		

(1) Because, in this case, the fault does not trigger a stop, it is essential to assign a relay or logic output to its indication.

Code	Name/Description	Adjustment range	Factory setting
USb-	**[UNDERVOLTAGE MGT]**		
USb	**❑ [UnderV. fault mgt]**		[Flt&R1open] (0)
	Behavior of the drive in the event of an undervoltage ☐ **[Flt&R1open]** (0): Fault and fault relay open. ☐ **[Flt&R1close]** (1): Fault and fault relay closed. ☐ **[Alarm]** (2): Alarm and fault relay remains closed. The alarm can be assigned to a logic output or a relay.		
UrES	**❑ [Mains voltage]**	According to drive voltage rating	According to drive voltage rating
	Rated voltage of the line supply in V. For ATV71L●●●M3Z: ☐ **[200V ac]** (200): 200 Volts AC ☐ **[220V ac]** (220): 220 Volts AC ☐ **[240V ac]** (240): 240 Volts AC ☐ **[260V ac]** (260): 260 Volts AC (factory setting) For ATV71L●●●N4Z: ☐ **[380V ac]** (380): 380 Volts AC ☐ **[400V ac]** (400): 400 Volts AC ☐ **[440V ac]** (440): 440 Volts AC ☐ **[460V ac]** (460): 460 Volts AC ☐ **[480V ac]** (480): 480 Volts AC (factory setting)		
USL	**❑ [Undervoltage level]**		
	Undervoltage fault trip level setting in V. The adjustment range and factory setting are determined by the drive voltage rating and the [Mains voltage] (UrES) value.		
USt	**❑ [Undervolt. time out]**	0.2 s to 999.9 s	0.2 s
	Time delay for taking undervoltage fault into account		
StP	**❑ [UnderV. prevention]**		[No] (nO)
	Behavior in the event of the undervoltage fault prevention level being reached ☐ **[No]** (nO): No action ☐ **[DC Maintain]** (MMS): This stop mode uses the inertia to maintain the DC bus voltage as long as possible. ☐ **[Ramp stop]** (rMP): Stop following an adjustable ramp [Max stop time] (StM). ☐ **[Lock-out]** (LnF): Lock (freewheel stop) without fault		
tSM	**❑ [UnderV. restart tm]**	1.0 s to 999.9 s	1.0 s
	Time delay before authorizing the restart after a complete stop for [UnderV. prevention] (StP) = [Ramp stop] (rMP), if the voltage has returned to normal.		
UPL	**❑ [Prevention level]**		
	Undervoltage fault prevention level setting in V, which can be accessed if [UnderV. prevention] (StP) is not [No] (nO). The adjustment range and factory setting are determined by the drive voltage rating and the [Mains voltage] (UrES) value.		
StM ( )	**❑ [Max stop time]**	0.01 to 60.00 s	1.00 s
	Ramp time if [UnderV. prevention] (StP) = [Ramp stop] (rMP).		
tbS ( )	**❑ [DC bus maintain tm]**	1 to 9999 s	9999 s
	DC bus maintain time if [UnderV. prevention] (StP) = [DC Maintain] (MMS).		

( ) Parameter that can be modified during operation or when stopped.

Code	Name/Description	Adjustment range	Factory setting
tIt-	**[IGBT TESTS]**		
Strt nO YES	❑ **[IGBT test]** ☐ **[No]** (nO): No test ☐ **[Yes]** (YES): The IGBTs are tested on power up and every time a run command is sent. These tests cause a slight delay (a few ms). In the event of a fault, the drive will lock. The following faults can be detected: - Drive output short-circuit (terminals U-V-W): SCF display. - IGBT faulty: xtF, where x indicates the number of the IGBT concerned. - IGBT short-circuited: x2F, where x indicates the number of the IGBT concerned.		[No] (nO)

Code	Name/Description	Adjustment range	Factory setting
LFL-	**[4-20mA LOSS]**		
LFL2	❏ **[AI2 4-20mA loss]**		[Ignore] (nO)
nO	☐ **[Ignore]** (nO): Fault ignored. This configuration is the only one possible if [AI2 min. value] (CrL2) page 172 is not greater than 3 mA or if [AI2 Type] (AI2t) page 172 = [Voltage] (10U).		
YES	☐ **[Freewheel]** (YES): Freewheel stop		
Stt	☐ **[Per STT]** (Stt): Stop according to configuration of [Type of stop] (Stt) page 221, without fault tripping. In this case the fault relay does not open and the drive is ready to restart as soon as the fault disappears, according to the restart conditions of the active command channel (e.g. according to [2/3 wire control] (tCC) and [2 wire type] (tCt) page 166 if control is via the terminals). It is advisable to configure an alarm for this fault (assigned to a logic output, for example) in order to indicate the cause of the stop.		
LFF	☐ **[fallback spd]** (LFF): Change to fallback speed, maintained as long as the fault persists and the run command has not been removed (1).		
rLS	☐ **[Spd maint.]** (rLS): The drive maintains the speed being applied when the fault occurred, as long as the fault is present and the run command has not been removed (1).		
rMP	☐ **[Ramp stop]** (rMP): Stop on ramp.		
FSt	☐ **[Fast stop]** (FSt): Fast stop		
dCI	☐ **[DC injection]** (dCI): DC injection stop. This type of stop cannot be used with certain other functions. See table on page 210.		
LFL3	❏ **[AI3 4-20mA loss]**		[Ignore] (nO)
nO	☐ **[Ignore]** (nO): Fault ignored. This configuration is the only one possible if [AI3 min. value] (CrL3) page 173 is not greater than 3 mA.		
YES	☐ **[Freewheel]** (YES): Freewheel stop		
Stt	☐ **[Per STT]** (Stt): Stop according to configuration of [Type of stop] (Stt) page 221, without fault tripping. In this case the fault relay does not open and the drive is ready to restart as soon as the fault disappears, according to the restart conditions of the active command channel (e.g. according to [2/3 wire control] (tCC) and [2 wire type] (tCt) page 166 if control is via the terminals). It is advisable to configure an alarm for this fault (assigned to a logic output, for example) in order to indicate the cause of the stop.		
LFF	☐ **[fallback spd]** (LFF): Change to fallback speed, maintained as long as the fault persists and the run command has not been removed (1).		
rLS	☐ **[Spd maint.]** (rLS): The drive maintains the speed being applied when the fault occurred, as long as the fault is present and the run command has not been removed (1).		
rMP	☐ **[Ramp stop]** (rMP): Stop on ramp.		
FSt	☐ **[Fast stop]** (FSt): Fast stop		
dCI	☐ **[DC injection]** (dCI): DC injection stop. This type of stop cannot be used with certain other functions. See table on page 210.		
LFL4	❏ **[AI4 4-20mA loss]**		[Ignore] (nO)
nO	☐ **[Ignore]** (nO): Fault ignored. This configuration is the only one possible if [AI4 min. value] (CrL4) page 174 is not greater than 3 mA or if [AI4 Type] (AI4t) page 174 = [Voltage] (10U).		
YES	☐ **[Freewheel]** (YES): Freewheel stop		
Stt	☐ **[Per STT]** (Stt): Stop according to configuration of [Type of stop] (Stt) page 221, without fault tripping. In this case the fault relay does not open and the drive is ready to restart as soon as the fault disappears, according to the restart conditions of the active command channel (e.g. according to [2/3 wire control] (tCC) and [2 wire type] (tCt) page 166 if control is via the terminals). It is advisable to configure an alarm for this fault (assigned to a logic output, for example) in order to indicate the cause of the stop.		
LFF	☐ **[fallback spd]** (LFF): Change to fallback speed, maintained as long as the fault persists and the run command has not been removed (1).		
rLS	☐ **[Spd maint.]** (rLS): The drive maintains the speed being applied when the fault occurred, as long as the fault is present and the run command has not been removed (1).		
rMP	☐ **[Ramp stop]** (rMP): Stop on ramp.		
FSt	☐ **[Fast stop]** (FSt): Fast stop		
dCI	☐ **[DC injection]** (dCI): DC injection stop. This type of stop cannot be used with certain other functions. See table on page 210.		

(1) Because, in this case, the fault does not trigger a stop, it is essential to assign a relay or logic output to its indication.

[1.8 FAULT MANAGEMENT] (FLt-)

Parameter can be accessed in [Expert] mode.

Code	Name/Description	Adjustment range	Factory setting
InH-	**[FAULT INHIBITION]**		
InH	❏ **[Fault inhibit assign.]**		[No] (nO)

To assign fault inhibit, press and hold down the “ENT” key for 2 s.

CAUTION

Inhibiting faults results in the drive not being protected. This invalidates the warranty.
Check that the possible consequences do not present any risk.
Failure to follow this instruction can result in equipment damage.

nO
LI1
-
-
-

☐ **[No]** (nO): Function inactive
☐ **[LI1]** (LI1)
:
:
☐ **[...]** (...): See the assignment conditions on page 204.
If the assigned input or bit is at inactive state, fault monitoring is active. If the assigned input or bit is at active state, fault monitoring is inactive. Active faults are reset on a rising edge (change from 0 to 1) of the assigned input or bit.

Note: The "Power Removal" function and any faults that prevent any form of operation are not affected by this function.
A list of faults affected by this function appears on pages 311 to 316.

Code	Name/Description	Adjustment range	Factory setting
CLL-	**[COM. FAULT MANAGEMENT]**		
CLL	❏ **[Network fault mgt]**		[Freewheel] (YES)
	Behavior of the drive in the event of a communication fault with a communication card.		
nO	☐ **[Ignore]** (nO): Fault ignored.		
YES	☐ **[Freewheel]** (YES): Freewheel stop		
Stt	☐ **[Per STT]** (Stt): Stop according to configuration of [Type of stop] (Stt) page 221, without fault tripping. In this case the fault relay does not open and the drive is ready to restart as soon as the fault disappears, according to the restart conditions of the active command channel (e.g. according to [2/3 wire control] (tCC) and [2 wire type] (tCt) page 166 if control is via the terminals). It is advisable to configure an alarm for this fault (assigned to a logic output, for example) in order to indicate the cause of the stop.		
LFF	☐ **[fallback spd]** (LFF): Change to fallback speed, maintained as long as the fault persists and the run command has not been removed (1).		
rLS	☐ **[Spd maint.]** (rLS): The drive maintains the speed being applied when the fault occurred, as long as the fault is present and the run command has not been removed (1).		
rMP	☐ **[Ramp stop]** (rMP): Stop on ramp.		
FSt	☐ **[Fast stop]** (FSt): Fast stop		
dCI	☐ **[DC injection]** (dCI): DC injection stop. This type of stop cannot be used with certain other functions. See table on page 210.		
COL	❏ **[CANopen fault mgt]**		[Freewheel] (YES)
	Behavior of the drive in the event of a communication fault with integrated CANopen.		
nO	☐ **[Ignore]** (nO): Fault ignored.		
YES	☐ **[Freewheel]** (YES): Freewheel stop		
Stt	☐ **[Per STT]** (Stt): Stop according to configuration of [Type of stop] (Stt) page 221, without fault tripping. In this case the fault relay does not open and the drive is ready to restart as soon as the fault disappears, according to the restart conditions of the active command channel (e.g. according to [2/3 wire control] (tCC) and [2 wire type] (tCt) page 166 if control is via the terminals). It is advisable to configure an alarm for this fault (assigned to a logic output, for example) in order to indicate the cause of the stop.		
LFF	☐ **[fallback spd]** (LFF): Change to fallback speed, maintained as long as the fault persists and the run command has not been removed (1).		
rLS	☐ **[Spd maint.]** (rLS): The drive maintains the speed being applied when the fault occurred, as long as the fault is present and the run command has not been removed (1).		
rMP	☐ **[Ramp stop]** (rMP): Stop on ramp.		
FSt	☐ **[Fast stop]** (FSt): Fast stop		
dCI	☐ **[DC injection]** (dCI): DC injection stop. This type of stop cannot be used with certain other functions. See table on page 210.		
SLL	❏ **[Modbus fault mgt]**		[Freewheel] (YES)
	Behavior of the drive in the event of a communication fault with integrated Modbus		
nO	☐ **[Ignore]** (nO): Fault ignored.		
YES	☐ **[Freewheel]** (YES): Freewheel stop		
Stt	☐ **[Per STT]** (Stt): Stop according to configuration of [Type of stop] (Stt) page 221, without fault tripping. In this case the fault relay does not open and the drive is ready to restart as soon as the fault disappears, according to the restart conditions of the active command channel (e.g. according to [2/3 wire control] (tCC) and [2 wire type] (tCt) page 166 if control is via the terminals). It is advisable to configure an alarm for this fault (assigned to a logic output, for example) in order to indicate the cause of the stop.		
LFF	☐ **[fallback spd]** (LFF): Change to fallback speed, maintained as long as the fault persists and the run command has not been removed (1).		
rLS	☐ **[Spd maint.]** (rLS): The drive maintains the speed being applied when the fault occurred, as long as the fault is present and the run command has not been removed (1).		
rMP	☐ **[Ramp stop]** (rMP): Stop on ramp.		
FSt	☐ **[Fast stop]** (FSt): Fast stop		
dCI	☐ **[DC injection]** (dCI): DC injection stop. This type of stop cannot be used with certain other functions. See table on page 210.		

(1) Because, in this case, the fault does not trigger a stop, it is essential to assign a relay or logic output to its indication.

Code	Name/Description	Adjustment range	Factory setting
Sdd-	**[ENCODER FAULT]** Can be accessed if the encoder option card has been inserted and the encoder is used for speed feedback (see page 142).		
Sdd	❏ **[Load slip detection]** ☐ **[No]** (nO): Fault not monitored. Only the alarm may be assigned to a logic output or a relay. ☐ **[Yes]** (YES): Fault monitored. [Load slip detection] (Sdd) is forced to [Yes] (YES) if [Motor control type] (Ctt) page 137 = [FVC] (FUC) or [Sync.CL] (FSY). The fault is triggered by comparison with the ramp output and the speed feedback, and is only effective for speeds greater than 10% of the [Rated motor freq.] (FrS), see page 143. In the event of a fault, the drive will switch to a freewheel stop, and if the brake logic control function has been configured, the brake command will be set to 0.		[No] (nO)
ECC	❏ **[Encoder coupling]** ☐ **[No]** (nO): Fault not monitored. ☐ **[Yes]** (YES): Fault monitored. If the brake logic control function has been configured, the factory setting changes to [Yes] (YES). [Encoder coupling] (ECC) = [Yes] (YES) is only possible if [Load slip detection] (Sdd) = [Yes] (YES) and [Motor control type] (Ctt) page 137 = [FVC] (FUC) or [Sync.CL] (FSY) and [Brake assignment] (bLC) page 233 is not [No] (nO). The fault monitored is the break in the mechanical coupling of the encoder. In the event of a fault, the drive will switch to a freewheel stop, and if the brake logic control function has been configured, the brake command will be set to 0.		[No] (nO)
ECt	❏ **[Encoder check time]** Encoder faults filtering time. This parameter can be accessed if [Encoder coupling] (ECC) = [Yes] (YES)	2 to 10 s	2 s
tId-	**[TORQUE OR I LIM. DETECT]**		
SSb	❏ **[Trq/I limit. stop]** Behavior in the event of switching to torque or current limitation ☐ **[Ignore]** (nO): Fault ignored. ☐ **[Freewheel]** (YES): Freewheel stop ☐ **[Per STT]** (Stt): Stop according to configuration of [Type of stop] (Stt) page 221, without fault tripping. In this case the fault relay does not open and the drive is ready to restart as soon as the fault disappears, according to the restart conditions of the active command channel (e.g. according to [2/3 wire control] (tCC) and [2 wire type] (tCt) page 166 if control is via the terminals). It is advisable to configure an alarm for this fault (assigned to a logic output, for example) in order to indicate the cause of the stop. ☐ **[fallback spd]** (LFF): Change to fallback speed, maintained as long as the fault persists and the run command has not been removed (1). ☐ **[Spd maint.]** (rLS): The drive maintains the speed being applied when the fault occurred, as long as the fault is present and the run command has not been removed (1). ☐ **[Ramp stop]** (rMP): Stop on ramp. ☐ **[Fast stop]** (FSt): Fast stop ☐ **[DC injection]** (dCI): DC injection stop. This type of stop cannot be used with certain other functions. See table on page 210.		[Ignore] (nO)
StO	❏ **[Trq/I limit. time out]** (If fault has been configured). Time delay for taking SSF "Limitation" fault into account.	0 to 9999 ms	1000 ms

Parameter that can be modified during operation or when stopped.

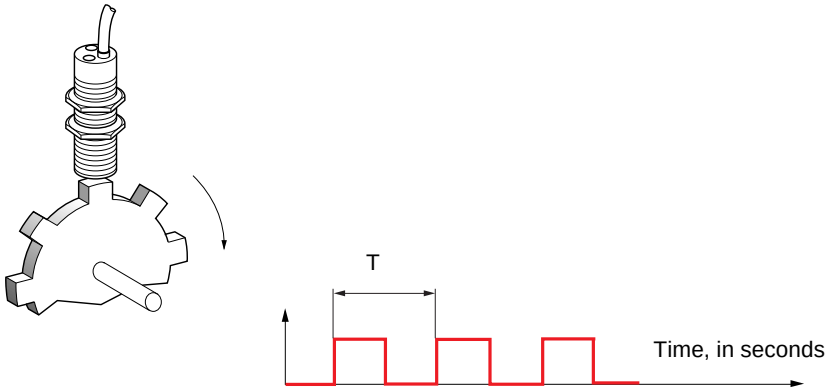
(1) Because, in this case, the fault does not trigger a stop, it is essential to assign a relay or logic output to its indication.

Use of the "Pulse input" to measure the speed of rotation of the motor

This function uses the "Pulse input" from the VW3A3202 extension card and can, therefore, only be used if this card has been inserted and if the "Pulse input" is not being used for another function.

Example of use

A notched disc driven by the motor and connected to a proximity sensor can be used to generate a frequency signal that is proportional to the speed of rotation of the motor.



When applied to the "Pulse input", this signal supports:

- Measurement and display of the motor speed: signal frequency = 1/T. This frequency is displayed by means of the [Pulse in. work. freq.] (FqS) parameter, page 121 or 123.
- Overspeed detection (if the measured speed exceeds a preset threshold, the drive will trip on a fault).
- Brake failure detection, if brake logic control has been configured: If the speed does not drop sufficiently quickly following a command to engage the brake, the drive will trip on a fault. This function can be used to detect worn brake linings.
- Detection of a speed threshold that can be adjusted using [Pulse warning thd.] (FqL) page 135 and is assignable to a relay or logic output, see page 182.

Code	Name/Description	Adjustment range	Factory setting
FqF-	**[FREQUENCY METER]** Can be accessed if a VW3A3202 option card has been inserted		
FqF nO YES	❏ **[Frequency meter]** Activation of the speed measurement function. ☐ **[No]** (nO): Function inactive, In this case, none of the function parameters can be accessed. ☐ **[Yes]** (YES): Function active, assignment only possible if no other functions have been assigned to the "Pulse input".		[No] (nO)
FqC	❏ **[Pulse scal. divisor]** • Scaling factor for the "Pulse input" (divisor). The frequency measured is displayed by means of the [Pulse in. work. freq.] (FqS) parameter, page 121 or 123.	1.0 to 100.0	1.0
FqA nO -	❏ **[Overspd. pulse thd.]** Activation and adjustment of overspeed monitoring: [Overspeed] (SOF) fault. ☐ **[No]** (nO): No overspeed monitoring ☐ **1 Hz to 30.00 Hz**: Adjustment of the frequency tripping threshold on the "Pulse input" divided by [Pulse scal. divisor] (FqC)		[No] (nO)
tdS	❏ **[Pulse overspd delay]** Time delay for taking overspeed fault into account	0.0 s to 10.0 s	0.0 s
Fdt nO -	❏ **[Level fr. pulse ctrl]** Activation and adjustment of monitoring for the Pulse input (speed feedback): [Speed fdback loss] (SPF) fault ☐ **[No]** (nO): No monitoring of speed feedback ☐ **0.1 Hz to 500.0 Hz**: Adjustment of the motor frequency threshold for tripping a speed feedback fault (difference between the estimated frequency and the measured speed)		[No] (nO)
FqE nO -	❏ **[Pulse thd. wo Run]** Activation and adjustment of brake failure monitoring: [Brake feedback] (brF). If brake logic control [Brake assignment] (bLC) page 233 is not configured, this parameter is forced to [No] (nO). ☐ **[No]** (nO): No brake monitoring ☐ **1 Hz to 1000 Hz**: Adjustment of the motor frequency threshold for tripping abrake failure fault (detection of speeds other than zero).		[No] (nO)
tqb	❏ **[Pulse thd. wo Run]** Time delay for taking brake failure fault into account.	0.0 s to 10.0 s	0.0 s

Code	Name/Description	Adjustment range	Factory setting
brP-	**[DB RES. PROTECTION]**		
brO	❏ **[DB res. protection]**		[No] (nO)
	☐ **[No]** (nO): No braking resistor protection (thereby preventing access to the other function parameters). ☐ **[Alarm]** (YES): Alarm. The alarm may be assigned to a logic output or a relay (see page 182). ☐ **[Fault]** (FLt): Switch to fault (bOF) with locking of drive (freewheel stop). ☞ **Note:** The thermal state of the resistor can be displayed on the graphic display terminal. It is calculated for as long as the drive control remains connected to the power supply.		
brP	❏ **[DB Resistor Power]**	0.1 kW (0.13 HP) to 1000 kW (1333 HP)	0.1 kW (0.5 HP)
	This parameter can be accessed if [DB res. protection] (brO) is not [No] (nO). Rated power of the resistor used.		
brU	❏ **[DB Resistor value]**	0.1 to 200 ohms	0.1 ohms
	This parameter can be accessed if [DB res. protection] (brO) is not [No] (nO). Rated value of the braking resistor in ohms.		
tnF-	**[AUTO TUNING FAULT]**		
tnL	❏ **[Autotune fault mgt]**		[Freewheel] (YES)
	☐ **[Ignore]** (nO): Fault ignored. ☐ **[Freewheel]** (YES): Freewheel stop ☐ **[Per STT]** (Stt): Stop according to the type of stop selected by [Type of stop] (Stt) page 221. ☐ **[fallback spd]** (LFF): Fallback speed ☐ **[Spd maint.]** (rLS): Maintain speed ☐ **[Ramp stop]** (rMP): Stop on ramp. ☐ **[Fast stop]** (FSt): Fast stop. ☐ **[DC injection]** (dCI): DC injection stop		

Parameter that can be modified during operation or when stopped.

Card pairing

Function can only be accessed in [Expert] mode.

This function is used to detect whenever a card has been replaced or the software has been modified in any way.

When a pairing password is entered, the parameters of the cards currently inserted are stored. On every subsequent power-up these parameters are verified and in the event of a discrepancy the drive locks in HCF fault mode. Before the drive can be restarted you must revert to the original situation or re-enter the pairing password.

The following parameters are verified:

- The type of card for: all cards.
- The software version for: the two control cards, the VW3A3202 extension card, the Controller Inside card and the communication cards.
- The serial number for: both control cards.

Code	Name/Description	Adjustment range	Factory setting
PPI-	**[CARDS PAIRING]**		
PPI	❑ **[Pairing password]** The [OFF] (OFF) value signifies that the card pairing function is inactive. The [ON] (On) value signifies that card pairing is active and that an access code must be entered in order to start the drive in the event of a card pairing fault. As soon as the code has been entered the drive is unlocked and the code changes to [ON] (On). - The PPI code is an unlock code known only to Schneider Electric Product Support.	OFF to 9999	[OFF] (OFF)

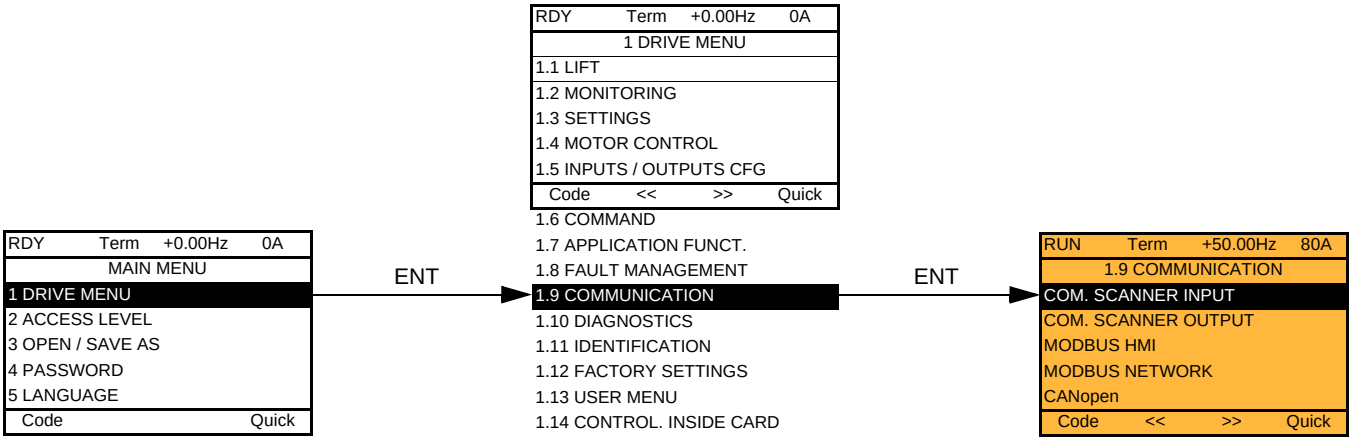
Code	Name/Description		Adjustment range	Factory setting
LFF-	**[FALLBACK SPEED]**			
LFF	❏ **[Fallback speed]** Selection of the fallback speed.		0 to 1,600 Hz	0 Hz
FSt-	**[RAMP DIVIDER]**			
dCF ↻	❏ **[Ramp divider]** The ramp that is enabled (dEC or dE2) is then divided by this coefficient when stop requests are sent. Value 0 corresponds to a minimum ramp time.	(1)	0 to 10	4
dCI-	**[DC INJECTION]**			
IdC ↻	❏ **[DC inject. level 1]** Level of DC injection braking current activated via logic input or selected as stop mode. **CAUTION** Check that the motor will withstand this current without overheating. **Failure to follow this instruction can result in equipment damage.**	(1) (3)	0.1 to 1.41 In (2)	0.64 In (2)
tdI ↻	❏ **[DC injection time 1]** Maximum current injection time [DC inject. level 1] (IdC). After this time the injection current becomes [DC inject. level 2] (IdC2).	(1) (3)	0.1 to 30 s	0.5 s
IdC2 ↻	❏ **[DC inject. level 2]** Injection current activated by logic input or selected as stop mode, once period of time [DC injection time 1] (tdI) has elapsed. **CAUTION** Check that the motor will withstand this current without overheating. **Failure to follow this instruction can result in equipment damage.**	(1) (3)	0.1 In (2) to [DC inject. level 1] (IdC)	0.5 In (2)
tdC ↻	❏ **[DC injection time 2]** Maximum injection time [DC inject. level 2] (IdC2) for injection, selected as stop mode only. (Can be accessed if [Type of stop] (Stt) = [DC injection] (dCI)).	(1) (3)	0.1 to 30 s	0.5 s

(1) Parameter can also be accessed in the [1.3 SETTINGS] (SEt-) and [1.7 APPLICATION FUNCT.] (FUn-) menus.
(2) In corresponds to the rated drive current indicated in the Installation Manual and on the drive nameplate.
(3) Note: These settings are independent of the [AUTO DC INJECTION] (AdC-) function.

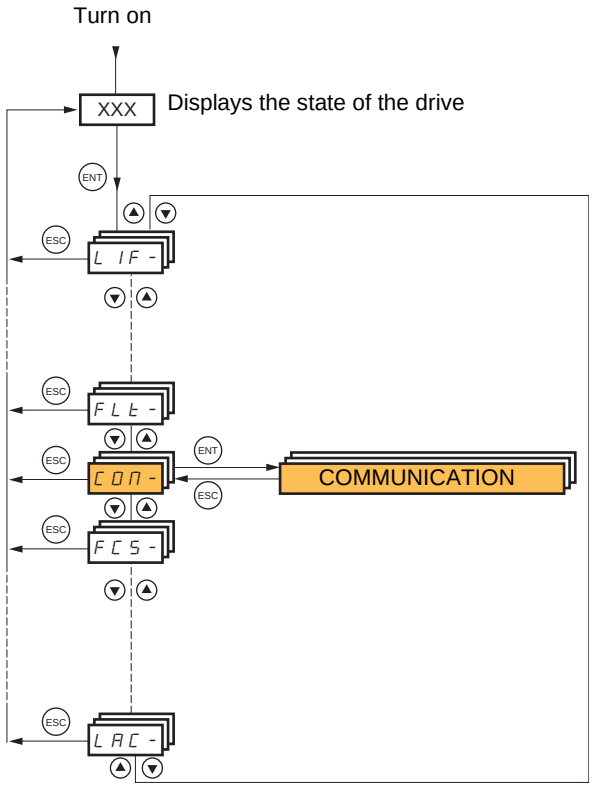
↻ Parameter that can be modified during operation or when stopped.

[1.9 COMMUNICATION] (COM-)

With graphic display terminal:



With integrated display terminal:



Code	Name/Description	Adjustment range	Factory setting
	[COM. SCANNER INPUT] **Only accessible via graphic display terminal**		
nMA1	❑ **[Scan. IN1 address]** Address of the 1st input word		3201
nMA2	❑ **[Scan. IN2 address]** Address of the 2nd input word.		8604
nMA3	❑ **[Scan. IN3 address]** Address of the 3rd input word.		0
nMA4	❑ **[Scan. IN4 address]** Address of the 4th input word.		0
nMA5	❑ **[Scan. IN5 address]** Address of the 5th input word.		0
nMA6	❑ **[Scan. IN6 address]** Address of the 6th input word.		0
nMA7	❑ **[Scan. IN7 address]** Address of the 7th input word.		0
nMA8	❑ **[Scan. IN8 address]** Address of the 8th input word.		0
	[COM. SCANNER OUTPUT] **Only accessible via graphic display terminal**		
nCA1	❑ **[Scan.Out1 address]** Address of the 1st output word		8501
nCA2	❑ **[Scan.Out2 address]** Address of the 2nd output word.		8602
nCA3	❑ **[Scan.Out3 address]** Address of the 3rd output word.		0
nCA4	❑ **[Scan.Out4 address]** Address of the 4th output word.		0
nCA5	❑ **[Scan.Out5 address]** Address of the 5th output word.		0
nCA6	❑ **[Scan.Out6 address]** Address of the 6th output word.		0
nCA7	❑ **[Scan.Out7 address]** Address of the 7th output word.		0
nCA8	❑ **[Scan.Out8 address]** Address of the 8th output word.		0

Code	Name/Description	Adjustment range	Factory setting
Md2-	**[MODBUS HMI]** Communication with the graphic display terminal		
tbr2	❑ **[HMI baud rate]** 9.6 or 19.2 kbps via the integrated display terminal. 9600 or 19200 bauds via the graphic display terminal. The graphic display terminal only operates if [HMI baud rate] (tbr2) = 19200 bauds (19.2 kbps). In order for any change in the assignment of [HMI baud rate] (tbr2) to be taken into account you must: - Provide confirmation in a confirmation window if using the graphic display terminal - Press the ENT key for 2 s if using the integrated display terminal		19.2 kbps
tFO2	❑ **[HMI format]** Read-only parameter, cannot be modified.		8E1
Md1-	**[MODBUS NETWORK]**		
Add	❑ **[Modbus Address]** OFF to 247		OFF
ANOA	❑ **[Modbus add Prg C.]** Modbus address of the Controller Inside card OFF at 247 This parameter can be accessed if the Controller Inside card has been inserted and depending on its configuration (please consult the specific documentation).		OFF
ANOC	❑ **[Modbus add Com.C.]** Modbus address of the communication card OFF to 247 This parameter can be accessed if a communication card has been inserted and depending on its configuration (please consult the specific documentation).		OFF
tbr	❑ **[Modbus baud rate]** 4.8 - 9.6 - 19.2 - 38.4 kbps on the integrated display terminal. 4800, 9600, 19200 or 38400 bauds on the graphic display terminal.		19.2 kbps
tFO	❑ **[Modbus format]** 8O1 - 8E1 - 8n1, 8n2		8E1
ttO	❑ **[Modbus time out]** 0.1 to 30 s		10.0 s
CnO-	**[CANopen]**		
AdCO	❑ **[CANopen address]** 0 to 127		0
bdCO	❑ **[CANopen bit rate]** 50 - 125 - 250 - 500 kbps - 1 Mbps		125 kbps
ErCO	❑ **[Error code]** Read-only parameter, cannot be modified.		

[COMMUNICATION CARD]

See the specific documentation for the card used.

[FORCED LOCAL]

❏ [Forced local assign.]

[No] (nO)

- ☐ **[No]** (nO): Function inactive
- ☐ **[LI1]** (LI1) to **[LI6]** (LI6)
- ☐ **[LI7]** (LI7) to **[LI10]** (LI10): If VW3A3201 logic I/O card has been inserted
- ☐ **[LI11]** (LI11) to **[LI12]** (LI12): If VW3A3203 ESIM card has been inserted
- ☐ **[LI11]** (LI11) to **[LI14]** (LI14): If VW3A3202 extended I/O card has been inserted

Forced local mode is active when the input is at active state.
[Forced local assign.] (FLO) is forced to [No] (nO) if [Profile] (CHCF) page 205 = [I/O profile] (IO).

❏ [Forced local Ref.]

[No] (nO)

- ☐ **[No]** (nO): Not assigned (control via the terminals with zero reference).
- ☐ **[AI1]** (AI1): Analog input
- ☐ **[AI2]** (AI2): Analog input
- ☐ **[AI3]** (AI3): Analog input, if VW3A3202 extension card has been inserted.
- ☐ **[AI4]** (AI4): Analog input, if VW3A3202 extension card has been inserted.
- ☐ **[HMI]** (LCC): Assignment of the reference and command to the graphic display terminal.
  Reference: [HMI Frequency ref.] (LFr), page 121, control: RUN/STOP/FWD/REV buttons.
- ☐ **[RP]** (PI): Frequency input, if VW3A3202 card has been inserted.
- ☐ **[Encoder]** (PG): Encoder input, if encoder card has been inserted.

If the reference is assigned to an analog input, [RP] (PI) or [Encoder] (PG) the command is automatically assigned to the terminals as well (logic inputs).

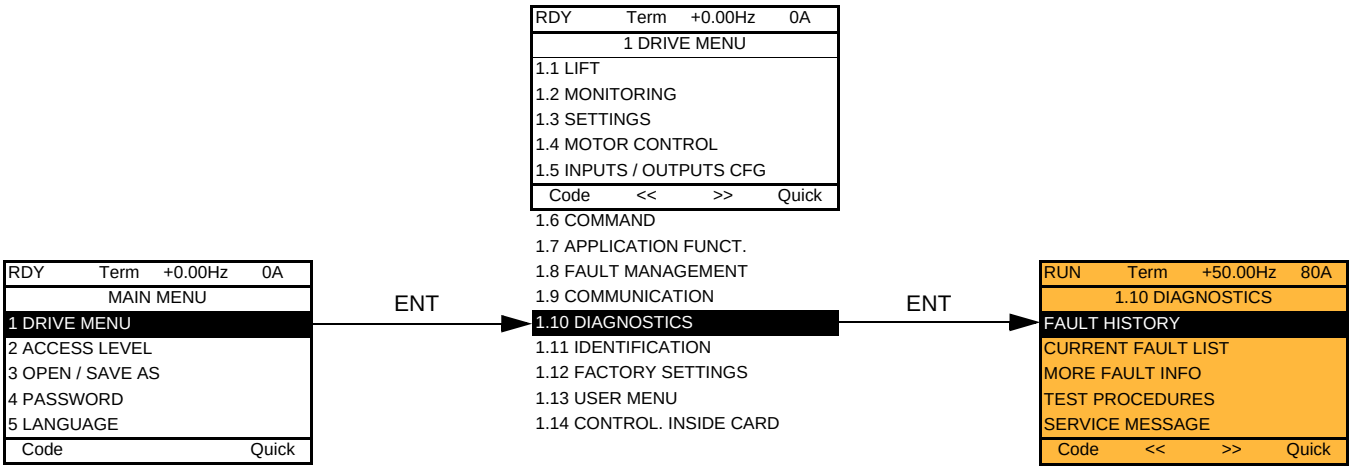
❏ [Time-out forc. local]

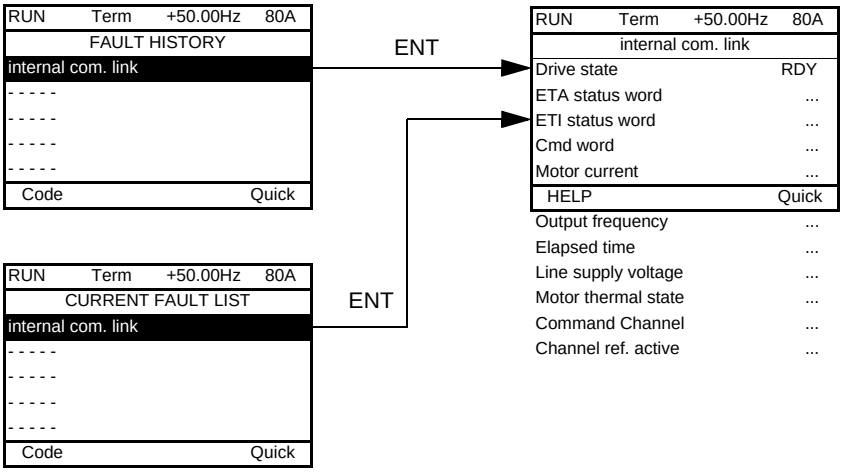
10.0 s

0.1 to 30 s
This parameter can be accessed if [Forced local assign.] (FLO) is not [No] (nO).
Time delay before communication monitoring is resumed on leaving forced local mode.

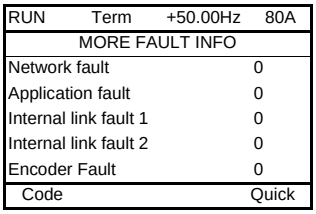
[1.10 DIAGNOSTICS]

This menu can only be accessed with the graphic display terminal.





This screen indicates the state of the drive at the moment the selected fault occurred.



This screen indicates the number of communication faults, for example, with the option cards.
Number: from 0 to 65535

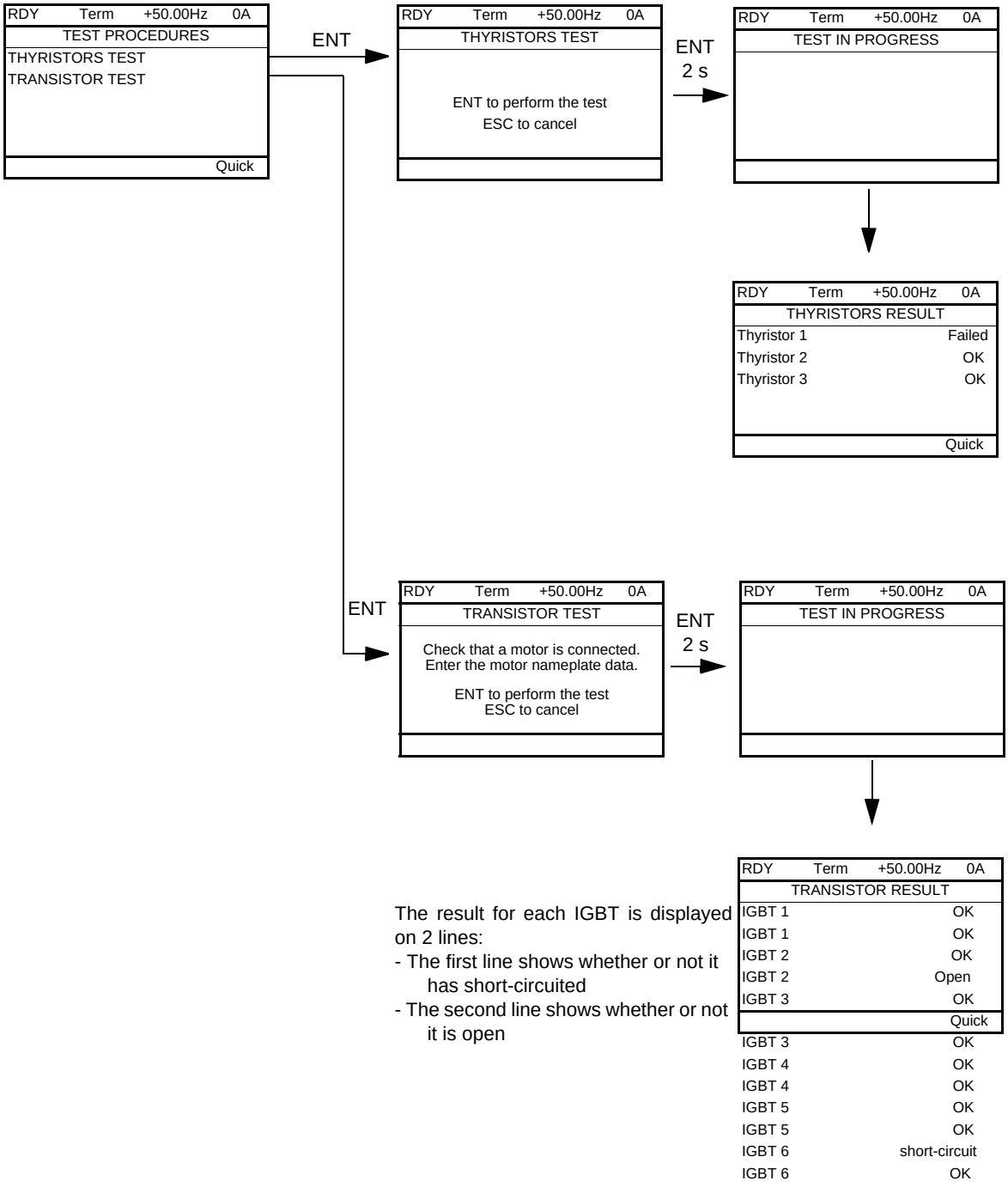
For [Encoder Fault], which is only visible if a VW3 A3 408, VW3 A3 409,VW3 A3 410 or VW3 A3 411 card has been inserted, the figure displayed is one of the fault codes summarized in the table on the next page.

Summary table of types of [Encoder Fault]

Code	Description of the error
0	No error, except if the control section has a separate power supply, in which case the power section must be turned on to display the actual code.
1	Internal UE/MC communication fault (CRC fault).
2	Internal UE/MC communication fault (time out).
16	Synchronization error (PLL error).
17	Encoder signal cut or short-circuited.
18	PUC emulation fault.
19	Resolver: Unstable feedback signal.
20	Internal card communication fault.
21	Resolver: Feedback signal too weak.
22	Resolver: Feedback signal too strong.
23	Encoder overcurrent.
32	EnDAT: CRC error.
33	EnDAT: Start bit not detected.
34	EnDAT: EEP access error.
35	EnDAT: Incorrect EEP value.
48	Hiperface: Incoherent SinCos signal.
49	Hiperface: Time out.
50	Hiperface: Unknown encoder.
51	Hiperface: CRC error.
64	SinCos: Incoherent SinCos signal.
80	SSI: Parity error.
81	SSI: Invalid data.
96	The position is not available.
4096	ABZ Esim: Top Z error.

[1.10 DIAGNOSTICS]

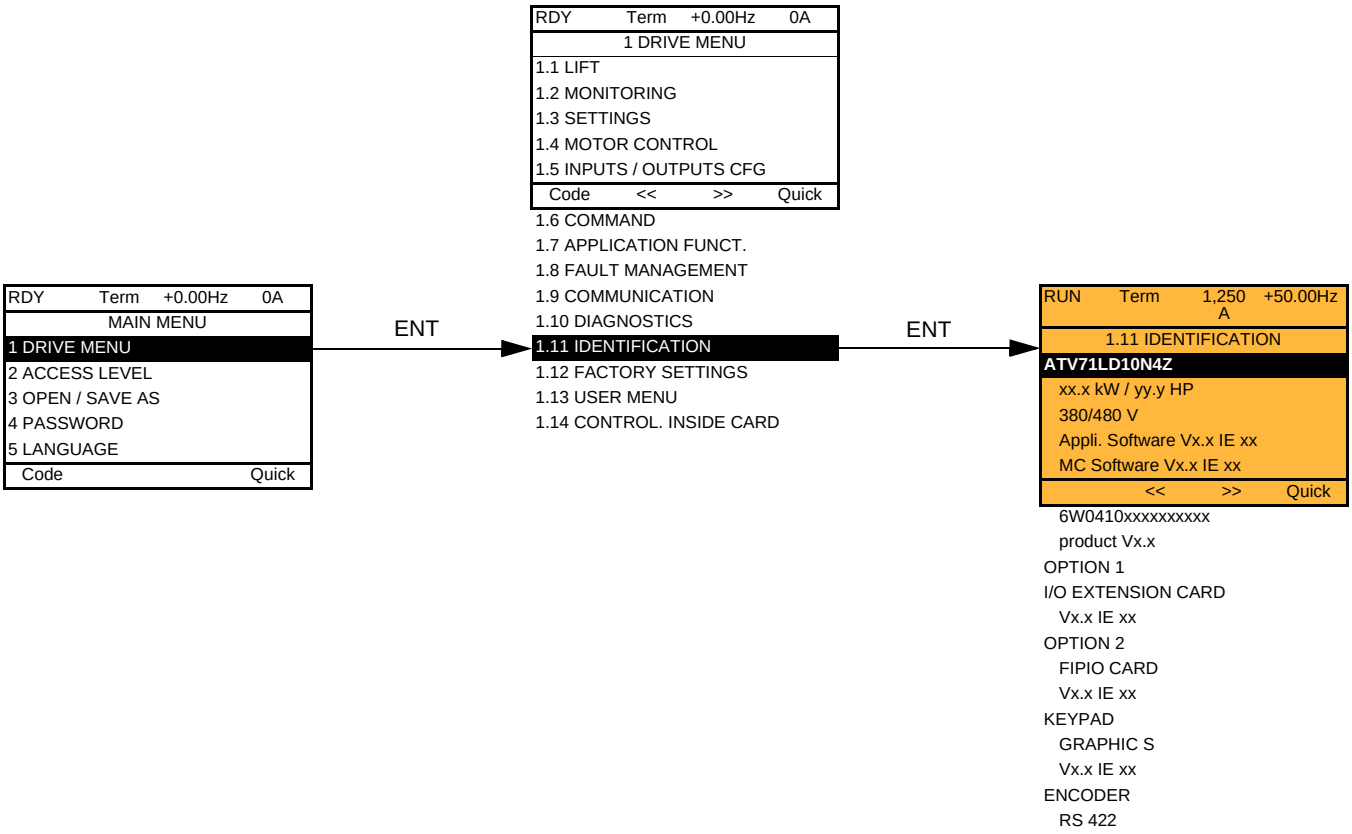
[THYRISTORS TEST] is only accessible for ATV71LD48N4Z drives.



The result for each IGBT is displayed on 2 lines:
- The first line shows whether or not it has short-circuited
- The second line shows whether or not it is open

Note: To start the tests, press and hold down (2 s) the ENT key.

[1.11 IDENTIFICATION]

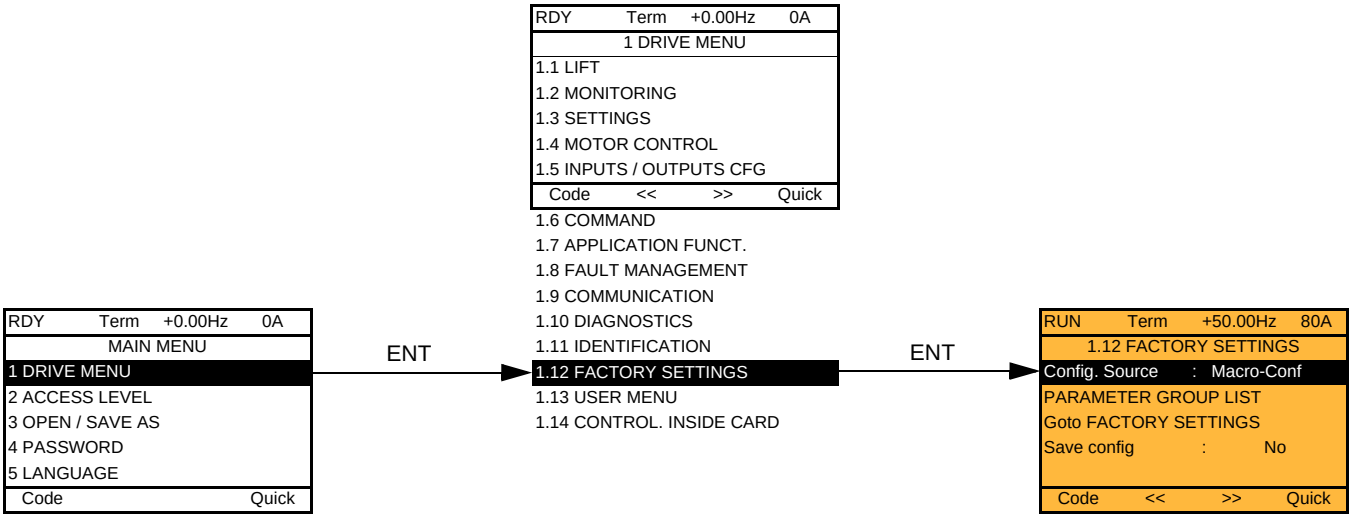


The [1.11 IDENTIFICATION] menu can only be accessed on the graphic display terminal.
This is a read-only menu that cannot be configured. It enables the following information to be displayed:

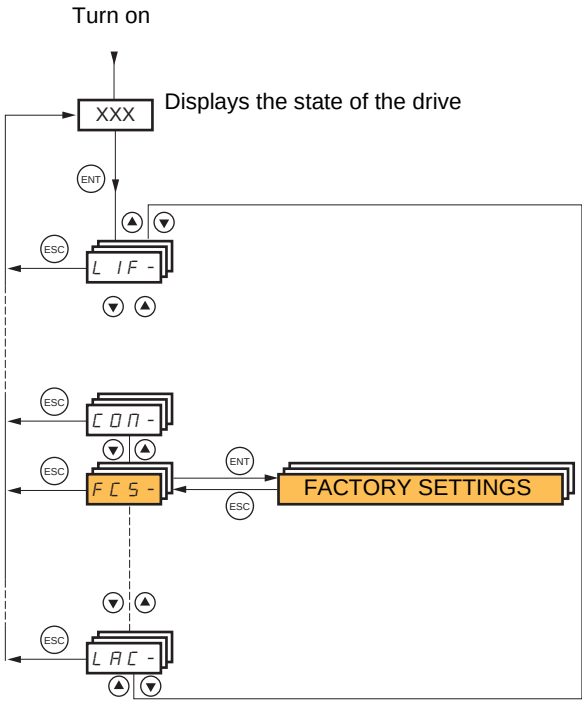
- Drive reference, power rating and voltage
- Drive software version
- Drive serial number
- Type of options present, with their software version.

[1.12 FACTORY SETTINGS] (FCS-)

With graphic display terminal:



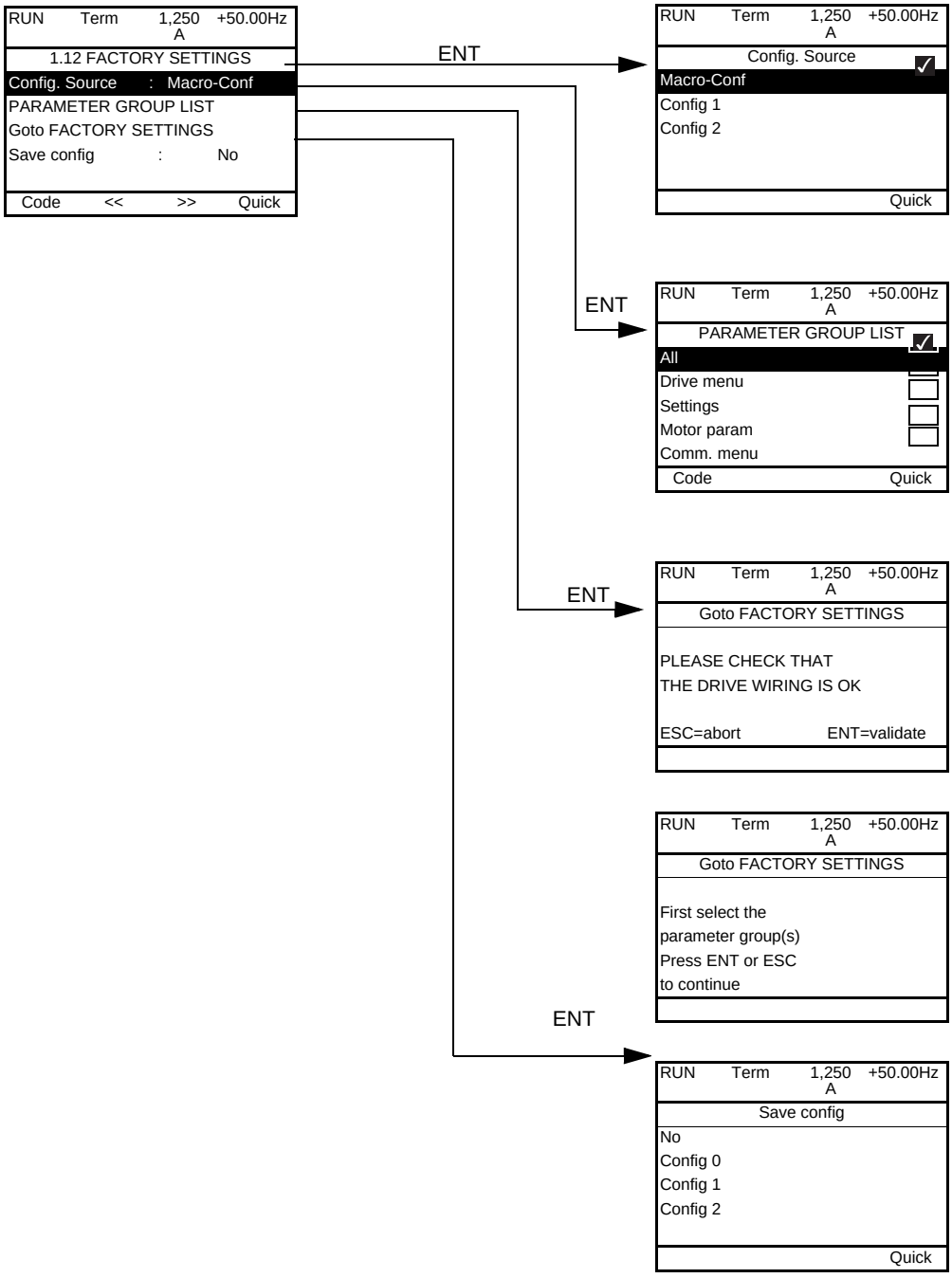
With integrated display terminal:



The [1.12 FACTORY SETTINGS] (FCS-) menu is used to:

- Replace the current configuration with the factory configuration or a configuration saved previously.
  All or part of the current configuration can be replaced: Select a group of parameters in order to select the menus you wish to load with the selected source configuration.
- Save the current configuration to a file.

[1.12 FACTORY SETTINGS] (FCS-)



Selection of source configuration

Selection of the menus to be replaced

Note: In factory configuration and after a return to "factory settings", [PARAMETER GROUP LIST] will be empty.

Command to return to "factory settings"

This window appears if no group of parameters is selected.

[1.12 FACTORY SETTINGS] (FCS-)

Code	Name/Description
FCSI	❏ **[Config. Source]** Choice of source configuration. ☐ **[Macro-Conf]** (InI) Factory configuration, return to selected macro configuration. ☐ **[Config 1]** (CFG1) ☐ **[Config 2]** (CFG2) If the configuration switching function is configured, it will not be possible to access [Config 1] (CFG1) and [Config 2] (CFG2).
FrY-	❏ **[PARAMETER GROUP LIST]** Selection of menus to be loaded ☐ **[All]** (ALL): All parameters ☐ **[Drive menu]** (drM): The [1 DRIVE MENU] menu without [1.9 COMMUNICATION] and [1.14 CONTROL INSIDE MENU]. In the [7 DISPLAY CONFIG.] menu, [Return std name] page 305 returns to [No]. ☐ **[Settings]** (SEt): The [1.3 SETTINGS] menu without the [IR compensation] (UFr), [Slip compensation] (SLP) and [Mot. therm. current] (ItH) parameters. ☐ **[Motor param]** (MOt): Motor parameters, see list below. The following options can only be accessed if [Config. Source] (FCSI) = [Macro-Conf] (InI): ☐ **[Comm. menu]** (COM): The [1.9 COMMUNICATION] menu without either [Scan. IN1 address] (nMA1) to [Scan. IN8 address] (nMA8) or [Scan.Out1 address] (nCA1) to [Scan.Out8 address] (nCA8). ☐ **[Control Inside menu]** (PLC): The [1.14 CONTROL INSIDE MENU] menu. ☐ **[Monitor config.]** (MOn): The [6 MONITORING CONFIG.] menu. ☐ **[Display config.]** (dIS): the [7 DISPLAY CONFIG.] menu. See the multiple selection procedure on page 24 for the integrated display terminal and page 15 for the graphic display terminal. **Note:** In factory configuration and after a return to "factory settings", [PARAMETER GROUP LIST] will be empty.
GFS	❏ **[Goto FACTORY SETTINGS]** It is only possible to revert to the factory settings if at least one group of parameters has previously been selected. With the integrated display terminal: - No - Yes: The parameter changes back to nO automatically as soon as the operation is complete. With the graphic display terminal: See the previous page.
SCSI	❏ **[Save config]** ☐ **[No]** (nO): ☐ **[Config 0]** (Str0): Press the "ENT" key for 2 s. ☐ **[Config 1]** (Str1): Press the "ENT" key for 2 s. ☐ **[Config 2]** (Str2): Press the "ENT" key for 2 s. The active configuration to be saved does not appear for selection. For example, if the active configuration is [Config 0] (Str0), only [Config 1] (Str1) and [Config 2] (Str2) appear. The parameter changes back to [No] (nO) automatically as soon as the operation is complete.

List of motor parameters

[1.4 MOTOR CONTROL] (drC-) menu:

[Rated motor power] (nPr) - [Rated motor volt.] (UnS) - [Rated mot. current] (nCr) - [Rated motor freq.] (FrS) - [Rated motor speed] (nSP) - [Auto-tuning] (tUn) - [Auto tuning status] (tUS) - [Angle auto-test] (ASA) - [Angle offset value] (ASU) - [U0] (U0) à [U5] (U5) - [Freq pt 1on 5pt V/F] (F1) to [F5] (F5) - [V. constant power] (UCP) - [Freq. Const. Power] (FCP) - [Nominal I sync.] (nCrS) - [Nom motor spdsync] (nSPS) - [Pole pairs] (PPnS) - [Syn. EMF constant] (PHS) - [Autotune L d-axis] (LdS) - [Autotune L q-axis] (LqS) - [Cust. stator R syn] (rSAS) - [IR compensation] (UFr) - [Slip compensation] (SLP) - motor parameters that can be accessed in [Expert] mode, pages 146, 147 and 149.

[1.3 SETTINGS] (SEt-) menu:

[Mot. therm. current] (ItH)

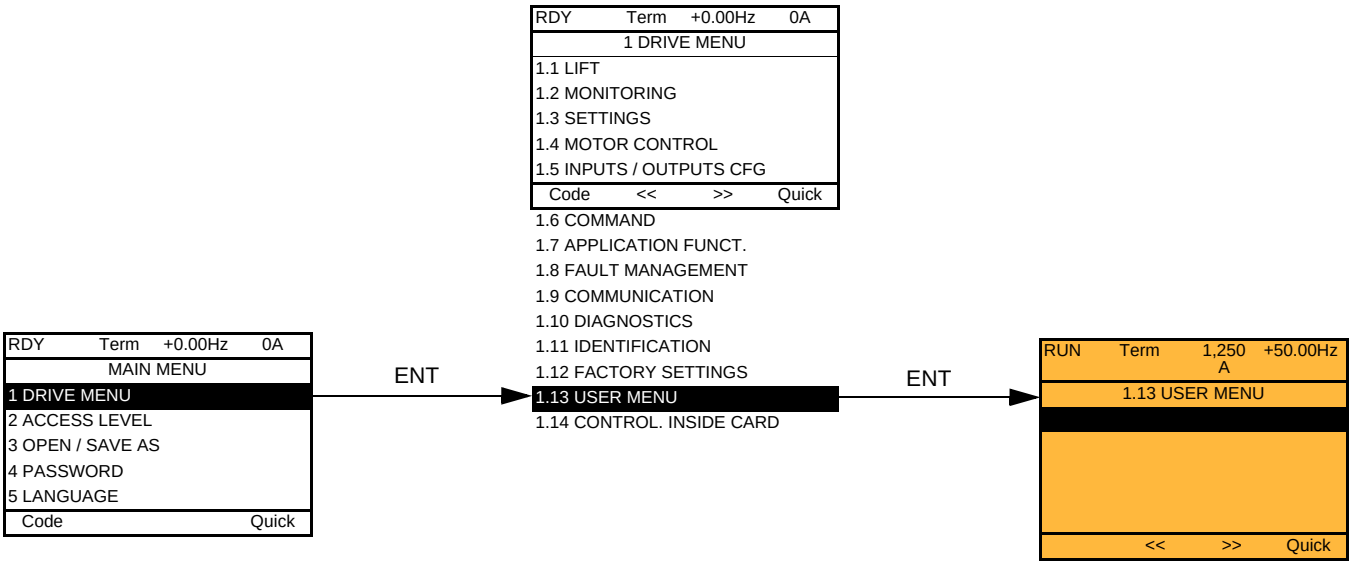
Example of total return to factory settings

1. [Config. Source] (FCSI) = [Macro-conf] (InI)
2. [PARAMETER GROUP LIST] (FrY-) = [All] (ALL)
3. [Goto FACTORY SETTINGS] (GFS = YES)

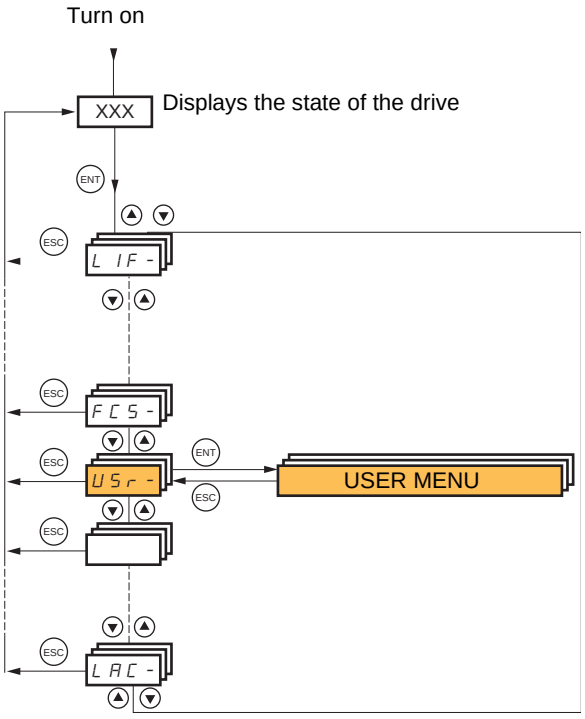
[1.13 USER MENU] (USr-)

This menu contains the parameters selected in the [7 DISPLAY CONFIG.] menu on page 304.

With graphic display terminal:



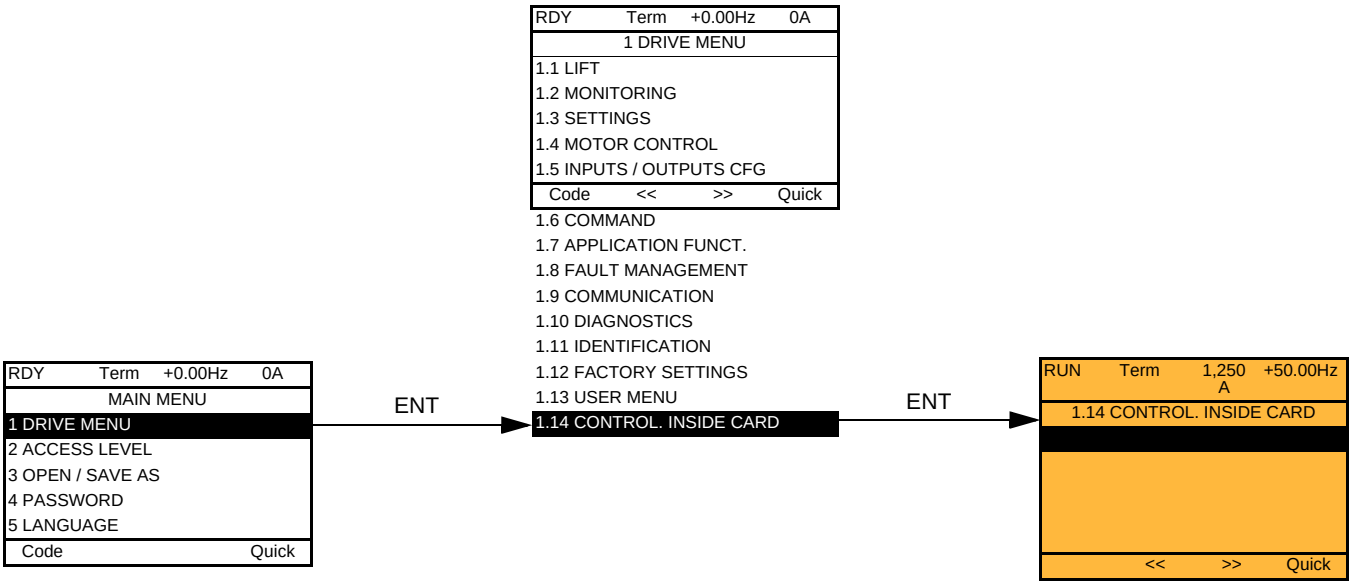
With integrated display terminal:



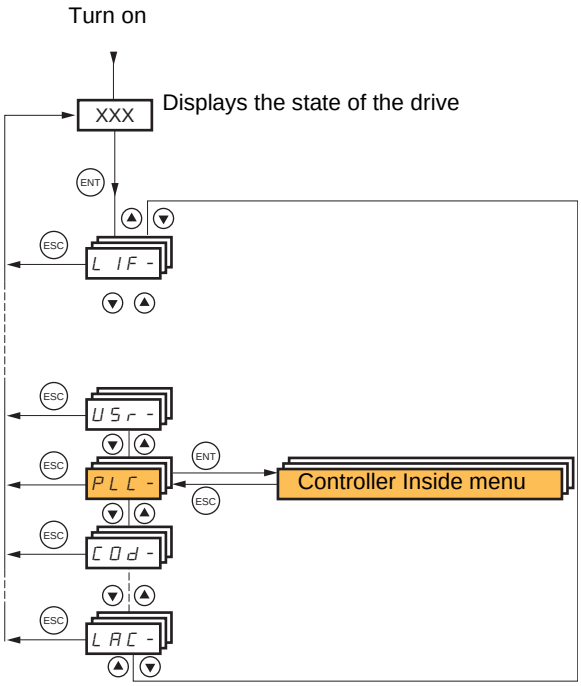
[1.14 CONTROL. INSIDE CARD] (PLC-)

This menu can only be accessed if a Controller Inside card has been inserted. Refer to the documentation specific to this card.

With graphic display terminal:

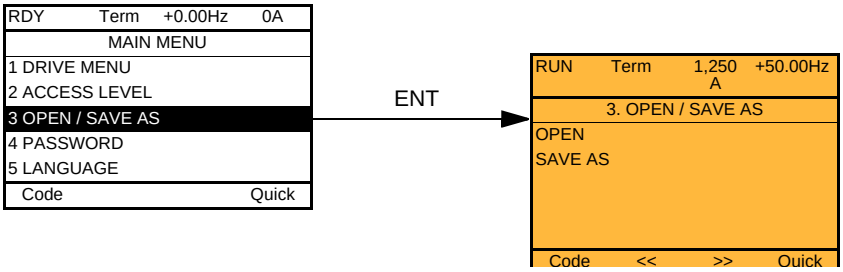


With integrated display terminal:



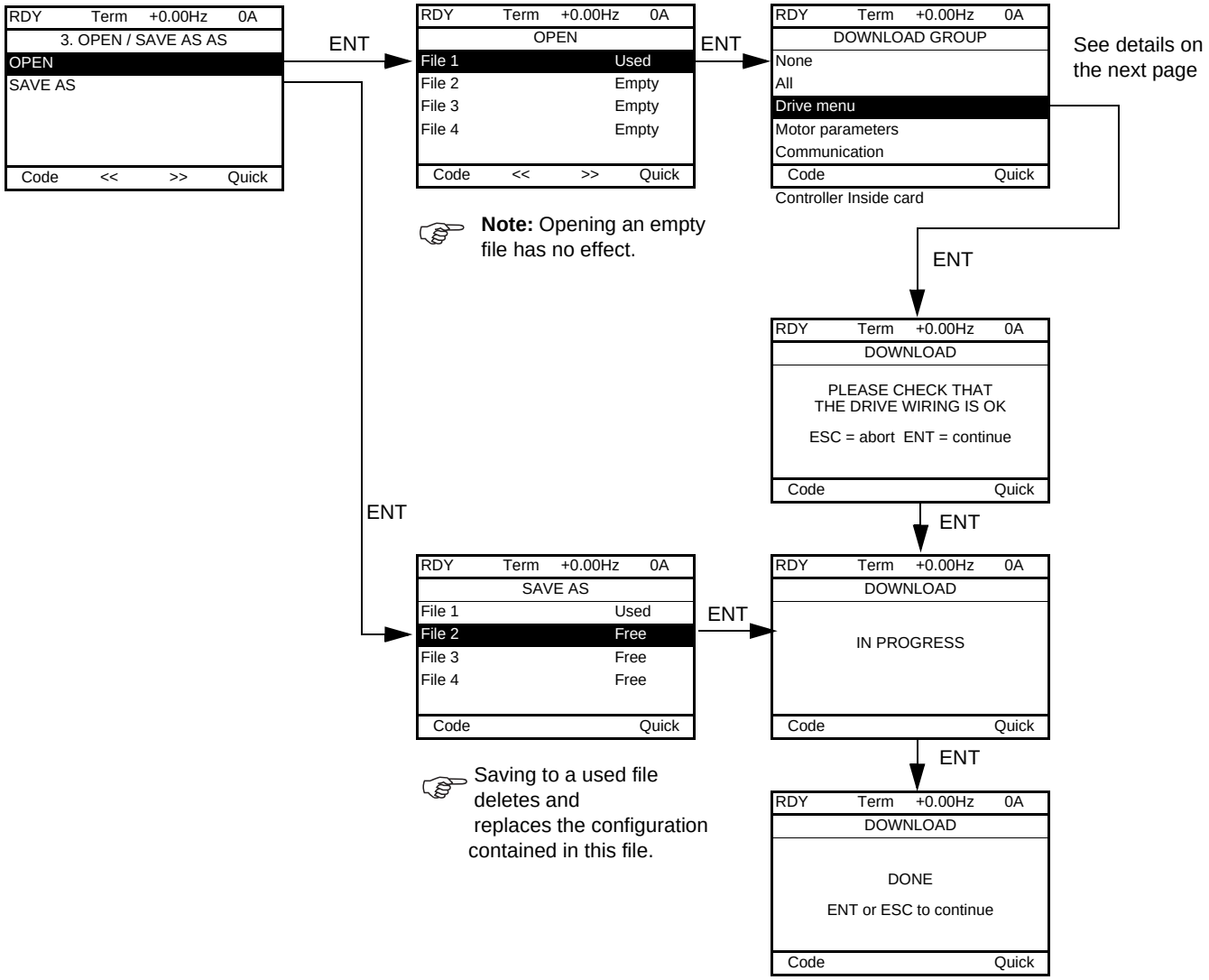
[3 OPEN/SAVE AS]

This menu can only be accessed with the graphic display terminal.



[OPEN]: To download one of the 4 files from the graphic display terminal to the drive.
[SAVE AS]: To download the current drive configuration to the graphic display terminal.

Note: The transfer from the graphic display terminal to the drive (and vice versa) can only be carried out while the motor is stopped.



Various messages may appear when the download is requested:

- [IN PROGRESS]
- [DONE]
- Error messages if download not possible
- [Motor parameters are NOT COMPATIBLE. Do you want to continue?]: In this case the download is possible, but the parameters will be restricted.

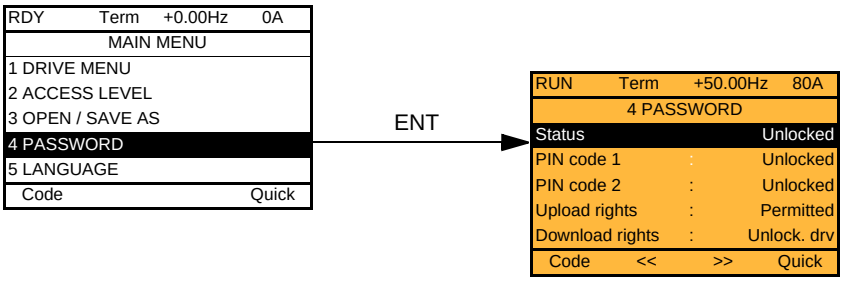
[3 OPEN/SAVE AS]

[DOWNLOAD GROUP]

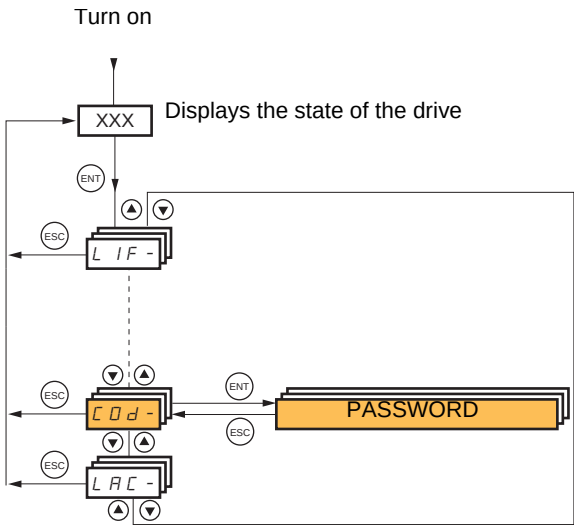
[None]:		No parameters
[All]:		All parameters in all menus
[Drive menu]:		The entire [1 DRIVE MENU] without [1.9 COMMUNICATION] and [1.14 CONTROL. INSIDE CARD].
[Motor parameters]:	[Rated motor power] (nPr)	In the [1.4 MOTOR CONTROL] (drC-) menu
	[Rated motor volt.] (UnS)	
	[Rated mot. current] (nCr)	
	[Rated motor freq.] (FrS)	
	[Rated motor speed] (nSP)	
	[Auto tuning] (tUn)	
	[Auto tuning status] (tUS)	
	[Angle auto-test] (ASA)	
	[Angle offset value] (ASU)	
	[U0] (U0) to [U5] (U5)	
	[F1] (F1) to [F5] (F5)	
	[V. constant power] (UCP)	
	[Freq. Const Power] (FCP)	
	[Nominal I sync.] (nCrS)	
	[Nom motor spdsync] (nSPS)	
	[Pole pairs] (PPnS)	
	[Syn. EMF constant] (PHS)	
	[Autotune L d-axis] (LdS)	
	[Autotune L q-axis] (LqS)	
	[Cust. stator R syn] (rSAS)	
	[Motor torque] (tqS)	
	[Measured Ld-axis] (LdMS)	
	[Measured Lq-axis] (LqMS)	
	[IR compensation] (UFr)	
	[Slip compensation] (SLP)	
	The motor parameters that can be accessed in [Expert] mode, pages 146, 147 and 149.	
	[Mot. therm. current] (ItH)	In the [1.3 SETTINGS] (SEt-) menu
[Communication]:		All the parameters in the [1.9 COMMUNICATION] menu
[Control Inside card]:		All the parameters in the [1.14 CONTROL. INSIDE CARD] menu

[4. PASSWORD] (COd-)

With graphic display terminal:

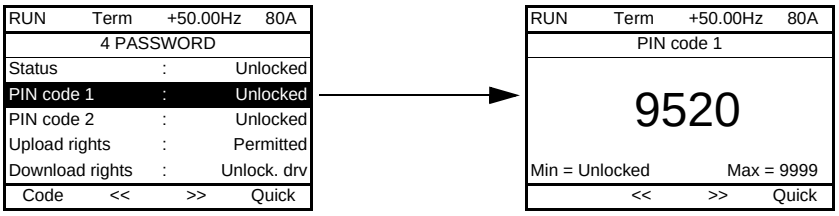


With integrated display terminal:



Enables the configuration to be protected with an access code or a password to be entered in order to access a protected configuration.

Example with graphic display terminal:



- The drive is unlocked when the PIN codes are set to [unlocked] (OFF) (no password) or when the correct code has been entered.
- Before protecting the configuration with an access code, you must:
  - Define the [Upload rights] (ULr) and [Download rights] (dLr).
  - Make a careful note of the code and keep it in a safe place where you will always be able to find it.
- The drive has 2 access codes, enabling 2 access levels to be set up.
  - PIN code 1 is a public unlock code: 6969.
  - PIN code 2 is an unlock code known only to Schneider Electric Product Support. It can only be accessed in [Expert] mode.
  - Only one PIN1 or PIN2 code can be used - the other must remain set to [OFF] (OFF).

Note: When the unlock code is entered, the user access code appears.

The following items are access-protected:

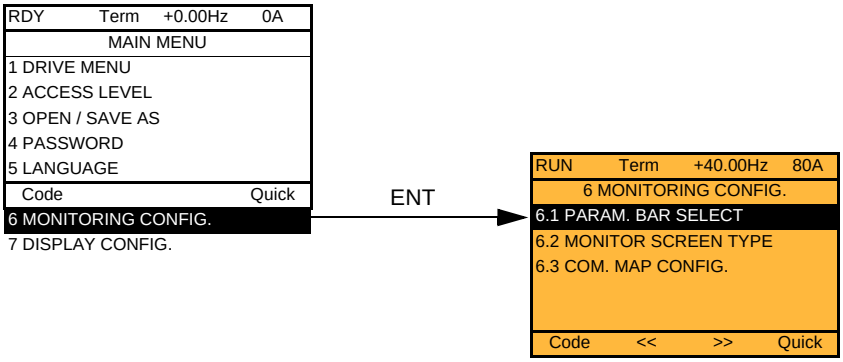
- Return to factory settings ([1.12 FACTORY SETTINGS] (FCS-) menu).
- The channels and parameters protected by the [1.13 USER MENU] as well as the menu itself.
- The custom display settings ([7 DISPLAY CONFIG.] menu).

[4. PASSWORD] (COd-)

Code	Name/Description	Adjustment range	Factory setting
CSt	❏ **[Status]**		[Unlocked] (ULC)
	Information parameter, cannot be modified. ☐ **[Locked]** (LC): The drive is locked by a password. ☐ **[Unlocked]** (ULC): The drive is not locked by a password.		
COd	❏ **[PIN code 1]**	OFF to 9999	[OFF] (OFF)
	1st access code. The value [OFF] (OFF) indicates that no password has been set [Unlocked]. The value [ON] (On) indicates that the drive is protected and an access code must be entered in order to unlock it. Once the correct code has been entered, it remains on the display and the drive is unlocked until the next time the power supply is disconnected. - PIN code 1 is a public unlock code: 6969.		
COd2	❏ **[PIN code 2]**	OFF to 9999	[OFF] (OFF)
	Parameter can only be accessed in [Expert] mode. 2nd access code. The value [OFF] (OFF) indicates that no password has been set [Unlocked]. The value [ON] (On) indicates that the drive is protected and an access code must be entered in order to unlock it. Once the correct code has been entered, it remains on the display and the drive is unlocked until the next time the power supply is disconnected. - PIN code 2 is an unlock code known only to Schneider Electric Product Support.		
ULr	❏ **[Upload rights]**		[Permitted] (ULr0)
	Read or copy the current configuration to the drive. ☐ **[Permitted]** (ULr0): The current drive configuration can always be uploaded to the graphic display terminal or PowerSuite. ☐ **[Not allowed]** (ULr1): The current drive configuration can only be uploaded to the graphic display terminal or PowerSuite if the drive is not protected by an access code or if the correct code has been entered.		
dLr	❏ **[Download rights]**		[Unlock. drv] (dLr1)
	Writes the current configuration to the drive or downloads a configuration to the drive ☐ **[Locked drv]** (dLr0): A configuration file can only be downloaded to the drive if the drive is protected by an access code, which is the same as the access code for the configuration to be downloaded. ☐ **[Unlock. drv]** (dLr1): A configuration file can be downloaded to the drive or a configuration in the drive can be modified if the drive is unlocked (access code entered) or is not protected by an access code. ☐ **[not allowed]** (dLr2): Download not authorized. ☐ **[Lock/unlock]** (dLr3): Combination of [Locked drv] (dLr0) and [Unlock. drv] (dLr1).		

[6 MONITORING CONFIG.]

This menu can only be accessed with the graphic display terminal.



This can be used to configure the information displayed on the graphic display screen during operation.

[6.1. PARAM. BAR SELECT]: Selection of 1 to 2 parameters displayed on the top line (the first 2 cannot be modified).

[6.2. MONITOR SCREEN TYPE]: Selection of parameters displayed in the centre of the screen and the display mode (digital values or bar graph format).

[6.3. COM. MAP CONFIG.]: Selection of the words displayed and their format.

Name/Description

[6.1 PARAM. BAR SELECT]

☐ [Alarm groups]	
☐ [Frequency ref.]	in Hz: parameter displayed in factory configuration.
☐ [Torque reference]	as a %
☐ [Output frequency]	in Hz
☐ [Motor current]	in A: parameter displayed in factory configuration.
☐ [ENA avg speed]	in Hz
☐ [Vitesse ascenseur]	in m/s
☐ [Motor speed]	in rpm
☐ [Motor voltage]	in V
☐ [Motor power]	in W
☐ [Motor torque]	as a %
☐ [Mains voltage]	in V
☐ [Travel distance]	
☐ [Number of travels]	
☐ [Motor thermal state]	as a % as a %
☐ [Drv. thermal state]	as a %
☐ [DBR thermal state]	in Wh or kWh depending on drive rating
☐ [Consumption]	in hours (length of time the motor has been switched on)
☐ [Run time]	in hours (length of time the drive has been switched on)
☐ [Power on time]	in seconds (total time of IGBT overheating alarms)
☐ [IGBT alarm counter]	Word generated by the Controller Inside card (can be accessed if the card has been inserted)
☐ [- - - - 02] to ☐ [- - - - 06]	Word generated by the Controller Inside card (can be accessed if the card has been inserted) CNFO, 1 or 2 (see page 254) SET1, 2 or 3 (see page 105)
☐ [Config. active]	
☐ [Utilised param. set]	

Select the parameter using ENT (a ☑ then appears next to the parameter). Parameter(s) can also be deselected using ENT. 1 or 2 parameters can be selected.

E.g.

PARAM. BAR SELECT	
MONITORING	
---------	☑
---------	☐
---------	☐
---------	☑

Name/Description

[6.2. MONITOR SCREEN TYPE]

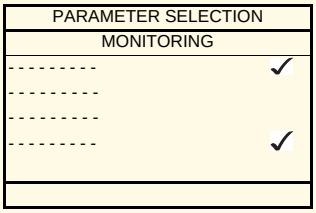
❑ [Display value type]

- ☐ **[Digital]**: Display of one or two digital values on the screen (factory configuration).
- ☐ **[Bar graph]**: Display of one or two bar graphs on the screen.
- ☐ **[List]**: Display a list of between one and five values on the screen.

❑ [PARAMETER SELECTION]

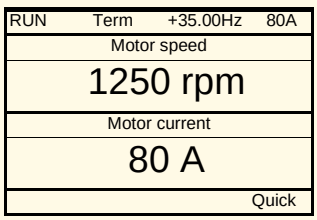
☐ **[Alarm groups]**	can only be accessed if [Display value type] = [List]
☐ **[Frequency ref.]**	in Hz: parameter displayed in factory configuration.
☐ **[Torque reference]**	as a %
☐ **[Output frequency]**	in Hz
☐ **[Motor current]**	in A
☐ **[ENA avg speed]**	in Hz
☐ **[Vitesse ascenseur]**	in m/s
☐ **[Motor speed]**	in rpm
☐ **[Motor voltage]**	in V
☐ **[Motor power]**	in W
☐ **[Motor torque]**	as a %
☐ **[Mains voltage]**	in V
☐ **[Travel distance]**	
☐ **[Number of travels]**	
☐ **[Motor thermal state]**	as a %
☐ **[Drv. thermal state]**	as a %
☐ **[DBR thermal state]**	as a %
☐ **[Consumption]**	in Wh or kWh depending on drive rating
☐ **[Run time]**	in hours (length of time the motor has been switched on)
☐ **[Power on time]**	in hours (length of time the drive has been switched on)
☐ **[IGBT alarm counter]**	in seconds (total time of IGBT overheating alarms)
☐ **[- - - - 02]**	Word generated by the Controller Inside card (can be accessed if the card has been inserted)
to	
☐ **[- - - - 06]**	Word generated by the Controller Inside card (can be accessed if the card has been inserted)
☐ **[Config. active]**	CNFO, 1 or 2 (see page 254), can only be accessed if [Display value type] = [List]
☐ **[Utilised param. set]**	SET1, 2 or 3 (see page 105), can only be accessed if [Display value type] = [List]

Select the parameter(s) using ENT (a ☑ then appears next to the parameter). Parameter(s) can also be deselected using ENT.

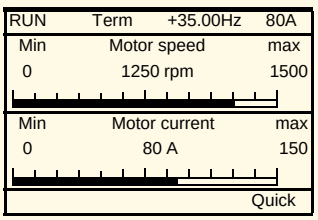


Examples include

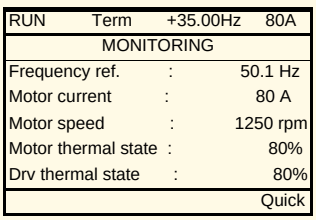
Display of 2 digital values



Display of 2 bar graphs



Display of a list of 5 values



Name/Description

[6.3. COM. MAP CONFIG.]

❏ [Word 1 add. select.]

Select the address of the word to be displayed by pressing the <<, >> (F2 and F3) keys and rotating the navigation button.

❏ [Format word 1]

Format of word 1.

- ☐ **[Hex]**: Hexadecimal
- ☐ **[Signed]**: Decimal with sign
- ☐ **[Unsigned]**: Decimal without sign

❏ [Word 2 add. select.]

Select the address of the word to be displayed by pressing the <<, >> (F2 and F3) keys and rotating the navigation button.

❏ [Format word 2]

Format of word 2.

- ☐ **[Hex]**: Hexadecimal
- ☐ **[Signed]**: Decimal with sign
- ☐ **[Unsigned]**: Decimal without sign

❏ [Word 3 add. select.]

Select the address of the word to be displayed by pressing the <<, >> (F2 and F3) keys and rotating the navigation button.

❏ [Format word 3]

Format of word 3.

- ☐ **[Hex]**: Hexadecimal
- ☐ **[Signed]**: Decimal with sign
- ☐ **[Unsigned]**: Decimal without sign

❏ [Word 4 add. select.]

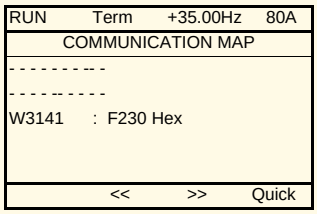
Select the address of the word to be displayed by pressing the <<, >> (F2 and F3) keys and rotating the navigation button.

❏ [Format word 4]

Format of word 4.

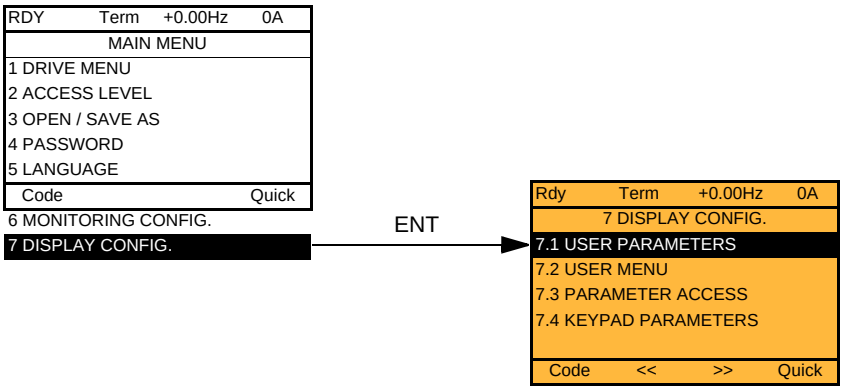
- ☐ **[Hex]**: Hexadecimal
- ☐ **[Signed]**: Decimal with sign
- ☐ **[Unsigned]**: Decimal without sign

It will then be possible to view the selected words in the [COMMUNICATION MAP] submenu of the [1.2 MONITORING] menu.
Example:



[7 DISPLAY CONFIG.]

This menu can only be accessed with the graphic display terminal. It can be used to customize parameters or a menu and to access parameters.



7.1 USER PARAMETERS: Customization of 1 to 15 parameters.

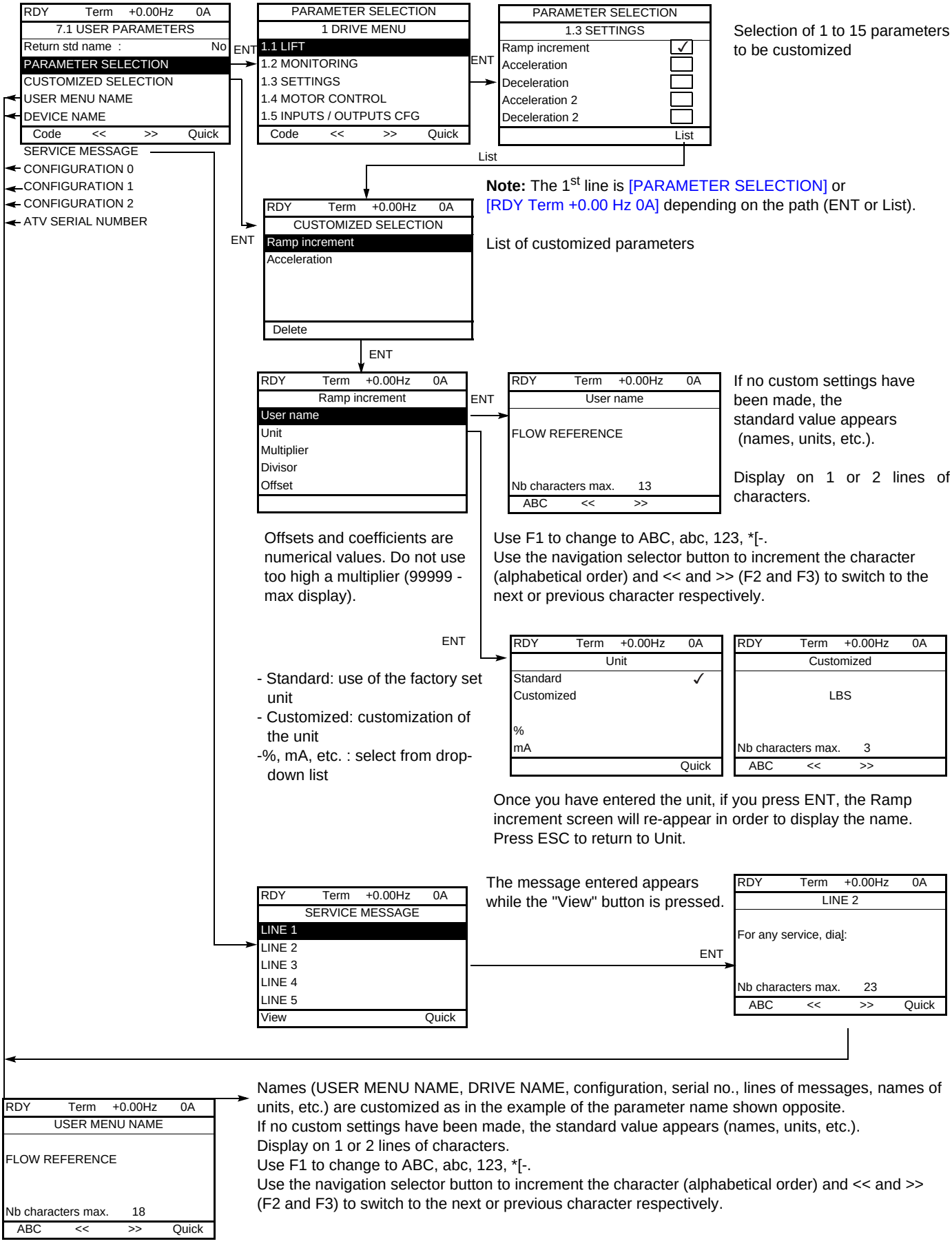
7.2 USER MENU: Creation of a customized menu.

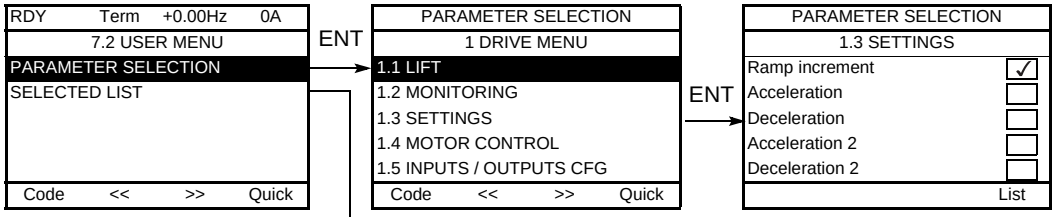
7.3 PARAMETER ACCESS: Customization of the visibility and protection mechanisms of menus and parameters.

7.4 KEYPAD PARAMETERS: Adjustment of the contrast and stand-by mode of the graphic display terminal (parameters stored in the terminal rather than in the drive).

[7 DISPLAY CONFIG.]

If [Return std name] = [Yes] the display reverts to standard but the custom settings remain stored.



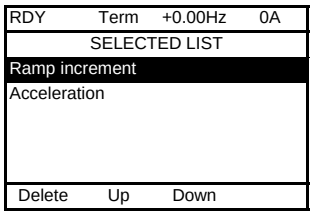


Selection of parameters included in the user menu.

List

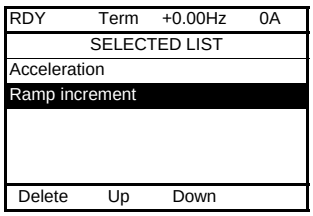
Note: The 1st line is [PARAMETER SELECTION] or [RDY Term +0.00 Hz 0A] depending on the path (ENT or List).

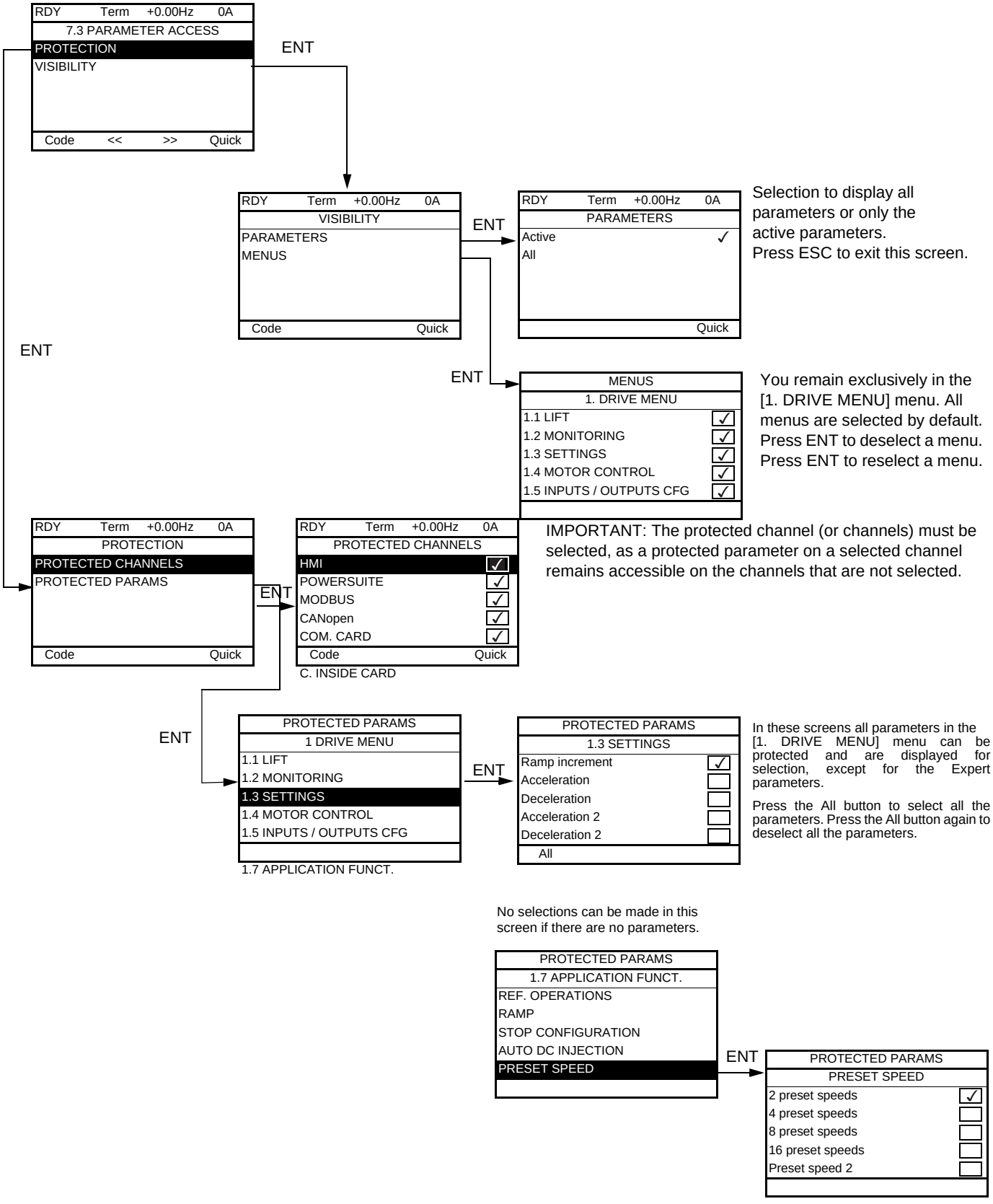
ENT



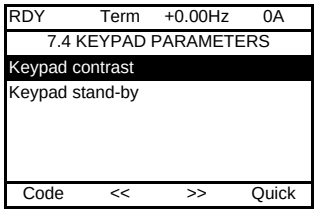
Parameter list making up the user menu.

Use the F2 and F3 keys to arrange the parameters in the list (example below using F3).





Note: The protected parameters are no longer accessible and are not, therefore, displayed for the selected channels.

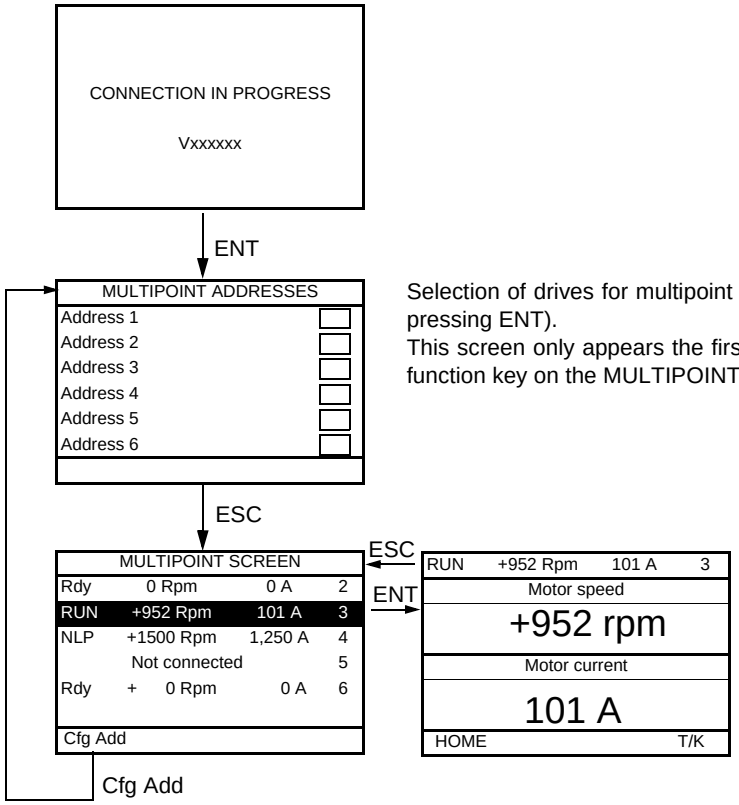


Name/Description	Adjustment range	Factory setting
❏ **[Keypad contrast]** Adjustment of contrast on the graphic display unit.	0 to 100 %	50 %
❏ **[Keypad stand-by]** Configuration and adjustment of the graphic display unit's stand-by mode. ☐ **[No]**: No stand-by mode ☐ **[1]** to **[10]**: Number of minutes during which the terminal is to remain idle before stand-by mode is triggered. After this idle time, the display backlight turns off and the contrast is reduced. The screen returns to normal operation when a key or the navigation button is pressed. It also returns to normal operation if the terminal exits the normal display mode, for example, if a fault occurs.		[5]

[MULTIPOINT SCREEN]

Communication is possible between a graphic display terminal and a number of drives connected on the same bus. The addresses of the drives must be configured in advance in the [1.9 COMMUNICATION] menu using the [Modbus Address] (Add) parameter, page 285.

When a number of drives are connected to the same display terminal, the terminal automatically displays the following screens:



Selection of drives for multipoint dialog (select each address and check the box by pressing ENT).
This screen only appears the first time the drive is powered up, or if the "Cfg Add" function key on the MULTIPOINT SCREEN is pressed (see below).

Selection of a drive for multipoint dialog

In multipoint mode, the command channel is not displayed. From left to right, the state, then the 2 selected parameters and finally the drive address appear.

All menus can be accessed in multipoint mode. Only drive control via the graphic display terminal is not authorized, apart from the Stop key, which locks all the drives.
If there is a fault on a drive, this drive is displayed.

Servicing

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

- Check the condition and tightness of the 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, first check that the recommendations relating to the environment, mounting and connections have been observed.

The first fault detected is saved and displayed, and the drive locks.
The drive switching to fault mode can be indicated remotely via a logic output or a relay, which can be configured in the [1.5 INPUTS / OUTPUTS CFG] (I-O-) menu, see, for example, [R1 CONFIGURATION] (r1-) page 182.

Menu [1.10 DIAGNOSTICS]

This menu can only be accessed with the graphic display terminal. It displays faults and their cause in plain text and can be used to carry out tests, see page 287.

Clearing the fault

Disconnect the drive power supply in the event of a non-resettable fault.
Wait for the display to disappear completely.
Find the cause of the fault in order to correct it.

The drive is unlocked after a fault:

- By turning off the drive until the display disappears completely, then turning it back on again
- Automatically in the scenarios described for the [AUTOMATIC RESTART] (Atr-) function, page 265
- By means of a logic input or control bit assigned to the [FAULT RESET] (rSt-) function, page 264
- By pressing the STOP/RESET button on the graphic display terminal

Menu [1.2 MONITORING] (SUP-):

This is used to prevent and find the causes of faults by displaying the drive state and its current values.
It can be accessed with the integrated display terminal.

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 ATV LIFT then displays [Freewheel] (nSt) in freewheel stop and [Fast stop] (FSt) in fast stop. This is normal since these functions are active at zero so that the drive will be stopped safely if there is a wire break.
- Make sure that the run command input or inputs are activated in accordance with the selected control mode ([2/3 wire control] (tCC) and [2 wire type] (tCt) parameters, page 166).
- If the reference channel or command channel is assigned to a communication bus, when the power supply is connected, the drive will display [Freewheel] (nSt) and remain in stop mode until the communication bus sends a command.
- When an encoder is used with a VW3 A3 409 card, if the encoder is not fully configured, the drive remains locked in stop mode (displays [NST] (nSt) or [NLP] (nLP)).

Faults, which cannot be reset automatically

The cause of the fault must be removed before resetting by turning off and then back on.
AnF, ASF, brF, ECF, EnF, SOF, SPF and tnF faults can also be reset remotely by means of a logic input or control bit ([Fault reset] (rSF) parameter, page 264).
AnF, EnF, InFA, InFb, SOF, SPF, and tnF faults can be inhibited and cleared remotely by means of a logic input or control bit ([Fault inhibit assign.] (InH) parameter, page 275).

Fault	Name	Probable cause	Remedy
AI2F	[AI2 input]	• Non-conforming signal on analog input AI2	• Check the wiring of analog input AI2 and the value of the signal.
AnF	[Load slipping]	• The encoder speed feedback does not match the reference	• Check the motor, gain and stability parameters • Add a braking resistor • Check the size of the motor/drive/load. • Increase [Acceleration time] (ACt) and decrease [Lift leveling time] (LLt) • Check the encoder's mechanical coupling and its wiring. • If the "torque control" function is used, see "Note" on page 242.
ASF	[Angle Error]	• A modification has changed the phase-shift angle between the motor and the encoder. • The "Procedure for measuring the phase-shift angle between the motor and the encoder" page 150 has failed or has not been performed • In [Sync. mot. (SYn) mode, inappropriate settings of the speed loop, when the speed reference switches to 0	• See comments on page 150. • Repeat the "Procedure for measuring the phase-shift angle between the motor and the encoder" page 150. • Check the speed loop parameters
bOF	[DBR overload]	• The braking resistor is under excessive stress	• Check the size of the resistor and wait for it to cool down • Check the [DB Resistor Power] (brP) and [DB Resistor value] (brU) parameters, page 280.
brF	[Brake feedback]	• The brake feedback contact does not match the brake logic control • The brake does not stop the motor quickly enough (detected by measuring the speed on the "Pulse input").	• Check the feedback circuit and the brake logic control circuit. • Check the mechanical state of the brake. • Check the brake linings
CrF1	[Precharge]	• Precharge relay control fault or damaged precharge resistor	• Turn the drive off and then back on again. • Check the internal connections. • Inspect/repair the drive.
CrF2	[Thyr. soft charge]	• DC bus charging fault (thyristors)	
ECF	[Encoder coupling]	• Break in encoder's mechanical coupling	• Check the encoder's mechanical coupling.

Faults, which cannot be reset automatically (continued)

Fault	Name	Probable cause	Remedy
EEF1	[Control Eeprom]	• Internal memory fault, control card	• Check the environment (electromagnetic compatibility). • Turn off, reset, return to factory settings • Inspect/repair the drive.
EEF2	[Power Eeprom]	• Internal memory fault, power card	
EnF	[Encoder]	• Encoder feedback fault	• Check all the configuration parameters for the encoder used. • Refer to the [1.10 DIAGNOSTICS] menu for the value of parameter RESE. • Check that the encoder's mechanical and electrical operation, its power supply and connections are all correct. • If necessary, reverse the direction of rotation of the motor ([Output Ph rotation] (PHr) parameter, page 138) or the encoder signals.
FCF1	[Out. contact. stuck]	• The output contactor remains closed while open conditions are OK	• Check the contactor and its wiring. • Check the feedback circuit.
HdF	[IGBT desaturation]	• Short-circuit or grounding at the drive output	• Check the cables connecting the drive to the motor, and the motor insulation. • Perform the diagnostic tests via the [1.10 DIAGNOSTICS] menu.
ILF	[internal com. link]	• Communication fault between option card and drive	• Check the environment (electromagnetic compatibility) • Check the connections. • Check that no more than two option cards (max. permitted) have been installed on the drive • Replace the option card • Inspect/repair the drive.
InF1	[Rating error]	• The power card is different from the card stored	• Check the power card's catalog number.
InF2	[Incompatible PB]	• The power card is incompatible with the control card	• Check the power card's part number and compatibility.
InF3	[Internal serial link]	• Communication fault between the internal cards	• Check the internal connections. • Inspect/repair the drive.
InF4	[Internal-mftg zone]	• Internal data inconsistent	• Recalibrate the drive (performed by Schneider Electric Product Support).
InF6	[Internal - fault option]	• The option installed in the drive is not recognized	• Check the reference and compatibility of the option.
InF7	[Internal-hard init.]	• Initialization of the drive is incomplete	• Remove and restore power to reset the fault.
InF8	[Internal-ctrl supply]	• The control power supply is incorrect	• Check the control section power supply.
InF9	[Internal- I measure]	• The current measurements are incorrect	• Replace the current sensors, or the power card. • Inspect/repair the drive.
InFA	[Internal-mains circuit]	• The input stage is not operating correctly	• Perform the diagnostic tests via the [1.10 DIAGNOSTICS] menu. • Inspect/repair the drive.
InFb	[Internal-Th. sensor]	• The drive temperature sensor is not operating correctly • The braking unit's temperature sensor is not operating correctly	• Replace the drive temperature sensor • Inspect/repair the drive. • Replace the braking unit's temperature sensor • Inspect/repair the braking unit
InFC	[Internal-time meas.]	• Fault on the electronic time measurement component	• Inspect/repair the drive.
InFE	[internal- CPU]	• Internal microprocessor fault	• Turn off and reset. Inspect/repair the drive

Faults which cannot be reset automatically (continued)

Fault	Name	Probable cause	Remedy
OCF	[Overcurrent]	• Parameters in the [SETTINGS] (SEt-) and [1.4 MOTOR CONTROL] (drC-) menus are not correct. • Inertia or load too high • Mechanical locking	• Check the parameters • Check the size of the motor/drive/load. • Check the state of the mechanism.
PrF	[Power removal]	• Fault with the drive's "Power removal" safety function	• Inspect/repair the drive.
SCF1	[Motor short circuit]	• Short-circuit or grounding at the drive output • Significant earth leakage current at the drive output if several motors are connected in parallel	• Check the cables connecting the drive to the motor, and the motor insulation. • Perform the diagnostic tests via the [1.10 DIAGNOSTICS] menu. • Reduce the switching frequency. • Connect chokes in series with the motor. • Check the speed loop and brake settings.
SCF2	[Impedant sh. circuit]		
SCF3	[Ground short circuit]		
SOF	[Overspeed]	• Instability or driving load too high	• Check the motor, gain and stability parameters • Add a braking resistor • Check the size of the motor/drive/load. • Check the parameter settings for the [FREQUENCY METER] (FqF-) function, page 279, if it is configured.
SPF	[Speed fdback loss]	• Encoder feedback signal missing • No Top Z signal after activation of the Top Z function and 2 rotations. • No signal on "Pulse input", if the input is used for speed measurement	• Check the wiring between the encoder and the drive. • Check the encoder. • Check all the configuration parameters for the encoder used. • Refer to the [1.10 DIAGNOSTICS] menu for the value of parameter RESE. • Check the wiring of the input and the detector used
tnF	[Auto-tuning]	• Special motor or motor whose power is not suitable for the drive • Motor not connected to the drive	• Check that the motor/drive are compatible. • Check that the motor is present during auto-tuning. • If an output contactor is being used, close it during auto-tuning.

Faults - Causes - Remedies

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

These faults can also be reset by turning on and off or by means of a logic input or control bit ([Fault reset] (rSF) parameter, page 264). APF, CnF, COF, EPF1, EPF2, FCF2, LFF2, LFF3, LFF4, ObF, OHF, OLF, OPF1, OPF2, OSF, OtF1, OtF2, OtFL, PHF, PtF1, PtF2, PtFL, SLF1, SLF2, SLF3, SrF, SSF and tJF faults can be inhibited and cleared remotely by means of a logic input or control bit ([Fault inhibit assign.] (InH)parameter, page 275).

Fault	Name	Probable cause	Remedy
APF	[Application fault]	• Controller Inside card fault	• Please refer to the card documentation
bLF	[Brake control]	• Brake release current not reached • Brake engage frequency threshold [Brake engage freq] (bEn) only regulated when brake logic control is assigned	• Check the drive/motor connection. • Check the motor windings. • Check the [Brake release I FW] (Ibr) and [Brake release I Rev] (Ird) settings, page 233 • Apply the recommended settings for [Brake engage freq] (bEn).
CnF	[Com. network]	• Communication fault on communication card	• Check the environment (electromagnetic compatibility) • Check the wiring. • Check the time-out. • Replace the option card • Inspect/repair the drive.
COF	[CANopen com.]	• Interruption in communication on the CANopen bus	• Check the communication bus. • Check the time-out. • Refer to the CANopen User's Manual.
EPF1	[External flt-LI/Bit]	• Fault triggered by an external device, depending on user	• Check the device which caused the fault, and reset.
EPF2	[External fault com.]	• Fault triggered by a communication network	• Check for the cause of the fault and reset.
FCF2	[Out. contact. open.]	• The output contactor remains open although the closing conditions have been met	• Check the contactor and its wiring. • Check the feedback circuit.
LCF	[Input contactor]	• The drive is not turned on even though [Mains V. time out] (LCt) has elapsed.	• Check the contactor and its wiring. • Check the time-out. • Check the AC supply/contactor/drive connection.
LFF2 LFF3 LFF4	[AI2 4-20mA loss] [AI3 4-20mA loss] [AI4 4-20mA loss]	• Loss of the 4-20 mA reference on analog input AI2, AI3 or AI4	• Check the connection on the analog inputs.
ObF	[Overbraking]	• Braking too sudden or driving load	• Increase the deceleration time. • Add a braking resistor if necessary. • Activate the [Dec ramp adapt.] (brA) function, page 220, if it is compatible with the application.
OHF	[Drive overheat]	• Drive temperature too high	• Check the motor load, the drive ventilation and the ambient temperature. Wait for the drive to cool down before restarting.
OLF	[Motor overload]	• Triggered by excessive motor current	• Check the setting of the motor thermal protection, check the motor load. Wait for the drive to cool down before restarting.
OPF1	[1 motor phase loss]	• Loss of one phase at drive output	• Check the connections from the drive to the motor.

Faults that can be reset with the automatic restart function, after the cause has disappeared (continued)

Fault	Name	Probable cause	Remedy
OPF2	[3 motor phase loss]	• Motor not connected or motor power too low • Output contactor open • Instantaneous instability in the motor current	• Check the connections from the drive to the motor. • If an output contactor is being used, parameterize [Output Phase Loss] (OPL) = [Output cut] (OAC), page 268. • Test on a low power motor or without a motor: In factory settings mode, motor output phase loss detection is active [Output Phase Loss] (OPL) = [Yes] (YES). To check the drive in a test or maintenance environment, without having to use a motor with the same rating as the drive (in particular for high power drives), deactivate output phase loss detection [Output Phase Loss] (OPL) = [No] (nO) • Check and optimize the following parameters: [IR compensation] (UFr), page 160, [Rated motor volt.] (UnS) and [Rated mot. current] (nCr), page 143, and perform [Auto tuning] (tUn), page 154
OSF	[Mains overvoltage]	• Mains supply is too high • Disturbed mains supply	• Check the line voltage.
OtF1	[PTC1 overheat]	• Overheating of the PTC1 probes detected	• Check the motor load and motor size. • Check the motor ventilation. • Wait for the motor to cool before restarting. • Check the type and state of the PTC probes.
OtF2	[PTC2 overheat]	• Overheating of the PTC2 probes detected	
OtFL	[LI6=PTC overheat]	• Overheating of PTC probes detected on input LI6	
PtF1	[PTC1 probe]	• PTC1 probes open or short-circuited	• Check the PTC probes and the wiring between them and the motor/drive.
PtF2	[PTC2 probe]	• PTC2 probes open or short-circuited	
PtFL	[LI6=PTC probe]	• PTC probes on input LI6 open or short-circuited	
SCF4	[IGBT short circuit]	• Power component fault	• Perform a test via the [1.10 DIAGNOSTICS] menu. • Inspect/repair the drive.
SCF5	[Motor short circuit]	• Short-circuit at drive output	• Check the cables connecting the drive to the motor and the motor insulation. • Perform tests via the [1.10 DIAGNOSTICS] menu. • Inspect/repair the drive.
SLF1	[Modbus com.]	• Interruption in communication on the Modbus bus	• Check the communication bus. • Check the time-out. • Refer to the Modbus User's Manual.
SLF2	[PowerSuite com.]	• Fault communicating with PowerSuite	• Check the PowerSuite connecting cable. • Check the time-out.
SLF3	[HMI com.]	• Fault communicating with the graphic display terminal	• Check the terminal connection. • Check the time-out.
SrF	[Torque time-out]	• The time-out of the torque control function is attained	• Check the function's settings. • Check the state of the mechanism.
SSF	[Torque/current lim]	• Switch to torque limitation	• Check if there are any mechanical problems. • Check the parameters of [TORQUE LIMITATION] (tLA-) page 244 and the parameters of the [TORQUE OR I LIM. DETECT.] (tId-) fault, page 277).
tJF	[IGBT overheat]	• Drive overload	• Check the size of the load/motor/drive. • Decrease the switching frequency. • Wait for the motor to cool before restarting

Faults - Causes - Remedies

Faults that can be reset as soon as their causes disappear

The USF fault can be inhibited and cleared remotely by means of a logic input or control bit ([Fault inhibit assign.] (InH) parameter, page 275).

Fault	Name	Probable cause	Remedy
CFF	[Incorrect config.]	• Option card changed or removed	• Check that there are no card errors. • In the event of the option card being changed/removed deliberately, see the remarks below.
		• Control card replaced by a control card configured on a drive with a different rating	• Check that there are no card errors. • In the event of the control card being changed deliberately, see the remarks below.
		• The current configuration is inconsistent	• Return to factory settings or retrieve the backup configuration, if it is valid (see page 293).
CFI	[Invalid config.]	• Invalid configuration The configuration loaded in the drive via the bus or communication network is inconsistent.	• Check the configuration loaded previously. • Load a compatible configuration.
dLF	[Dynamic load fault]	• Abnormal load variation	• Check that the load is not blocked by an obstacle • Removal of a run command causes a reset.
HCF	[Cards pairing]	• The [CARDS PAIRING] (PPI-) function, page 281, has been configured and a drive card has been changed	• In the event of a card error, reinsert the original card. • Confirm the configuration by entering the [Pairing password] (PPI) if the card was changed deliberately.
PHF	[Input phase loss]	• Drive incorrectly supplied or a fuse blown • Failure of one phase • Three-phase ATV LIFT used on a single-phase line supply • Unbalanced load This protection only operates with the drive on load.	• Check the power connection and the fuses. • Use a three-phase line supply. • Disable the fault by setting [Input phase loss] (IPL) = [No] (nO). (page 268).
USF	[Undervoltage]	• Line supply is too low • Transient voltage dip	• Check the voltage and the parameters of [UNDERVOLTAGE MGT] (USb-), page 272.

Option card changed or removed

When an option card is removed or replaced by another, the drive locks in [Incorrect config.] (CFF) fault mode on power-up. If the card has been deliberately changed or removed, the fault can be cleared by pressing the ENT key twice, which **causes the factory settings to be restored** (see page 293) for the parameter groups affected by the card. These are as follows:

Card replaced by a card of the same type

- I/O cards: [Drive menu] (drM)
- Encoder cards: [Drive menu] (drM)
- Communication cards: Only the parameters that are specific to communication cards
- Controller Inside cards: [Control Inside menu] (PLC)

Card removed (or replaced by a different type of card)

- I/O card: [Drive menu] (drM)
- Encoder card: [Drive menu] (drM)
- Communication card: [Drive menu] (drM) and parameters specific to communication cards
- Controller Inside card: [Drive menu] (drM) and [Control. insid. menu] (PLC)

Control card changed

When a control card is replaced by a control card configured on a drive with a different rating, the drive locks in [Incorrect config.] (CFF) fault mode on power-up. If the card has been deliberately changed, the fault can be cleared by pressing the ENT key twice, which **causes all the factory settings to be restored.**

Functions assigned to I/O

Inputs Outputs	Functions assigned
LI1	
LI2	
LI3	
LI4	
LI5	
LI6	
LI7	
LI8	
LI9	
LI10	
LI11	
LI12	
LI13	
LI14	

Inputs Outputs	Functions assigned
LO1	
LO2	
LO3	
LO4	
AI1	
AI2	
AI3	
AI4	
R1	
R2	
R3	
R4	
R5	
RP	
Encoder	

Other parameters (table to be created by the user)

Code	Name	Customer setting

Code	Name	Customer setting

Index of functions

Direct power supply via DC bus	259
Deferred stop on thermal alarm	270
[Auto tuning]	53
Command and reference channels	197
[2/3 wire control]	166
Output contactor command	249
Line contactor command	247
Brake logic control	229
Motor or configuration switching [MULTIMOTORS/CONFIG.]	254
Parameter set switching [PARAM. SET SWITCHING]	251
[REFERENCE SWITCH.]	215
[STOP CONFIGURATION]	221
[ENCODER CONFIGURATION]	178
[RP CONFIGURATION]	176
Torque regulation	240
Half floor	99
[ENA SYSTEM]	158
[Load sharing]	162
Evacuation function	97
[FLUXING BY LI]	153
Limit switch management	227
[ROLLBACK MGT]	88
[TOP Z MANAGEMENT]	260
[AUTO DC INJECTION]	223
[1.7 APPLICATION FUNCT.] (FUn-)	209
Torque limitation	243
External weight measurement	92
Use of the "Pulse input" to measure the speed of rotation of the motor	278
Inspection	95
[4. PASSWORD] (COd-)	298
Motor thermal protection	266
[RAMP]	217
[FAULT RESET]	264
[AUTOMATIC RESTART]	265
[Noise reduction]	160
[1.12 FACTORY SETTINGS] (FCS-)	291
[2nd CURRENT LIMIT.]	246
Summing input/Subtracting input/Multiplier	214
PTC probes	262
[DRIVE OVERHEAT]	269

Index of parameter codes

Code	Page										
	[1.1 LIFT] (LIF-)	[1.2 MONITORING] (SUP-)	[1.3 SETTINGS] (SEt-)	[1.4 MOTOR CONTROL] (drC-)	[1.5 INPUTS / OUTPUTS CFG] (I-O-)	[1.6 COMMAND] (CtL-)	[1.7 APPLICATION FUNCT.] (FUn-)	[1.8 FAULT MANAGEMENT] (FLt-)	[1.9 COMMUNICATION] (COM-)	[1.12 FACTORY SETTINGS] (FCS-)	[4 PASSWORD] (COd-)
AIC-					195						
A2C-					195						
A3C-					195						
AC2	64		125				219				
ACC	62, 96		125				217				
ACn	56										
ACt	59										
AdC							223				
AdCO									285		
Add									285		
AI1A		122			171						
AI1E					171						
AI1F					171						
AI1S					171						
AI1t					171						
AI2A		122			172						
AI2E					172						
AI2F					172						
AI2L					172						
AI2S					172						
AI2t					172						
AI3A		122			173						
AI3E					173						
AI3F					173						
AI3L					173						
AI3S					173						
AI3t					173						
AI4A		122			174						
AI4E					174						
AI4F					174						
AI4L					174						
AI4S					174						
AI4t					174						
AIC1					175						
ALGr		121, 123									

Index of parameter codes

Code	Page										
	[1.1 LIFT] (LIF-)	[1.2 MONITORING] (SUP-)	[1.3 SETTINGS] (SEt-)	[1.4 MOTOR CONTROL] (drC-)	[1.5 INPUTS / OUTPUTS CFG] (I-O-)	[1.6 COMMAND] (CtL-)	[1.7 APPLICATION FUNCT.] (FUn-)	[1.8 FAULT MANAGEMENT] (FLt-)	[1.9 COMMUNICATION] (COM-)	[1.12 FACTORY SETTINGS] (FCS-)	[4 PASSWORD] (COd-)
AN0A									285		
AN0C									285		
AO1	43				191						
AO1F					192						
AO1t					191						
AO2					193						
AO2F					193						
AO2t					193						
AO3					194						
AO3F					194						
AO3t					194						
AOH1					191						
AOH2					193						
AOH3					194						
AOL1					191						
AOL2					193						
AOL3					194						
APH		121, 123									
ASA				151							
ASH1					192						
ASH2					193						
ASH3					194						
ASL				151							
ASL1					192						
ASL2					193						
ASL3					194						
AStt				151,153							
AStS				152							
ASU				152							
AtA				152							
Atr								265			
AU1-					175						
AUS		121, 123									
AUt				154							
bbA				162							

Index of parameter codes

Code	Page										
	[1.1 LIFT] (LIF-)	[1.2 MONITORING] (SUP-)	[1.3 SETTINGS] (SEt-)	[1.4 MOTOR CONTROL] (drC-)	[1.5 INPUTS / OUTPUTS CFG] (I-O-)	[1.6 COMMAND] (CtL-)	[1.7 APPLICATION FUNCT.] (FUn-)	[1.8 FAULT MANAGEMENT] (FLt-)	[1.9 COMMUNICATION] (COM-)	[1.12 FACTORY SETTINGS] (FCS-)	[4 PASSWORD] (COd-)
bC I	37						233				
bdCO									285		
bECd							234				
bEd							235				
bEn	94		133				234				
bEt	94		134				234				
bFr				137							
b IP	87						233				
b Ir	87		133				234				
bLC	41						233				
bOO	67			160							
bMP						208					
brA							220				
brHO							236				
brH I							236				
brH2							237				
brH3							237				
brH4							237				
brO								280			
brP								280			
brr							237				
brS-	87										
brt	87		133				234				
brU								280			
bSP					169						
bSt							233				
CCS						206					
Cd I						206					
Cd2						206					
CFPS		121, 123									
CHA I	104						252				
CHA2	104						252				
CHCF						205					
CHM							256				
CL2			129				246				

Index of parameter codes

Code	Page										
	[1.1 LIFT] (LIFt-)	[1.2 MONITORING] (SUP-)	[1.3 SETTINGS] (SEt-)	[1.4 MOTOR CONTROL] (drC-)	[1.5 INPUTS / OUTPUTS CFG] (I-O-)	[1.6 COMMAND] (CtL-)	[1.7 APPLICATION FUNCT.] (FUn-)	[1.8 FAULT MANAGEMENT] (FLt-)	[1.9 COMMUNICATION] (COM-)	[1.12 FACTORY SETTINGS] (FCS-)	[4 PASSWORD] (COd-)
CLI	52		129	140			246				
CLL								276			
CMA	56										
CnF1							256				
CnF2							256				
CnFS		121, 123									
COd											299
COd2											299
COL								276			
COP						207					
CP1	93						239				
CP2	93						239				
CrH2					172						
CrH3					173						
CrH4					174						
CrL2					172						
CrL3					173						
CrL4					174						
CSP	55										
CSt											299
Ctd			134								
CtM	56										
Ctt	137			137							
dA2							216				
dA3							216				
dAS	98						250				
dbn							242				
dbP							242				
dbS	98						250				
dCF			127				221	282			
dCI							222				
dCO							259				
dE2	64		125				219				
dEC	62		125				217				
dEL	60										

Index of parameter codes

Code	Page										
	[1.1 LIFT] (LIF-)	[1.2 MONITORING] (SUP-)	[1.3 SETTINGS] (SEt-)	[1.4 MOTOR CONTROL] (drC-)	[1.5 INPUTS / OUTPUTS CFG] (I-O-)	[1.6 COMMAND] (CtL-)	[1.7 APPLICATION FUNCT.] (FUn-)	[1.8 FAULT MANAGEMENT] (FLt-)	[1.9 COMMUNICATION] (COM-)	[1.12 FACTORY SETTINGS] (FCS-)	[4 PASSWORD] (COd-)
dLr											299
dOI	43				188						
dOId					188						
dOIH					188						
dOIS					188						
dOt	110	121, 123									
ECC								277			
ECt								277			
EFI	44				179						
EFr	44				179						
EIL	44				179						
EnA				159							
EnC				142	178						
End-	45										
EnMr	46				180						
Enr I	44				178						
EnS	44				178						
EnSP	46				181						
Entr	46				180						
EnU	44			142	178						
EPL								271			
ErCO									285		
ESP	110	121, 123									
EtF								271			
F I				144							
F2				144							
F2d	100		135								
F3				144							
F4				144							
F5				144							
FAb	67			160							
FCP				145							
FCSI										293	
Fdt								279			
FFA	46, 82				181						

Index of parameter codes

Code	Page										
	[1.1 LIFT] (LIFt-)	[1.2 MONITORING] (SUP-)	[1.3 SETTINGS] (SEt-)	[1.4 MOTOR CONTROL] (drC-)	[1.5 INPUTS / OUTPUTS CFG] (I-O-)	[1.6 COMMAND] (CtL-)	[1.7 APPLICATION FUNCT.] (FUn-)	[1.8 FAULT MANAGEMENT] (FLt-)	[1.9 COMMUNICATION] (COM-)	[1.12 FACTORY SETTINGS] (FCS-)	[4 PASSWORD] (COd-)
FFP	82			157							
FFr	47, 82				181						
FFt			135				221				
FFU	82			157							
FLG	81		126	156							
FLO									286		
FLOC									286		
FLOt									286		
FLU			130	153							
FN1						208					
FN2						208					
FN3						208					
FN4						208					
Ftd-	100										
Ftd	100		135								
FFt			135								
F9A								279			
F9C								279			
F9F								279			
F9L			135								
F9S		121, 123									
F9t								279			
Fr1	37					205					
Fr1b							215				
Fr2						206					
FrES	45				179						
FrH		121, 123									
FrS	50		143								
FrSS				149							
Frt	63						219				
Fry-										293	
FSt							221				
Ftd			135								
GFS										293	
GIE			127	159							

Index of parameter codes

Code	Page										
	[1.1 LIFT] (LIF-)	[1.2 MONITORING] (SUP-)	[1.3 SETTINGS] (SEt-)	[1.4 MOTOR CONTROL] (drC-)	[1.5 INPUTS / OUTPUTS CFG] (I-O-)	[1.6 COMMAND] (CtL-)	[1.7 APPLICATION FUNCT.] (FUn-)	[1.8 FAULT MANAGEMENT] (FLt-)	[1.9 COMMUNICATION] (COM-)	[1.12 FACTORY SETTINGS] (FCS-)	[4 PASSWORD] (COd-)
GPE			127	159							
HFF-	99						258				
HLS	99						258				
HSP			126								
Ibr	87		133				233				
IbrA	93						239				
IdA	65			147							
IdC			127				222	282			
IdC2			127				222	282			
IdN	65			146							
InH								275			
INP-	34										
Inr	62		125				217				
InSP				143							
IntP							244				
IPHS	66			148							
IPL								268			
Ird			133				233				
ISP	96						257				
ISPS	40										
ISrF	96						257				
ItH	52		126								
JAPL	81										
JAr 1	61										
JAr2	61										
JAr3	61										
JAr4	61										
JAr5	61										
JAr6	61										
JCAL	81										
JdC			134				235				
JNOt	81										
L IA to L I4A		122			167						
L Id to L I4d					167						
LAF							228				
LAr							228				

Index of parameter codes

Code	Page										
	[1.1 LIFT] (LIF-)	[1.2 MONITORING] (SUP-)	[1.3 SETTINGS] (SEt-)	[1.4 MOTOR CONTROL] (drC-)	[1.5 INPUTS / OUTPUTS CFG] (I-O-)	[1.6 COMMAND] (CtL-)	[1.7 APPLICATION FUNCT.] (FUn-)	[1.8 FAULT MANAGEMENT] (FLt-)	[1.9 COMMUNICATION] (COM-)	[1.12 FACTORY SETTINGS] (FCS-)	[4 PASSWORD] (COd-)
LAS							228				
LbA				162							
LbC			135	162							
LbC1				164							
LbC2				164							
LbC3				164							
LbF				164							
LC2							246				
LCA	56										
LCO-	34										
LCr		121, 123									
LCt							248				
LdA-	55										
LdNS	66										
LdS	66			148							
LES							248				
LEt								271			
LFA	65			147							
LFF								282			
LFL2 LFL3 LFL4								274			
LFN	65			146							
LFn-	96										
LIO-	34										
LIS1		122									
LIS2		122									
LLC							248				
LLS	60										
LLSL	110										
LLSS	40										
LLt	60										
LNO-	110										
LOI					186						
LOId					186						
LOIH					186						

Index of parameter codes

Code	Page										
	[1.1 LIFT] (LIF-)	[1.2 MONITORING] (SUP-)	[1.3 SETTINGS] (SEt-)	[1.4 MOTOR CONTROL] (drC-)	[1.5 INPUTS / OUTPUTS CFG] (I-O-)	[1.6 COMMAND] (CtL-)	[1.7 APPLICATION FUNCT.] (FUn-)	[1.8 FAULT MANAGEMENT] (FLt-)	[1.9 COMMUNICATION] (COM-)	[1.12 FACTORY SETTINGS] (FCS-)	[4 PASSWORD] (COd-)
LO1S					186						
LO2					186						
LO2d					186						
LO2H					186						
LO2S					186						
LO3					187						
LO3d					187						
LO3H					187						
LO3S					187						
LO4					187						
LO4d					187						
LO4H					187						
LO4S					187						
LFn-	96										
LOP-	65										
LP1	93						239				
LP2	93						239				
L9NS	66										
L9S	66			148							
LSN	36										
LSP			126								
LtS	59										
LtSS	40										
nA2							216				
nA3							216				
nCO-	65										
nFr		121, 123	132								
nnF		121, 123									
nOt-	51										
nCA1									284		
nCA2									284		
nCA3									284		
nCA4									284		
nCA5									284		
nCA6									284		

Index of parameter codes

Code	Page										
	[1.1 LIFT] (LIF-)	[1.2 MONITORING] (SUP-)	[1.3 SETTINGS] (SEt-)	[1.4 MOTOR CONTROL] (drC-)	[1.5 INPUTS / OUTPUTS CFG] (I-O-)	[1.6 COMMAND] (CtL-)	[1.7 APPLICATION FUNCT.] (FUn-)	[1.8 FAULT MANAGEMENT] (FLt-)	[1.9 COMMUNICATION] (COM-)	[1.12 FACTORY SETTINGS] (FCS-)	[4 PASSWORD] (COd-)
nCA7									284		
nCA8									284		
nCr	50		143								
nCrS	51			148							
nMA1									284		
nMA2									284		
nMA3									284		
nMA4									284		
nMA5									284		
nMA6									284		
nMA7									284		
nMA8									284		
nOt	110	121, 123									
nPr	50		143								
nrd	106			160							
nSL				146							
nSP	50		143								
nSPS	51			148							
nSt	34						221				
oO2		121, 123									
oO3		121, 123									
oO4		121, 123									
oO5		121, 123									
oO6		121, 123									
OCC	41, 98						250				
Odt	102							268			
OFI				139							
OHL								269			
OLL								267			
OPL	102							268			
OPr		121, 123									

Index of parameter codes

Code	Page										
	[1.1 LIFT] (LIF-)	[1.2 MONITORING] (SUP-)	[1.3 SETTINGS] (SEt-)	[1.4 MOTOR CONTROL] (drC-)	[1.5 INPUTS / OUTPUTS CFG] (I-O-)	[1.6 COMMAND] (CtL-)	[1.7 APPLICATION FUNCT.] (FUn-)	[1.8 FAULT MANAGEMENT] (FLt-)	[1.9 COMMUNICATION] (COM-)	[1.12 FACTORY SETTINGS] (FCS-)	[4 PASSWORD] (COd-)
OUt-	41										
PES	37, 93						239				
PFI					176						
PFr					176						
PGA	44				179						
PGI	44			179	179						
PHS	66			148							
PHr				138							
PIA					176						
PIL					176						
PPI								281			
PPn				146							
PPnS	51			148							
PS1-	105						253				
PS2-	105						253				
PS3-	105						253				
PS2	108						225				
PS4	108						225				
PS8	108						225				
PS16	108						225				
PSt						205					
PtC1								263			
PtC2								263			
PtCL								263			
PtH		121, 123									
r1	42				182						
r1d					183						
r1H					183						
r1S					183						
r2	43				183						
r2d					183						
r2H					183						
r2S					183						
r3					184						
r3d					184						

Index of parameter codes

Code	Page										
	[1.1 LIFT] (LIF-)	[1.2 MONITORING] (SUP-)	[1.3 SETTINGS] (SEt-)	[1.4 MOTOR CONTROL] (drC-)	[1.5 INPUTS / OUTPUTS CFG] (I-O-)	[1.6 COMMAND] (CtL-)	[1.7 APPLICATION FUNCT.] (FUn-)	[1.8 FAULT MANAGEMENT] (FLt-)	[1.9 COMMUNICATION] (COM-)	[1.12 FACTORY SETTINGS] (FCS-)	[4 PASSWORD] (COd-)
rH					184						
rS					184						
r4					184						
r4d					184						
r4H					184						
r4S					184						
rS					185						
rSd					185						
rSS					185						
rSH					185						
rAP				159							
rbM	89						238				
rbC	89						238				
rbd	89						238				
rCA	36, 98						250				
rCb							215				
rEqP	49			149							
rEtP	49			149							
rFC						206					
rFr		121, 123									
rFt-	97						258				
rFt	36, 97						258				
rIn						205					
rOP-	61										
rP								264			
rPA								264			
rPPn	45				179						
rPS	63						219				
rPt	62						217				
rrS	34				166						
rSA	65			147							
rSAS	66			148							
rSF								264			
rSM	65			146							
rSMS	66			149							

Index of parameter codes

Code	Page										
	[1.1 LIFT] (LIF-)	[1.2 MONITORING] (SUP-)	[1.3 SETTINGS] (SEt-)	[1.4 MOTOR CONTROL] (drC-)	[1.5 INPUTS / OUTPUTS CFG] (I-O-)	[1.6 COMMAND] (CtL-)	[1.7 APPLICATION FUNCT.] (FUn-)	[1.8 FAULT MANAGEMENT] (FLt-)	[1.9 COMMUNICATION] (COM-)	[1.12 FACTORY SETTINGS] (FCS-)	[4 PASSWORD] (COd-)
rSP	97						258				
rSU	97						258				
rtH		121, 123									
rtO							242				
SA2							216				
SA3							216				
SAt	101							270			
SCS I										293	
SdC I			128				223, 234				
SdC2			128				223				
Sdd								277			
SFC	82		126	156							
SFr	106		129	139							
SLL								276			
SLP	67		127	145							
SOP				161							
SP2	109		131				226				
SP3	109		131				226				
SP4	109		131				226				
SP5	109		131				226				
SP6	109		131				226				
SP7	109		131				226				
SP8	109		131				226				
SP9	109		131				226				
SP10	109		131				226				
SP11	109		131				226				
SP12	109		131				226				
SP13	109		131				226				
SP14	109		131				226				
SP15	109		132				226				
SP16	109		132				226				
SPd		121, 123									
SPL-	81										
SPS	105						253				

Index of parameter codes

Code	Page										
	[1.1 LIFT] (LIF-)	[1.2 MONITORING] (SUP-)	[1.3 SETTINGS] (SEt-)	[1.4 MOTOR CONTROL] (drC-)	[1.5 INPUTS / OUTPUTS CFG] (I-O-)	[1.6 COMMAND] (CtL-)	[1.7 APPLICATION FUNCT.] (FUn-)	[1.8 FAULT MANAGEMENT] (FLt-)	[1.9 COMMUNICATION] (COM-)	[1.12 FACTORY SETTINGS] (FCS-)	[4 PASSWORD] (COd-)
SPSA	40										
SPSB	40										
SPt							242				
SSb								277			
SSCd	46				181						
SSCP	45				180						
SSFS	46				180						
StA-	87										
StA	81		126	156							
StL	59										
StN								272			
StO-	94										
StO								277			
StP								272			
StPS	40										
Strt								273			
Stt							221				
SUL				161							
tA1	63		125				218				
tA2	63		125				218				
tA3	63		125				218				
tA4	63		126				218				
tAA							244				
tAC		121, 123									
tAr								265			
tbE	94		133				234				
tbr									285		
tbr2									285		
tbS								272			
tCC					166						
tCt					166						
td1			127				222	282			
tdC			127				222	282			
tdC1			128				223				
tdC2			128				224				

Index of parameter codes

Code	Page										
	[1.1 LIFT] (LIF-)	[1.2 MONITORING] (SUP-)	[1.3 SETTINGS] (SEt-)	[1.4 MOTOR CONTROL] (drC-)	[1.5 INPUTS / OUTPUTS CFG] (I-O-)	[1.6 COMMAND] (CtL-)	[1.7 APPLICATION FUNCT.] (FUn-)	[1.8 FAULT MANAGEMENT] (FLt-)	[1.9 COMMUNICATION] (COM-)	[1.12 FACTORY SETTINGS] (FCS-)	[4 PASSWORD] (COd-)
tdS								279			
tFO									285		
tFO2									285		
tFr			138								
tHA	101							269, 270			
tHd		121, 123									
tHr		121, 123									
tHt								267			
tLA							244				
tLC							245				
tLIG			134				244				
tLIM			134				244				
tLS			130								
tnL								280			
tOb							242				
tOSt							260				
t9b								279			
t9S	51										
tr1							241				
trA	65			147							
trn	65			146							
trP							241				
trr		121, 123									
trt							241				
tSd							241				
tSn								272			
tSS							241				
tSt							241				
ttd	101		135					267, 270			
ttd2	101							267, 270			
ttd3	101							267, 270			

Index of parameter codes

Code	Page										
	[1.1 LIFT] (LIF-)	[1.2 MONITORING] (SUP-)	[1.3 SETTINGS] (SEt-)	[1.4 MOTOR CONTROL] (drC-)	[1.5 INPUTS / OUTPUTS CFG] (I-O-)	[1.6 COMMAND] (CtL-)	[1.7 APPLICATION FUNCT.] (FUn-)	[1.8 FAULT MANAGEMENT] (FLt-)	[1.9 COMMUNICATION] (COM-)	[1.12 FACTORY SETTINGS] (FCS-)	[4 PASSWORD] (COd-)
ttH			134								
ttL			134								
ttO								285			
ttr			134				235				
tUL				154			154				
tUn	53			154							
tUS	65			155							
U0				144							
U1				144							
U2				144							
U3				144							
U4				144							
U5				144							
Ubr				162							
UC2				145							
UCP				145							
UECP	45				180						
UECU	45				180						
UELC	45				180						
UFr			127	160							
UIH1					171						
UIH2					172						
UIH4					174						
UIL1					171						
UIL2					172						
UIL4					174						
ULn		121, 123									
ULr											299
UnS	50		143								
UOH1					191						
UOH2					193						
UOH3					194						
UOL1					191						
UOL2					193						
UOL3					194						

Index of parameter codes

Code	Page										
	[1.1 LIFT] (LIF-)	[1.2 MONITORING] (SUP-)	[1.3 SETTINGS] (SEt-)	[1.4 MOTOR CONTROL] (drC-)	[1.5 INPUTS / OUTPUTS CFG] (I-O-)	[1.6 COMMAND] (CtL-)	[1.7 APPLICATION FUNCT.] (FUn-)	[1.8 FAULT MANAGEMENT] (FLt-)	[1.9 COMMUNICATION] (COM-)	[1.12 FACTORY SETTINGS] (FCS-)	[4 PASSWORD] (COd-)
UOP		121, 123									
UPL								272			
UrES								272			
USb								272			
USL								272			
USt								272			