# BLEMO ${ }^{\circledR}$ ER24 <br> Variable Speed Drives for Asynchronous and Synchronous Motors 

## Programming Manual

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All pertinentstate, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions mustbe followed.

Failure to use BLEMO software or approved software with our hardware products mayresult in injury, harm, or improper operating results.

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## Safety Information



## Important Information

## NOTICE

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, or maintain it. The following specialmessages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.


The addition of this symbol to a Danger or Warning safety label indicates that an electrical hazard exists, which will result in personal injuryif the instructions are not followed.


This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injuryor death.

## A DANGER

DANGER indicates a hazardous situation, which, if not avoided, will result in death or serious injury.

## A W ARNING

W ARNING indicates a hazardous situation, which, if not avoided, could result in death, serious injury, or equipmentdamage.

## A CAUTION

CAUTION indicates a potentially hazardous situation, which, if not avoided, could result in minor or moderate injury, or equipmentdamage.

## NOTICE

NOTICE is used to address practices not related to physical injury.

## PLEASE NOTE

Electrical equipment should be installed, operated, serviced, and maintained onlyby qualified personnel. No responsibilityis assumed byBLEMO for any consequences arising out of the use of this material.
A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

## Qualification Of Personnel

Only appropriately trained persons who are familiar with and understand the contents of this manual and all other pertinent product documentation are authorized to work on and with this product. In addition, these persons must have received safety training to recognize and avoid hazards involved. These persons must have sufficient technical training, knowledge and experience and be able to foresee and detect potential hazards that may be caused byusing the product, by changing the settings and bythe mechanical, electrical and electronic equipment of the entire system in which the product is used. All persons working on and with the product mustbe fullyfamiliar with all applicable standards, directives, and accident prevention regulations when performing such work.

## Intended Use

This product is a drive for three-phase synchronous and asynchronous motors and intended for industrial use according to this manual. The product mayonly be used in compliance with all applicable safety regulations and directives, the specified requirements and the technical data.Prior to using the product, you must perform a risk assessment in view of the planned application. Based on the results, the appropriate safety measures mustbe implemented. Since the productis used as a component in an entire system, you mustensure the safety of persons bymeans of the design of this entire system (for example, machine design). Any use other than the use explicitly permitted is prohibited and can result in hazards. Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel.

## Product related information

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

## A. ADANGER

## HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Only appropriately trained persons who are familiar with and understand the contents of this manual and all other pertinent product documentation and who have received safety training to recognize and avoid hazards involved are authorized to work on and with this drive system. Installation, adjustment, repair and maintenance must be performed by qualified personnel.
- The system integrator is responsible for compliance with all local and national electrical code requirements as wellas all other applicable regulations with respect to grounding of all equipment.
- Many components of the product, including the printed circuitboards, operate with mains voltage. Do not touch. Use only electrically insulated tools.
- Do not touch unshieldedcomponents or terminals with voltage present.
- Motors can generate voltage when the shaftis rotated. Prior to performing anytype of work on the drive system, block the motor shaft to preventrotation.
- AC voltage can couple voltage to unused conductors in the motor cable. Insulate both ends of unused conductors of the motor cable.
- Do not short across the DC bus terminals or the DC bus capacitors or the braking resistor terminals.
- Before performing work on the drive system:
- Disconnect all power, including external control power that maybe present.
- Place a "Do Not Turn On" label on all powerswitches.
- Lock all power switches in the open position.
- Wait 15 minutes to allow the DC bus capacitors to discharge. The DC bus LED is not an indicator of the absence of DC bus voltage that can exceed 800 Vdc .
Measure the voltage on the DC bus between the DC bus terminals (PA+ and PC/-) using a properly rated voltmeter to verify that the voltage is $<42 \mathrm{Vdc}$.
- If the DC bus capacitors do not discharge properly, contact your local BLEMO representative. Do not repair or operate the product.
- Install and close all covers before applying voltage.

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

Drive systems mayperform unexpected movements because of incorrect wiring, incorrect settings, incorrect data or other errors.

| WARNING |
| :--- |
| UNEXPECTED EQUIPMENT OPERATION |
| - Carefully install the wiring in accordance with the EMC requirements. |
| - Do not operate the product with unknown or unsuitable settings or data. |
| - Perform a comprehensive commissioningtest. |
| Failure to follow these instructions can result in death, serious injury, or equipment damage. |

Damaged products or accessories may cause electric shock or unanticipated equipment operation.

## A ADANGER

ELECTRIC SHOCK OR UNANTICIPATED EQUIPMENT OPERATION
Do not use damaged products or accesssories.
Failure to follow these instructions will result in death or serious injury.
Contact your local BLEMO sales office if you detect any damage.

## A WARNING

## LOSS OF CONTROL

- The designer of any control scheme must consider the potential failure modes of control paths and, for critical control functions, provide a means to achieve a safe state during and after a path failure. Examples of critical control functions are emergencystop, overtravel stop, power outage and restart.
- Separate or redundant control paths must be provided for critical control functions.
- System control paths mayinclude communicationlinks. Consideration must be given to the implications of unanticipated transmission delays or failures of the link.
- Observe all accident prevention regulations and locals safetyguidelines. ${ }^{1}$
- Each implementation of the product must be individually and thoroughly tested for proper operation before being placed into service.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

1. For USA: Additional inf ormation, ref er to NEMA ICS 1.1 (latest edition), "Saf ety Guidelines for the Application, Installation, and Maintenance of Solid State Control" and to NEMA ICS 7.1 (latest edition), "Saf ety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable-Speed Driv e Sy stems".

| NOT/CE |
| :--- |
| DESTRUCTION DUE TO INCORRECT MAINS VOLTAGE |
| - Before switching on and configuring the product, verify that it is approved for the mains voltage. |
| Failure to follow these instructions can result in equipment damage. |

## A WARNING

## HOT SURFACES

- Ensure that any contact with hot surfaces is avoided.
- Do not allow flammable or heat-sensitive parts in the immediate vicinity of hot surfaces.
- Verify that the product has sufficiently cooled down before handlingit.
- Verify that the heat dissipation is sufficient byperforming a testrun under maximum load conditions

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

## A WARNING

## EXPLOSION HAZARD

Only use this device outside of hazardous areas (explosive atmospheres).
Failure to follow these instructions can result in death, serious injury, or equipment damage.

## About the Book

## At a Glance

## Document scope

The purpose of this document is to:

- help you to set-up the drive,
- show you how to program the drive,
- show you the different menus, modes and parameters,
- help you in maintenance and diagnostics.


## Validity note

NOTE: The products listed in the document are not all available at the time of publication of this document online. The data, illustrations and product specifications listed in the guide will be completed and updated as the product availabilities evolve. Updates to the guide will be available for download once products are released on the market.
This documentation is valid for the ER24 drive.
The characteristics that are presented in this manual should be the same as those characteristics that appear online. In line with our policy of constant improvement, we may revise content over time to improve clarity and accuracy. If you see a difference between the manual and online information, use the online information as your reference.

Use your tablet or your PC to quickly access detailed and comprehensive information on all our products on www.blemo.com.
The internet site provides the information you need for products and solutions

## Terminology

The technical terms, terminology, and the corresponding descriptions in this manual normally use the terms or definitions in the relevant standards.

In the area of drive systems this includes, but is not limited to, terms such as error, error message, failure, fault, fault reset, protection, safe state, safety function, warning, warning message, and so on.
Among others, these standards include:

- IEC 61800 series: Adjustable speed electrical power drive systems
- IEC 61508 Ed. 2 series:Functional safety of electrical/electronic/programmable electronic safety-related
- EN 954-1 Safety of machinery- Safety related parts of control systems
- EN ISO 13849-1 \& 2 Safety of machinery-Safety related parts of control systems.
- IEC 61158 series: Industrial communication networks - Fieldbus specifications
- IEC 61784 series: Industrialcommunication networks - Profiles
- IEC 60204-1: Safety of machinery- Electrical equipment of machines - Part 1: General requirements

In addition, the term zone of operation is used in conjunction with the description of specific hazards, and is defined as it is for a hazard zone or danger zone in the EC Machinery Directive (2006/42/EC) and in ISO 12100-1.

Also see the glossaryat the end of this manual.

## General Overview

## What's in this Part?

This part contains the following chapters:

| Chapter | Chapter Name | Page |
| :---: | :--- | :---: |
| 1 | Overview | $\underline{17}$ |
| 2 | Setup | $\underline{37}$ |

## Overview

## What's in this Chapter?

This chapter contains the following topics:

| Topic | Page |
| :--- | :---: |
| Factory configuration | $\underline{18}$ |
| Application functions | $\underline{19}$ |
| Basic functions | $\underline{23}$ |
| Graphic display terminal option | $\underline{24}$ |
| Graphic display terminal option | $\underline{24}$ |
| Pow ering up the drive for the first time | $\underline{27}$ |
| Remote display terminal option | $\underline{30}$ |
| Structure of the parameter tables | $\underline{31}$ |
| Finding a parameter in this document | $\underline{32}$ |
| Description of the HMl | $\underline{33}$ |
| Structure of the menus | $\underline{35}$ |

## Factory configuration

## Factory settings

The ER24 is factory-set for common operating conditions:

- Display: drive ready [Ready] (rdY) when motor is ready to run and the output frequency when motor is running.
- The LI3 to LI6 logic inputs, Al2 and Al3 analog inputs, LO1 logic output, AO1 analog output, and R2 relay are unassigned.
- Stop mode if error is detected:freewheel.

| Code | Description | Factory settings values | Page |
| :---: | :---: | :---: | :---: |
| bFr | [Standard mot. freq] | [50Hz IEC] | 86 |
| tCC | [2/3 w ire control] | [2 w ire](2C): 2 -wire control | 85 |
| Ctt | [Motor control type] | [Standard] (Std) : standard motor law | 105 |
| ACC | [Accele ration] | 3.0 seconds | 87 |
| dEC | [Deceleration] | 3.0 seconds | 87 |
| LSP | [Low speed] | 0 Hz | 87 |
| HSP | [High speed] | 50 Hz | $\underline{87}$ |
| \\|tl| | [Mot. therm. current] | Nominal motor current (value depending on drive rating) | 87 |
| SolC1 | [Auto DC inj. level 1] | $0.7 \times$ nominal drive current, for 0.5 seconds | $\underline{93}$ |
| SFr | [Sw itching freq.] | 4 kHz | 94 |
| Frd | [Forw ard] | [L1] (L - 11): Logic input LI1 | 126 |
| rrs | [Reverse assign.] | [L12] (LI2): Logic input LI2 | 126 |
| Fr1 | [Ref. 1 channel] | [Al1] (Al1) : Analog input Al1 | 154 |
| r1 | [R1 Assignment] | [No drive flt] (FLt): The contact opens when a fault is detected or when the drive has been sw itched off | 138 |
| brA | [Dec ram p adapt.] | [Yes] (YES): Function active (automatic adaptation of deceleration ramp) | 172 |
| Atr | [Automatic restart] | [ No ] (nO): Function inactive | 252 |
| Stt | [Type of stop] | [Ramp stop] (rMP): On ramp | 173 |
| CFG | [Macro configuration] | [Start/Stop] (StS) | $\underline{82}$ |

Note: If you want to keep the drive presettings to a minimum, select the macro configuration [Macro configuration] (CFG) $=$ [Start/stop] (StS) followed by
[Restore config.] $(F C S)=[$ Config. CFG] (\|\|I). For more information, see page 82.

Check whether the values above are compatible with the application.

## Application functions

The tables on the following pages show the combinations of functions and applications, in order to guide your selection.
The applications in these tables relate to the following machines, in particular:

- Hoisting: cranes, overhead cranes, gantries (vertical hoisting, translation, slewing), lifting platforms
- Handling: palletizers/depalletizers, conveyors, roller tables
- Packing: carton packers, labeling machines
- Textiles: weaving looms, carding frames, was hing machines, spinners, drawing frames
- Wood: automatic lathes, saws, milling
- Process

Each machine has its own special features, and the combinations listed here are neither mandatory nor exhaustive.

Some functions are designed specificallyfor a particular application. In this case, the application is identified by a tab in the margin on the relevant programming pages.

## Motor control functions

| Functions | Page | Applications |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | (in | ( | - | ¢ | \% |  |
| V/f ratio | $\underline{105}$ |  |  |  |  |  |  |
| Sensorless flux vector control | 105 |  |  |  |  |  |  |
| 2-point vector control | $\underline{105}$ |  |  |  |  |  |  |
| Open-loop synchronous motor | 105 |  |  |  |  |  |  |
| Output frequency up to 599 Hz | $\underline{105}$ |  |  |  |  |  |  |
| Motor overvoltage limiting | $\underline{120}$ |  |  |  |  |  |  |
| DC bus connection (see Installation manual) | - |  |  |  |  |  |  |
| Motor fluxing using a logic input | $\underline{189}$ |  |  |  |  |  |  |
| Sw itching frequency of up to 16 kHz | $\underline{94}$ |  |  |  |  |  |  |
| Auto-tuning | 87 |  |  |  |  |  |  |

## Functions on speed references

| Functions | Page | Applications |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | ( 읃 | ( ㅈㅡㅡ | 矿 |  | \% | ¢ |
| Differential bipolar reference | 129 |  |  |  |  |  |  |
| Reference delinearization (magnifying glass effect) | 131 |  |  |  |  |  |  |
| Frequency control input | 154 |  |  |  |  |  |  |
| Reference switching | 167 |  |  |  |  |  |  |
| Reference summing | 168 |  |  |  |  |  |  |
| Reference subtraction | 168 |  |  |  |  |  |  |
| Reference multiplication | $\underline{168}$ |  |  |  |  |  |  |
| Adjustable profile ramp | $\underline{170}$ |  |  |  |  |  |  |
| Jog operation | $\underline{178}$ |  |  |  |  |  |  |
| Preset speeds | $\underline{180}$ |  |  |  |  |  |  |
| + speed/ - speed using single action pushbuttons (1 step) | 184 |  |  |  |  |  |  |
| + speed/ - speed using double action pushbuttons (2 steps) | 184 |  |  |  |  |  |  |
| +/- speed around a reference | 187 |  |  |  |  |  |  |
| Save reference | 188 |  |  |  |  |  |  |

## Application-Specific functions

| Functions | Page | Applications |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | 읃 | ( 즟 | 은 |  | \% | ¢ |
| Fast stop | 173 |  |  |  |  |  |  |
| Brake control | 191 |  |  |  |  |  |  |
| Load measurement | $\underline{199}$ |  |  |  |  |  |  |
| High-speed hoisting | 201 |  |  |  |  |  |  |
| Rope slack | $\underline{204}$ |  |  |  |  |  |  |
| PID regulator | 206 |  |  |  |  |  |  |
| Motor/generator torque limit | $\underline{215}$ |  |  |  |  |  |  |
| Load sharing | 122 |  |  |  |  |  |  |
| Line contactor control | $\underline{220}$ |  |  |  |  |  |  |
| Output contactor control | $\underline{223}$ |  |  |  |  |  |  |
| Positioning by limit sw itches or sensors | $\underline{224}$ |  |  |  |  |  |  |
| Stop at distance calculated after deceleration limit sw itch | $\underline{226}$ |  |  |  |  |  |  |
| Parameter sw itching | $\underline{229}$ |  |  |  |  |  |  |
| Motor or configuration switching | 232 |  |  |  |  |  |  |
| Traverse control | 237 |  |  |  |  |  |  |
| Stop configuration | 173 |  |  |  |  |  |  |

## Safety functions/Fault management

| Functions | Page | Applications |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | (읃 | (읓 | 吅 |  | - | - |
| Safe Torque Off (STO) (Safety function, see dedicated document) |  |  |  | $\square$ |  |  |  |
| Deferred stop on thermal alarm | $\underline{258}$ |  |  |  |  |  |  |
| Alarm handling | 145 |  |  |  |  |  |  |
| Fault management | $\underline{250}$ |  |  | $\square$ | $\square$ |  |  |
| IGBT tests | $\underline{260}$ |  |  |  |  |  |  |
| Catch a spinning load | $\underline{253}$ |  |  |  |  |  |  |
| Motor protection w ith PTC probes | $\underline{250}$ | - | - | $\square$ | - |  |  |
| Undervoltage management | $\underline{259}$ |  |  |  |  |  |  |
| 4-20 mA loss | $\underline{260}$ |  |  |  |  |  |  |
| Uncontrolled output cut (output phase loss) | 256 |  |  |  |  |  |  |
| Automatic restart | $\underline{252}$ |  |  |  |  |  |  |
| Use of the "Pulse input" input to measure the speed of rotation of the motor | 265 |  |  |  |  |  |  |
| Load variation detection | $\underline{267}$ |  |  |  |  |  |  |
| Underload detection | $\underline{270}$ |  |  |  |  |  |  |
| Overload detection | 272 |  |  |  |  |  |  |
| Safety Integrated functions (see related documents page 12) |  |  |  | $\square$ | $\square$ |  |  |

## Basic functions

## Drive ventilation

The fan starts autom atically when the drive thermal state reaches $70 \%$ of the maximum thermal state and if the [Fan Mode] (FFM) is setto [Standard] (Std).

## Graphic display terminal option

## Description of the graphic display terminal

With the graphic displayterminal, which works with FLASH V1.1IE26 or higher, it is possible to displaymore detailed information than can be shown on the integrated displayterminal.


Note: Keys 3, 4, 5 and $\mathbf{6}$ can be used to control the drive directly, if control via the graphic displayterminal is activated.

To activate the keys on the remote displayterminal, you first have to configure [Ref. 1 channel] (Fr1) = [HMI] (LCC). For more inform ation, see page 154.

## Example configuration windows:

## Single selection

|  |
| :--- |
| LANGUAGE |
| English |
| Irançals |
| Deutsch |
| Italiano |
| Español |
| Ctninese |
| Pycckии |
| Turkçe |

When pow ering up the graphic display terminal for the first time, the user has to select the required language.

When only one selection is possible, the selection made is indicated by $\checkmark$. Example: Only one language can be chosen.

## Multiple selection

| PARAMETER SELECTION |  |
| :---: | :---: |
| SETTINGS |  |
| Ramp increment | $\checkmark$ |
| Acceleration-- | $\square$ |
| Deceleration- |  |
| Acceleration2- |  |
| Deceleration2 |  |
|  | Edit |

When multiple selection is possible, the selections made are indicated by $\checkmark$. Example: A number of parameters can be chosen to formthe [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 jog dial is rotated to increase or decrease this number.

## Example visualization of function blocks state:

| RDY \$ | Term | +0.0 | 0.0 A |
| :---: | :---: | :---: | :---: |
| Acceleration |  |  |  |
| $\mathrm{Min}=0.00$ | 9.51 s |  |  |
|  | Max $=99.99$ |  |  |
|  | << | >> | Quick |

$\otimes$ OFF light: A valid function blocks program is in the ER24 in stop mode.

- ON light: A valid function blocks programis in the ER24 in run mode. The drive is considered as being in running state and configuration parameters cannot be modified.


## Powering up the drive with Graphic display terminal for the first time

When powering up the graphic dis playterminal for the first time, the user has to select the required language.


Display after the graphic display terminal has been pow ered up for the first time. Select the language and press ENT.


The drive's rating details w ill now appear.

| RDY $\quad$ Term 0.0 Hz | 0.0 A |
| :--- | ---: |
| ACCESS LEVEL |  |
| Bastc |  |
| Standard | $\checkmark$ |
| Advanced |  |
| Expert |  |
|  |  |



## Powering up the drive for the first time

With the integrated displayterminal, when powering up the drive for the firsttime, the userimmediately accesses to [Standard mot. freq] (bFr) (see page 86) in the menu (COnF > FULL > SIM).


The [ACCESS LEVEL] screen follow s automatically.

Automatically sw itches to the [1 DRIVE MENU] menu after 3 seconds. Select the menu and press ENT.

$$
\downarrow \quad \text { ESC }
$$

| MAIN MENU |
| :--- |
| T DRIVEIMENU |
| 2 IDENTIFICATION |
| 3 INTERFACE |
| 4 OPEN / SAVE AS |
| 5 PASSWORD |
|  |

The MAIN MENU appears on the graphic display terminal if you press the ESC key.

## Subsequent power-ups

With the integrated displayterminal, at subsequent power-ups of the drive for the first time, the user immediatelyaccesses to the drive state (Same liste than [Drive state] (HS1) page 65). Example: Ready (rdY).


Display after pow ering up.

| RDY | Term 0.0 Hz | 0.0 A |  |
| :--- | :--- | :--- | :--- |
| 1 DRIVE MENU |  |  |  |
| 1.1 SPEED REFERENCE |  |  |  |
| 1.2 MONITORING |  |  |  |
| 1.3 CONFIGURATION |  |  |  |
|  |  |  |  |
| Code | $\ll$ | $\gg$ | Quick |

Automatically sw itches to the [1 DRIVE MENU] menu after 3 seconds. Select the menu and press ENT.


| RDY | Term | $+0.0 \mathrm{~Hz}$ | 0.0 A |
| :---: | :---: | :---: | :---: |
| Frequency ref. |  |  |  |
| $+1.3 \mathrm{~Hz}$ |  |  |  |
| Min =-599.0 |  | Max | = 599.0 |
|  |  |  | Quick |

Automatically sw itches to the monitoring screen after 10 seconds.

## Identification menu

The [IDENTIFICATION] (Old-) menu can only be accessed on the graphic display terminal.
This is a read-only menu that cannot be configured. It enables the following inform ation to be displayed:

- Drive reference, power rating and voltage
- Drive software version
- Drive serial number
- Safety function status and checksum
- Function blocks program and catalogue version
- Type of options present, with their software version
- Graphic displayterminal type andversion



## Remote display terminal option

## Description of the remote display terminal

This rem ote displayterminal is a local control unit which can be mounted on the door of the wall-mounted or floor-standing enclosure. It has a cable with connectors, which is connected to the drive serial link (see the documentation supplied with the remote displayterminal). With this remote displayterminal, up and down arrows are used for navigation rather than a jog dial.

(1) If the drive is locked by a code ([PIN code 1] (COd) page 300), pressing the MODE key enables you to switch from the [1.2 MONITORING] (MOn-) menu to the [1.1 SPEED REFERENCE] ( $\mathrm{rEF} F_{-}$) menu and vice versa.

To activate the keys on the remote display terminal, you first have to configure [Ref. 1 channel] $($ Fr1 $)=$ [HMI] (LCC). For more information, see page 154.

## Structure of the parameter tables

The parameter tables contained in the descriptions of the various menus are organized as follows. Example:


1. Way to access the parameters described in this page
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 submenu on graphic display terminal
6. Name of parameter on graphic display terminal
7. Value of parameter on graphic display terminal

Note: The text in square brackets [] indicates what you will see on the graphic displayterminal.

A menu followed by the mention "(continued)" appears sometimes to locate you in the structure.
Example:

| FUn- | [APPLICATION FUNCT.] (continued) |
| :--- | :--- |
| Pld- | [PID REGULATOR] <br> Note: This function cannot be used w ith certain other functions. Follow the instructions on page 162. |

In this case, the mention "(continued)" indicates that the [APPLICATION FUNCT.] submenu is above the [PID REGULATOR] submenu in the structure.

A parameter can contain some pictograms. Each pictogram has its legend at the end of the table.
Main mictograms:

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.

Parameter that can be modified during operation or when stopped.

## Finding a parameter in this document

The following assistance with finding explanations on a param eter is provided:

- With the integrated displayterminal and the remote displayterminal: Direct use of the parameter code index, page 321 , to find the page giving details of the displayed parameter.
- With the graphic displayterminal:Select the required parameter and press F1 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 $\underline{321}$, to find the page giving details of the displayed parameter.


## Description of the HMI

## Functions of the Display and the Keys

1 The ESC key is used for menu navigation (backward) and parameters adjustment (cancel)
2 The Jog dial is used for menu navigation (up or down) and parameters adjustment (increase/decrease value or elementchoice). It can be used as Virtual analogic input 1 for drive frequency reference.
3 The ENT key (push on the Jog dial) is used for menu navigation (forward) and param eters adjustment (validate)


| A | REF mode selected (rEF-) | E | Dot used to display parameter value (1/10 unit) |  |
| :--- | :--- | :--- | :--- | :---: |
| B | MON mode selected (MOn-) | F | Current display is parameter value |  |
| C | CONF mode selected (COnF) | G | Current display is parameter unit |  |
| D | Dot used to display parameter value (1/100 unit) |  |  |  |

Normal display, with no error code displayed and no startup:
Displays the parameter selected in the [1.2 MONITORING] (MOn-) menu (default:
[Frequency ref.] (FrH)).

- In It: Initialization sequence (only on remote displayterminal)
- tUN: AutoTuning
- dCb: Injection braking
- rdY:Drive ready
- nSt: Freewheel stop control
- CLII: Currentlimit
- FSt: Faststop
- FLU: Fluxing function is activated
- nLP: Control is powered on but the DC bus is not loaded
- CtL: Controlled stop
- Obrr: Adapted deceleration
- SOC: Stand by output cut
- USA: Undervoltage alarm
- SS1: Safety function SS1
- SLS: Safety function SLS
- StO: Safety function STO
- SMS: Safety function SMS
- GdL: Safety function GDL

In the event of a detected error, the display will flash to notify the user accordingly. If a graphic displayterminal is connected, the name of the detected error will be displayed.

## Structure of the menus

| Pow ering up |  | Parameter selection |
| :--- | :--- | :--- |
| $-($ This parameter is only visible when |  |  |
| the drive is pow ered up for the first |  |  |
| time. |  |  |
| The setting can be amended |  |  |
| subsequently in the menu |  |  |
| [MOTOR CONTROL] (drC-) for |  |  |
| [Standard mot. freq] (bFr) |  |  |

On the 7-segment display, a dash after menu and submenu codes is used to differentiate them from parameter codes

Example: [APPLICATION FUNCT.] (FUn-) menu, [Acceleration] (ACC) parameter

## Selection of multiple assignments for one parameter

Example: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 digiton the right indicates:


The same principle is used for all multiple selections.

## Setup

## What's in this Chapter?

This chapter contains the following topics:

| Topic | Page |
| :--- | :---: |
| Steps for setting-up the drive | $\underline{38}$ |
| Initial steps | $\underline{39}$ |



- Before beginning programming, complete the customer setting tables, page 321 .
- Use the [Restore config.] (FCS) parameter, page 81, to return to the factory settings at any time.
- To locate the description of a function quickly, use the index of functions page 319 .
- Before configuring a function, read carefully the "Function compatibility" section page 165 .

Note: The following operations mustbe performed for optimum drive performance in terms of accuracy and response time:

- Enter the values indicated on the motor rating plate in the [MOTOR CONTROL] (drC-) menu, page 105.
- Perform auto-tuning with the motor cold and connected using the [Auto-tuning] (tUn) parameter, page 87.

2. Apply input power to the drive, but do not give a run command.

## 3. Configure:

- The nominal frequency of the motor
[Standard mot. freq] (bFr) page 86 if this is not 50 Hz .
- The motor parameters in the [MOTOR CONTROL] (drC-) menu, page 105, only if the factory configuration of the drive is notsuitable.
- The application functions in the
[INPUTS / OUTPUTS CFG] (I__O-) menu, page 125, the [COMMAND] (CtL-) menu, page 154, and the
[APPLICATION FUNCT.] (FUn-) menu, page 167, only if the factory configuration of the drive is not suitable.

4. In the [SETTINGS] (SEt-) menu, adjust the following parameters:

- [Acceleration] (ACC), page 87 and [Deceleration] (dEC), page 87 .
- [Low speed] (LSP), page 87 and [High speed] (HSP), page 89.
- [Mot. therm. current] (ItH), page 87.


## 5. Start the drive.

## Initial steps

If the drive was not connected to mains for an extended period of time, the capacitors mustbe restored to their full performance before the motor is started.

## NOTICE

## REDUCED CAPACITOR PERFORMANCE

- Apply mains voltage to the drive for one hour before starting the motor if the drive has not been connected to mains for the following periods oftime:
-12 months at a maximum storage temperature of $+50^{\circ} \mathrm{C}\left(+122^{\circ} \mathrm{F}\right)$.
-24 months at a maximum storage temperature of $+45^{\circ} \mathrm{C}\left(+113^{\circ} \mathrm{F}\right)$
-36 months at a maximum storage temperature of $+40^{\circ} \mathrm{C}\left(+104^{\circ} \mathrm{F}\right)$.
- Verify that no Run command can be applied before the period of one hour has elapsed.
- Verify the date of manufacture if the drive is commissioned for the firsttime and run the specified procedure if the date of manufacture is more than 12 months in the past.
Failure to follow these instructions can result in equipment damage.
If the specified procedure cannot be perform ed without a Run com mand because of internal mains contactor control, perform this procedure with the power stage enabled, but the motor being at a standstill so that there is no appreciable mains current in the capacitors.


## Before powering up the drive

| WNRNING |
| :--- |
| UNANTICIPATED EQUIPMENT OPERATION |
| Before switching onthe device, verify that no unintended signals canbe applied to the digitalinputs that could |
| cause unintended movements. |
| Failure to follow these instructions can result in death, serious injury, or equipment damage. |

## Drive locked

If a Run command such as Run forward, Run reverse, DC injection is still active during:

- productresetto the factorysettings,
- manual "Fault Reset" using [Fault Reset] (RsF),
- manual "Fault reset" by applying a product switched off and on again,
- stop comm and given by channel that is not the active channel command (such as Stop key of the displayterminal in $2 / 3$ wires control).

The drive is in a blocking state and displays [Freewheel stop] ( nSt ). It will be necessary to deactivate all active Run commands prior to authorizing a new Run command.

## Mains contactor

## NOTICE

RISK OF DAMAGE TO THE DRIVE
Do not switch on the drive at intervals of less than 60 s .
Failure to follow these instructions can result in equipment damage.

Using a motor with a lower rating or dispensing with a motor altogether
With the factory settings, motor outputphase loss detection is active ([Output Phase Loss] (OPL) = [Yes] (YES), page 256). To avoid having to use a motor with the same rating as the drive when testing the drive or during a maintenance phase, deactivate the motor outputphase loss detection ([Output Phase Loss] $(\mathrm{OPL})=[\mathrm{No}](\mathrm{nO})$ ). This can prove particularlyus eful if very large drives are being tested with a small motor.
Set [Motor control type] (Ctt), page 105, to [Standard] (Std) in [Motor control menu] (drC-).

## NOTICE

## MOTOR OVERHEATING

Install external thermal monitoring equipment under the following conditions:

- If a motor with a nominal current of less than $20 \%$ of the nominal current of the drive is connected.
- If you use the function Motor Switching.

Failure to follow these instructions can result in equipment damage.

## A. ADANGER

## HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

If output phase monitoring is dis abled, phase loss and, by implication, accidental disconnection of cables, are not detected.

- Verify that the setting of this parameter does not resultin unsafe conditions.

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

## Programming

## What's in this Part?

This part contains the following chapters:

| Chapter | Chapter Nam e | Page |
| :---: | :--- | :---: |
| 4 | Reference Mode (rEF) | $\underline{43}$ |
| 5 | Monitoring Mode (MOn) | $\underline{47}$ |
| 6 | Configuration Mode (ConF) | $\underline{77}$ |
| 7 | Interface (IFF) | $\underline{279}$ |
| 8 | Open / Save as (trA) | $\underline{295}$ |
| 9 | Passw ord (COd) | $\underline{299}$ |
| 10 | Multipoint Screen | $\underline{301}$ |

Incorrect wiring, unsuitable settings or unsuitable data may trigger unanticipated movements, trigger signals or dam age parts and disable monitoring functions.

|  |
| :--- |
| UNANTICIPATED EQUIPMENT OPERATION |
| - Do not operate the drive system with unknown settings or data. |
| - Never modify a parameter unless you fully understand the parameter and all effects of the modification. |
| - When commissioning the product, carefully run tests for all operating states and potential error situations. |
| - Verify that a functioning emergencystop push-button is within reach of all persons involved in running |
| tests. |
| - Verify the functions after replacing the product and also after making changes to the settings or data. |
| - Anticipate movements in unintendeddirections or oscillation of the motor. |
| - Only operate the system ifthere are no persons or obstructions in the zone of operation. |
| Failure to follow these instructions can result in death, serious injury, or equipment damage. |

If the power stage is dis abled unintentionally, for example as a result of power outage, errors or functions, the motor is no longer decelerated in a controlled way.

| M W ARNING |
| :--- |
| MOVEMENT WITHOUT BRAKING EFFECT |
| Verify that movements withoutbraking effect cannot cause injuries or equipment damage |
| Failure to follow these instructions can result in death, serious injury, or equipment damage. |

## Reference Mode(rEF)

## What's in this Chapter?

This chapter contains the following topics:

| Topic | Page |
| :--- | :---: |
| Introduction | $\underline{44}$ |
| Organization tree | $\underline{45}$ |
| Menu | $\underline{46}$ |

Use the reference mode to monitor and, if the reference channel is the analog input 1 ([Ref. 1 channel] (Fr1) page 154 set to [Al virtual 1] (AIU1)), adjustthe actual reference value by modifying the analog input voltage value.

If local control is enabled ([Ref. 1 channel] (Fr1) page 154 setto [HMI] (LCC)), the jog dial on the rem ote displayterminal or the Up/Down Navigation keys on the remote display terminalacts as a potentiometer to change the reference value up and down within the limits presetby other parameters ([Low speed] (LSP) or [High speed] (HSP)).

There is no need to press the ENT key to confirm the change of the reference.

## Organization tree

(1) Depending on the active reference channel

Possible values:
(AIU1)
(LFr)
(MFr)
(rPI)
( FrH )
(rPC)
(2) 2 s or ESC

Displayed parameter value and unit of the diagramare given as examples.


## Menu

| Code | Name / Description | Adjustment range | Factory setting |
| :---: | :---: | :---: | :---: |
| drl- | [1 DRIVE MENU] |  |  |
| rEF- | [1.1 SPEED REFERENCE] <br> Displayed parameters depend on drive settings |  |  |
| $\begin{gathered} \text { AIU1 } \\ * \end{gathered}$ <br> () <br> (1) | First virtual Al value. <br> This parameter allow s to modify the frequency reference with the embedded jog dial. |  |  |
| $\begin{gathered} \text { LFr } \\ \text { * } \end{gathered}$ <br> () <br> (1) | HMI frequency reference(signed value). <br> This parameter allow s to modify the frequency reference with the remote HM . |  |  |
| $\begin{gathered} \hline \text { MFr } \\ * \\ \text { () } \end{gathered}$ | Multiply frequency variable. <br> Multiplying coefficient, can be accessedif [Multiplier ref.-] (MA2,MA3) page 169 has been assigned to the graphic terminal. |  |  |
| rP\\| * () <br> (1) | PID: Internal reference PI. <br> This parameter allow s to modify the PID internal reference with the jog dial. Internal PID reference is visible if [PID feedback] (PIF) is not set to [ No ] ( nO ). |  |  |
| $\begin{gathered} \hline \text { FrH } \\ * \end{gathered}$ | Frequency referencebefore ramp (signed value). <br> Actual frequency reference applied to the motor regardless of which reference channel has been selected. This parameter is in read-only mode. <br> Frequency referenceis visible if the command channel is not HMI or virtual AI. |  |  |
| $\begin{gathered} \text { rPC } \\ * \end{gathered}$ | PID: Setpoint value. <br> PID reference is visible if [PID feedback] (PIF) is not set to [No] (nO). |  |  |

(1) It is not necessary to press the ENT key to confirmthe modification of the reference.

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

## Monitoring Mode (MOn)

## What's in this Chapter?

This chapter contains the following topics:

| Topic | Page |
| :--- | :---: |
| Introduction | $\underline{48}$ |
| Organization tree | $\underline{49}$ |
| Menu | $\underline{50}$ |

The parameters can be accessed when the drive is running or stopped.
Some functions have numerous parameters. In order to clarify program ming and avoid having to scroll through endless parameters, these functions have been grouped in subm enus. Like menus, submenus are identified by a dash after their code.
When the drive is running, the value displayed is one of the monitoring parameters. By default, the value displayed is the inputfrequency reference ([Frequency ref.] (FrH) parameterpage 50).
While the value of the new monitoring parameter required is being displayed, press a second time on the jog dial key to displaythe units or press and hold down the jog dial (ENT) again (for 2 seconds) to confirm the change of monitoring parameter and store it. From then on, it is the value of this parameter that will be displayed during operation (even after powering down).
Unless the new choice is confirmed by pressing and holding down ENT again, the display will revert to the previous param eter after powering down.
Note: After the drive has been turned off or following a loss of supplymains, the parameter displayed is the drive status (example:[Ready] (rdY)). The selected parameter is dis played following a run command.

## Organization tree

Displayed parameters of the diagram are given as examples.

(1) Visible only with graphic display terminal

## Menu



| Code | Name / Description ${ }^{\text {a }}$ |
| :---: | :---: |
| MOn- | [1.2 MONITORING] (continued) |
| MMO- | [MONIT. MOTOR] |
| 12tM | [12t overload level] <br> Monitoring of Ft overload level <br> This parameter can be accessed if [Pt model activation] (IITA) is set to [Yes] (YES) see page 219 |
| IOM- | [//O MAP] |
| L\\|A - | [LOGIC INPUT CONF.] <br> Logic input functions. |
| LIA | [LI1 assignment] <br> Read-only parameters, cannot be configured. <br> It displays all the functions that are assigned to the logic input in order to check for multiple assignments. <br> If no functions have been assigned, $[\mathrm{No}](\mathrm{nO})$ is displayed. Use the jog dial to scroll through the functions. <br> The use of graphic display terminal allow sto see the delay [LI1 On Delay] (L1d). Possible values arethe same than in configuration menu page 127. |
| $\begin{array}{r} \text { to } \begin{array}{r} \text { L2A } \\ \text { L䧓A } \\ \text { LA } \\ \text { LA2A } \end{array} \end{array}$ | [L-- assignment] <br> All the logic inputs available on the drive are processed as in the example for LII above. |
| LIS1 | [State of logic inputs LI1 to LI6] <br> Can be used to visualize the state of logic inputs LI1 to LI6 (display segment assignment: high = 1, low =0). <br> Example above: LI1 and LI6 are at 1; LI2 to LI5 are at 0 . |
| LIS2 | [State of Safe Torque Off] <br> Can be used to visualize the state of LA1, LA2 and STO (Safe Torque Off) (display segment assignment: high =1, low =0). <br> Example above: LA1 and LA2 are at 0; STO (Safe Torque Off) is at 1. |


| $\begin{array}{ll}\text { Parameters described in this page can be accessed by: } & \text { DRF }>\text { MON- }>1 O M->\text { AlA- }\end{array}$ |  |  |
| :---: | :---: | :---: |
| Code | Name / Description | Unit |
| Al/A- | [ANALOG INPUTS IMAGE] <br> Analog input functions. |  |
| Al1 C | [Al1] <br> Al1 customer image: Value of analog input 1. |  |
| Al1A <br> nO <br> Fr1 <br> Fr2 <br> SA2 <br> PIF <br> tAA <br> dA2 <br> PIM <br> FPI <br> SA3 <br> Fr1b <br> dA3 <br> FLOC <br> MA2 <br> MA3 <br> PES <br> IA01 <br> IA10 | [Al1 assignment] <br> Al1 functions assignment. If no functions have been assigned, $[\mathrm{No}](\mathrm{nO})$ is displayed. <br> Follow ing parameters are visible on the graphic display terminal by pressing the ENT key on the parameter. <br> [No] (nO): Not assigned <br> [Ref. 1 channel] (Fr1): Reference source 1 <br> [Ref. 2 channel] (Fr2): Reference source 2 <br> [Summing ref. 2] (SA2): Summing reference2 <br> [PID feedback] (PIF): Pl feedback (PI control) <br> [Torque limitation] (tAA): Torque limitation: Activation by an analog value <br> [Subtract.ref. 2] (dA2): Subtracting reference 2 <br> [Manual PID ref.] (PIM): Manual speed reference of the PI(D) regulator (auto-man) <br> [PID speed ref.] (FPI): Speed reference of the PI(D) regulator (predictive reference) <br> [Sum ming ref. 3] (SA3): Summing reference 3 <br> [Ref.1B channel] (Fr1b): Reference source 1B <br> [Subtract.ref. 3] (dA3): Subtracting reference 3 <br> [Forced local] (FLOC): Forced local reference source <br> [Ref. 2 multiplier] (MA2): Multiplying reference 2 <br> [Ref. 3 multiplier] (MA3): Multiplying reference 3 <br> [Weight input] (PES): External w eight measurement function <br> [IA01] (IA01): Functions blocks: Analog Input 01 <br> ... <br> [IA10] (IA10): Functions blocks: Analog Input 10 |  |
| UIL1 | [Al1 min value] <br> Voltage scaling parameter of $0 \%$. |  |
| UIH1 | [Al1 max value] <br> Voltage scaling parameter of $100 \%$. |  |
| Al1 F | [Al1 filter] <br> Interference filtering cut-off time of the low -filter. |  |
| AlA - | [ANALOG INPUTS IMAGE] (continued) Analog input functions. |  |
| Al2C | [AI2] <br> Al2 customer image: Value of analog input 2. |  |
| Al2A | [AI2 assignment] <br> Al2 functions assignment. If no functions have been assigned, $[\mathrm{No}](\mathrm{nO})$ is displayed. Follow ing parameters are visible on the graphic display terminal by pressing the ENT key on the parameter. Identical to [A11 assignment] (Al1A) page $5 \underline{2}$. |  |
| UIL2 | [Al2 min value] <br> Voltage scaling parameter of $0 \%$. | V |
| U1H2 | [Al2 max value] <br> Voltage scaling parameter of $100 \%$. | V |
| Al2F | [Al2 filter] <br> Interference filtering cutoff time of the low -filter. | s |


| Code | Name / Description | Unit |
| :---: | :---: | :---: |
| Al/A- | [ANALOG INPUTS IMAGE] (continued) Analog input functions. |  |
| Al3C | [AI3] <br> Al3 customer image: Value of analog input 3. |  |
| AI3A | [AI3 assignment] <br> $A 13$ functions assignment. If no functions have been assigned, $[\mathrm{No}](\mathrm{nO})$ is displayed. Follow ing parameters are visible on the graphic display terminal by pressing the ENT key on the parameter. <br> Identical to [Al1 assignment] (Al1A) page 52. |  |
| CrL3 | [Al3 min value] <br> Current scaling parameter of $0 \%$. | mA |
| CrH3 | [AI3 max value] <br> Current scaling parameter of $100 \%$. |  |
| Al3F | [Al3 filter] <br> Interference filtering cutoff time of the low-filter. |  |
| IOM- | [I/O MAP] (continued) |  |
| A○A- | [ANALOG OUTPUTS IMAGE] <br> Analog output functions. <br> Follow ing parameters are visible on the graphic display terminal by pressing the ENT key on the parameter. |  |
| $\begin{gathered} \mathrm{AO} 1 \mathrm{C} \\ \text { (1) } \end{gathered}$ | [A01C] <br> AO1 customer image: Value of analog output 1. |  |
| AO1 | [AO1 assignment] <br> AO1 functions assignment. If no functions have been assigned, $[\mathrm{No}](\mathrm{nO})$ is displayed. Identical to [AO1 assignment] (AOI) page 144. |  |
| $\begin{gathered} \text { UOL1 } \\ \quad * \end{gathered}$ | [AO1 min Output] <br> Voltage scaling parameter of 0\%. Can be accessed if [AO1 Type] (AO1t) is set to [Voltage] (10U). |  |
| $\begin{gathered} \text { UOH1 } \\ \text { * } \end{gathered}$ | [AO1 max Output] <br> Voltage scaling parameter of 100\%. Can be accessed if [AO1 Type] (AO1t) is set to [Voltage] (10U). | V |
| $\begin{gathered} \text { AOL1 } \\ * \end{gathered}$ | [AO1 min output] <br> Current scaling parameter of 0\%. Can be accessed if [AO1 Type] (AO1t) is set to [Current] (OA). | mA |
| $\begin{gathered} \mathrm{AOH} 1 \\ * \end{gathered}$ | [AO1 max output] <br> Current scaling parameter of $100 \%$. Can be accessed if [AO1 Type] (AO1t) is set to [Current] (OA). | mA |
| ASL1 | [Scaling AO1 max] <br> Minimum scaling value for AO . | \% |
| ASH1 | [Scaling AO1 min] <br> Maximum scaling value for AO1. | \% |
| A01F | [AO1 filter] <br> Cutoff time of the low -filter. |  |



| Code | Name / Description | Unit |
| :---: | :---: | :---: |
| GdLS <br> nO oFF Std LGD oN LFt | [GDL status] <br> Status of the Guard Door Locking safety function. <br> [Not Set] (nO): GDL not set [lnactive] (Off): GDL inactive <br> [Short Delay] (Std): Short Delay In Progress <br> [Long Delay] (LGd): Long Delay In Progress <br> [Active] (LGd): GDL active <br> [Internal Err.] (LGd): GDL internal error |  |
| SFFE | [Safety fault reg.] <br> Safety function error register. <br> Bit0 $=1$ : Logic inputs debounce time-out (verify value of debounce time LIDT according to the application) <br> Bit1 Reserved <br> Bit2 $=1:$ Motor speed sign has changed during SS1 ramp <br> Bit3 $=1$ : Motor speed has reached the frequency limit threshold during SS1 ramp. <br> Bit4: Reserved <br> Bit5: Reserved <br> Bit6 $=1$ : Motor speed sign has changed during SLS limitation <br> Bit7 = 1: Motor speed has reached the frequency limit threshold during SS1 ramp. <br> Bit8: Reserved <br> Bit9: Reserved <br> Bit10: Reserved <br> Bit11: Reserved <br> Bit12: Reserved <br> Bit13 = 1: Not possible to measure the motor speed (verify the motor wiring connection) <br> Bit14 = 1: Motor ground short-circuit detected (verify the motor w iring connection) <br> Bit15 = 1: Motor phase to phase short-circuit detected (verify the motor $w$ iring connection) |  |
| MOn- | [1.2 MONITORING] (continued) |  |
| MFb- | [MONIT. FUN. BLOCKS] <br> For more details on Function Blocks, please refer to dedicated Function Blocks manual. |  |
| FbSt <br> IdLE <br> CHEC <br> StOP <br> Inlt <br> rUn <br> Err | [FB status] <br> Function Block Status. <br> [Idle] (IdLE): Idle state <br> [Check prog.] (CHEC): Check program state <br> [Stop] (StOP): STOP state <br> [lnit] (\\| \| \| t): Initialization state <br> [Run] (rUn): RUN state <br> [Error] (Err): Error state |  |
| FbFt $\begin{gathered} \text { no } \\ \text { Int } \\ \text { bln } \\ \text { InP } \\ \text { PAr } \\ \text { CAL } \\ \text { tOAU } \\ \text { tOPP } \\ \text { AdL } \\ \text { In } \end{gathered}$ | [FB fault] <br> Status of the function blocks execution. <br> [ No o ( nO ): : No error detected <br> [Internal] ( $\\| \cap \mathrm{nt}$ ): Internal error detected <br> [Binary file] (b\|n): Binary error detected <br> [Intern para.] (InP): Internal parameter error detected <br> [Para. RW] (PAr): Parameter access error detected <br> [Calculation] (CAL): Calculation error detected <br> [TO AUX] (tOAU): TimeOut AUX task <br> [TO synch] (tOPP): TimeOut in PRE/POST task <br> [Bad ADLC] (AdL): ADLC w ith bad parameter <br> [Input assign.] (IIn): Input not configured |  |
| Flol- | [FB IDENTIFICATION] |  |
| $\begin{gathered} \text { bソEr } \\ * \end{gathered}$ | [Program version] <br> Program user version. Can be accessed if [FB status] (FbSt) is not set to [Idle] (IdLE). |  |
| $\begin{gathered} \text { bns } \\ \text { * } \end{gathered}$ | [Program size] <br> Program file size. Can be accessed if [FB status] (FbSt) is not set to [Idle] (IdLE). |  |


| Code | Name/Description ${ }^{\text {U }}$ | Unit |
| :---: | :---: | :---: |
| bnU | [Prg. format version] <br> Binary format version of the drive. Can be accessed if [FB status] (FbSt) is not set to [Idle] (IdLE). |  |
| CtU | [Catalogue version] Catalog version of the drive. |  |
| MOn- | [1.2 MONITORING] (continued) |  |
| CMM- | [COMMUNICATION MAP] <br> This menu is visible only on graphic display terminal, except for [COM. SCANNER INPUT MAP].(ISA-) and [CO MAP].(OSA-) menus. | SCAN |
| CMdC <br> tErM <br> HMI <br> Mdb <br> CAn <br> tUd <br> nEt <br> PS | [Command channel] <br> Active command channel. <br> [Terminals] (tErM): Terminals <br> [HMI] (HMI): Graphic display terminal or remote display terminal [Modbus] (Mdb): Integrated Modbus <br> [CANopen] (CAn): Integrated CANopen® <br> [+/- speed] (tUd): +/- speed command <br> [Com. card] ( nEt ): Communication card (if inserted) <br> [PC tool] (P S): PC softw are |  |
| CMd | [Cmd value] <br> DRIVECOM command register value. <br> [Profile] (CHCF) is not set to [I/O profile] (IO), see page 154. <br> Possible values in CiA402 profile, separate or not separate mode. <br> Bit 0: "Sw itch on"/Contactor command <br> Bit 1: "Disable voltage"/Authorization to supply ACpower <br> Bit 2: "Quick stop"/Emergency stop <br> Bit 3: "Enable operation"/Run command <br> Bit 4 to Bit 6: Reserved (set to 0) <br> Bit 7: "Fault reset"/error acknowledgment active on 0 to 1 rising edge <br> Bit 8: Halt Stop according to the [Type of stop] (Stt) parameter without leaving the Operation enabled state <br> Bit 9: Reserved (set to 0) <br> Bit 10: Reserved (set to 0) <br> Bit 11 to Bit 15: Can be assigned to a command <br> Possible values in the VO profile. <br> On state command [2 w ire] (2C). <br> Bit 0: Forw ard (on state) command <br> $=0$ : No forw ard command <br> = 1: Forw ard command <br> The assignment of bit 0 cannot be modified. It corresponds to the assignment of the terminals. It can be sw itched is only active if the channel of this control w ord is active. <br> Bit 1 to Bit 15: Can be assigned to commands. <br> On edge command [3 wire] (3C). <br> Bit 0: Stop (run authorization). <br> = 0: Stop <br> = 1: Run is authorized on a forw ard or reverse command <br> Bit 1: Forw ard (on 0 to 1 rising edge) command <br> The assignment of bits 0 and 1 cannot be modified. It corresponds to the assignment of the terminals. It can be sw (Cd00) and 1 (Cd01) are only active if the channel of this control word is active. <br> Bit 2 to Bit 15: Can be assigned to commands | ed. Bit 0 (CdOO) <br> w itched. Bits 0 |
| $\begin{gathered} \hline \text { rFCC } \\ \text { tErM } \\ \text { LOC } \\ \text { HMI } \\ \text { Mdb } \\ \mathrm{CAn} \\ \mathrm{tUd} \\ \mathrm{nEt} \\ \mathrm{PS} \end{gathered}$ | [Active ref. channel] <br> HMI reference channel. <br> [Terminals] (tErM): Terminals <br> [Local] (LOC): Jog dial <br> [HMI] (HMI): Graphic display terminal or remote display terminal <br> [Modbus] (Mdb): Integrated Modbus <br> [CANopen] (CAn): Integrated CANopen® <br> [tUd] (tUd): +/- speed command <br> [Com. card] (nEt): Communication card (if inserted) <br> [PC tool] (P S): PC softw are |  |
| FrH | [Frequency ref.] <br> Frequency referencebefore ramp. | Hz |


| Code | Name/Description ${ }^{\text {a }}$ |
| :---: | :---: |
| EtA | [ETA state word] <br> DRIVECOM status word. <br> Possible values in CiA402 profile, separate or not separate mode. <br> Bit 0: "Ready to sw itch on", aw aiting power section supply mains <br> Bit 1: "Sw itched on", ready <br> Bit 2: "Operation enabled", running <br> Bit 3: "Fault" <br> $=0$ : No fault <br> $=1$ : Fault <br> Bit 4: "Voltage enabled", pow er section supply mains present <br> $=0$ : Pow er section supply mains absent <br> $=1$ : Pow er section supply mains present <br> When the drive is pow ered by the pow er section only, this bit is alw ays at 1 . <br> Bit 5: Quick stop/Emergency stop <br> Bit 6: "Sw itched on dis abled", pow er section supply mains locked <br> Bit 7: Alarm <br> $=0$ : No alarm <br> = 1: Alarm <br> Bit 8: Reserved ( $=0$ ) <br> Bit 9: Remote: command or reference via the netw ork <br> $=0$ : Command or reference via the graphic display terminal or the remote display terminal <br> = 1: Command or reference via the netw ork <br> Bit 10: Target reference reached <br> $=0$ : The reference is not reached <br> $=1$ : The reference has been reached <br> When the drive is in speed mode, this is the speed reference. <br> Bit 11: "Internal limit active", reference outside limits <br> $=0$ : The reference is $w$ ithin the limits <br> $=1$ : The reference is not w ithin the limits <br> When the drive is in speed mode, the limits are defined by the [Low speed] (LSP) and [High speed] (HSP) parameters. <br> Bit 12 and Bit 13: Reserved ( $=0$ ) <br> Bit 14: "Stop key", STOP via stop key <br> = 0 : STOP key not pressed <br> $=1$ : Stop triggered by the STOP key on the graphic display terminal or the remote display terminal <br> Bit 15: "Direction", direction of rotation <br> = 0: Forw ard rotation at output <br> $=1$ : Reverse rotation at output <br> The combination of bits $0,1,2,4,5$ and 6 defines the state in the DSP 402 state chart (see the Communication manuals). <br> Possible values in the VO profile. <br> Note: The value is identical in the CiA402 profile and the VO profile. In the VO profile, the description of the values is simplified and does not refer to the CiA402 (Drivecom) state chart. <br> Bit 0: Reserved ( $=0$ or 1 ) <br> Bit 1: Ready <br> $=0$ : Not ready <br> $=1$ : Ready <br> Bit 2: Running <br> $=0$ : The drive $w$ ill not start if a reference other than zero is applied. <br> $=1$ : Running, if a reference other than zero is applied, the drive can start. <br> Bit 3: Fault <br> $=0$ : No fault <br> $=1$ : Fault <br> Bit 4: Pow er section supply mains present <br> $=0$ : Pow er section supply mains absent <br> $=1$ : Pow er section supply mains present <br> Bit 5: Reserved (=1) <br> Bit 6: Reserved (=0 or 1) <br> Bit 7: Alarm <br> $=0$ : No alarm <br> $=1$ : Alarm <br> Bit 8: Reserved ( $=0$ ) <br> Bit 9: Command via a netw ork <br> $=0$ : Command via the terminals or the graphic display terminal <br> = 1: Command via a netw ork |


| Code | Name / Description | Unit |
| :---: | :---: | :---: |
|  | ```Bit 10: Reference reached \(=0\) : The reference is not reached \(=1\) : The reference has been reached Bit 11: Reference outside limits \(=0\) : The reference is \(w\) ithin the limits \(=1\) : The reference is not \(w\) ithin the limits When the drive is in speed mode, the limits are defined by LSP and HSP parameters. Bit 12 and Bit 13: Reserved ( \(=0\) ) Bit 14: Stop via STOP key = 0: STOP key not pressed \(=1\) : Stop triggered by the STOP key on the graphic display terminal or the remote display terminal Bit 15: Direction of rotation \(=0\) : Forw ard rotation at output \(=1\) : Reverse rotation at output``` |  |
| Mind- | [MODBUS NETWORK DIAG] <br> Modbus netw ork diagnostic. |  |
| Mdb1 | [COM LED] <br> View of the Modbus Communication. |  |
| M1Ct | [Mb NET frames nb.] <br> Modbus netw ork frame counter: Number of processed frames. |  |
| M1EC | [Mb NET CRC errors] Modbus netw ork CRC error counter: Number of CRC errors. |  |
| CMM- | [COMMUNICATION MAP] (continued) |  |
| ISA - | [COM. SCANNER INPUT MAP] <br> Used for CANopen® and Modbus Netw ork. |  |
| nM1 | [Com Scan In1 val.] <br> Value of the 1st input word. |  |
| nM2 | [Com Scan In2 val.] Value of the 2nd input w ord. |  |
| nM3 | [Com Scan In3 val.] <br> Value of the 3rd input word. |  |
| nM4 | [Com Scan In4 val.] <br> Value of the 4th input word. |  |
| nM5 | [Com Scan In5 val.] <br> Value of the 5th input word. |  |
| nM 同 | [Com Scan In6 val.] <br> Value of the 6th input word. |  |
| nM7 | [Com Scan In7 val.] <br> Value of the 7th input word. |  |
| nM8 | [Com Scan In8 val.] Value of the 8th input word. |  |
| CMM - | [COMMUNICATION MAP] (continued) |  |
| OSA- | [COM SCAN MAP] |  |
| nC1 | [Com Scan Out1 val.] Value of the 1st output w ord. |  |
| $\mathrm{nC2}$ | [Com Scan Out2 val.] Value of the 2nd output w ord. |  |
| nC3 | [Com Scan Out3 val.] <br> Value of the 3rd output w ord. |  |
| nC 4 | [Com Scan Out4 val.] Value of the 4th output $w$ ord. |  |
| nC5 | [Com Scan Out5 val.] Value of the 5th outputw ord |  |


| Code | Name / Description | Unit |
| :---: | :---: | :---: |
| nC6 | [Com Scan Out6 val.] <br> Value of the 6th output w ord. |  |
| nC7 | [Com Scan Out7 val.] <br> Value of the 7th output w ord. |  |
| $\mathrm{nC8}$ | [Com Scan Out8 val.] <br> Value of the 8th output w ord. |  |
| CMM - | [COMMUNICATION MAP] (continued) |  |
| C ı- | [CMD. WORD IMAGE] <br> Command w ord image: Only accessible via graphic display terminal. |  |
| CMd1 | [Modbus cmd.] <br> Modbus command word image. |  |
| CMd2 | [CANopen cmd.] CANopen® command w ord image. |  |
| CMd3 | [COM. card cmd.] Communication card command word image. |  |
| CMM - | [COMMUNICATION MAP] (continued) |  |
| r I- | [FREQ. REF. WORD MAP] <br> Frequency referenceimage: Only accessible via graphic display terminal. |  |
| LFr1 | [Modbus ref.] <br> Modbus frequency reference image. | Hz |
| LFr2 | [CANopen ref.] <br> CANopen® frequency reference image. | Hz |
| LFr3 | [Com. card ref.] <br> Communication card frequency reference image. | Hz |
| CMM- | [COMMUNICATION MAP] (continued) |  |
| CnM - | [CANopen MAP] <br> CANopen® image: Only accessible via graphic display terminal. |  |
| COn | [RUN LED] <br> View of the CANopen® RUN Led Status. |  |
| CAnE | [ERR LED] <br> View of the CANopen® Error Led Status. |  |
| PO1 - | [PDO1 IMAGE] <br> View of the RPDO1 and TPDO1. |  |
| $\begin{gathered} \mathrm{rp11} \\ * \end{gathered}$ | [Received PDO1-1] <br> First frame of the received PDO1. |  |
| $\begin{gathered} \mathrm{rp} 12 \\ * \end{gathered}$ | [Received PDO1-2] <br> Second frame of the received PDO1. |  |
| $\begin{gathered} \text { rp13 } \\ * \end{gathered}$ | [Received PDO1-3] <br> Third frame of the received PDO1. |  |
| $\begin{gathered} \text { rp14 } \\ * \end{gathered}$ | [Received PDO1-4] <br> Fourth frame of the received PDO1. |  |
| $\begin{gathered} \mathrm{tp} 11 \\ * \end{gathered}$ | [Transmit PDO1-1] <br> First frame of the transmit PDO1. |  |


| Code | Name / Description | Unit |
| :---: | :---: | :---: |
| $\begin{gathered} \hline \text { tp12 } \\ * \end{gathered}$ | [Transmit PDO1-2] <br> Second frame of the transmit PDO1. |  |
| $\begin{gathered} \hline \text { tp13 } \\ * \end{gathered}$ | [Transmit PDO1-3] <br> Third frame of the transmit PDO1. |  |
| $\begin{gathered} \text { tp14 } \\ * \end{gathered}$ | [Transmit PDO1-4] <br> Fourth frame of the transmit PDO1. |  |
| CnM- | [CANopen MAP] (continued) <br> CANopen® image: Only accessible via graphic display terminal. |  |
| PO2- | [PDO2 IMAGE] <br> View of the RPDO2 and TPDO2: Same structure as [PDO1 IM AGE (PO1-). |  |
| $\begin{gathered} \text { rp21 } \\ * \end{gathered}$ | [Received PDO2-1] <br> First frame of the received PDO2. |  |
| $\begin{gathered} \mathrm{rp22} \\ * \end{gathered}$ | [Received PDO2-2] <br> Second frame of the received PDO2. |  |
| $\begin{gathered} \text { rp23 } \\ * \end{gathered}$ | [Received PDO2-3] <br> Third frame of the received PDO2. |  |
| $\begin{gathered} \text { rp24 } \\ \text { * } \end{gathered}$ | [Received PDO2-4] <br> Fourth frame of the received PDO2. |  |
| $\begin{gathered} \mathrm{tp} 21 \\ * \end{gathered}$ | [Transmit PDO2-1] <br> First frame of the transmit PDO2. |  |
| $\begin{gathered} \hline \text { tp22 } \\ * \end{gathered}$ | [Transmit PDO2-2] <br> Second frame of the transmit PDO2. |  |
| $\begin{gathered} \mathrm{tp} 23 \\ * \end{gathered}$ | [Transmit PDO2-3] <br> Third frame of the transmit PDO2. |  |
| $\begin{gathered} \mathrm{tp} 24 \\ * \end{gathered}$ | [Transmit PDO2-4] <br> Fourth frame of the transmit PDO2. |  |
| CnM- | [CANopen MAP] (continued) <br> CANopen® image: Only accessible via graphic display terminal. |  |
| PO3- | [PDO3 IMAGE] <br> View of the RPDO3 and TPDO3: Same structure as [PDO1 IM AGE] (PO1-). |  |
| $\begin{gathered} \text { rp31 } \\ * \end{gathered}$ | [Received PDO3-1] <br> First frame of the received PDO3. |  |
| $\begin{gathered} \text { rp32 } \\ * \end{gathered}$ | [Received PDO3-2] <br> Second frame of the received PDO3. |  |
| $\begin{gathered} \text { rp33 } \\ * \end{gathered}$ | [Received PDO3-3] <br> Third frame of the received PDO3. |  |
| $\begin{gathered} \text { rp34 } \\ \text { * } \end{gathered}$ | [Received PDO3-4] <br> Fourth frame of the received PDO3. |  |


| Code | Name / Description | Unit |
| :---: | :---: | :---: |
| $\begin{gathered} \mathrm{tp} 31 \\ * \end{gathered}$ | [Transmit PDO3-1] <br> First frame of the transmit PDO3. |  |
| $\begin{gathered} \text { tp32 } \\ * \end{gathered}$ | [Transmit PDO3-2] <br> Second frame of the transmit PDO3. |  |
| $\begin{gathered} \text { tp33 } \\ * \end{gathered}$ | [Transmit PDO3-3] <br> Third frame of the transmit PDO3. |  |
| $\begin{gathered} \text { tp34 } \\ * \end{gathered}$ | [Transmit PDO3-4] <br> Fourth frame of the transmit PDO3. |  |
| CnM- | [CANopen MAP] (continued) <br> CANopen® image: Only accessible via graphic display terminal. |  |
| nMtS <br> bOOt <br> StOP <br> OPE <br> POPE | [Canopen NMT state] <br> Drive NMT State of the CANopen® slave. <br> [Boot] (bOOt): Bootup <br> [Stopped] (StOP): Stopped <br> [Operation] (OPE): Operational <br> [Pre-op] (POPE): Pre-Operational |  |
| nbtp | [Number of TX PDO] <br> Number of transmit PDO. |  |
| nbrp | [Number of RX PDO] <br> Number of receive PDO. |  |
| ErCO | [Error code] CANopen® error register (from 1 to 5). |  |
| rEC1 | [RX Error Counter] Controller Rx error counter (not stored at pow er off). |  |
| tEC1 | [TX error counter] Controller Tx error counter (not stored at pow er off). |  |


| Code | Name / Description | Unit |
| :---: | :---: | :---: |
| MOn- | [1.2 MONITORING] (continued) |  |
| $\begin{gathered} \mathrm{Mp} \\|- \\ * \end{gathered}$ | [MONIT. PI] <br> PID management. Visible if [PID feedback ass.] (PIF) is not set to [No] (nO). |  |
| $\begin{gathered} \hline \text { rPI } \\ \mathbb{Q} \\ * \end{gathered}$ | [Internal PID ref.] <br> Internal PID reference: As a process value. |  |
| $\begin{gathered} \text { rpE } \\ * \end{gathered}$ | [PID error] <br> PID error value. |  |
| $\begin{gathered} \mathrm{rpFF} \\ * \end{gathered}$ | [PID feedback] <br> PID feedbackvalue. |  |
| $\begin{gathered} \text { ripC } \\ * \end{gathered}$ | [PID reference] <br> PID setpoint value via graphic display terminal. |  |
| rpo | [PID Output] <br> PID output value w ith limitation. | Hz |
| MOn- | [1.2 MONITORING] (continued) |  |
| PE甘- | [MONIT. POWER TIME] |  |
| ApH | [Consumption] <br> Energy consumption in Wh, kWh or MWh (accumulated consumption). | Wh, kWh, MWh |
| r- | [Run time] <br> Run elapsed time display (resetable) in seconds, minutes or hours (length of time the motor has been sw itched | $\begin{aligned} & \hline \text { s, min, h } \\ & \hline \text { on). } \end{aligned}$ |
| Ptl\| | [Power on time] <br> Pow er elapsed time display in seconds, minutes or hours (length of time the drive has been sw itched on). | $\mathrm{s}, \mathrm{~min}, \mathrm{~h}$ |
| rpr () <br> nO APH rtH PtH | [Operating t. reset] <br> Reset of run elapsed time. <br> [ $\mathrm{No} \mathrm{]}$ ( nO ): Reset operation not in progress <br> [Reset kWh] (APH): Clear [Reset kWh] (APH) <br> [rst. runtime] $(r \leq H):$ Clear [rst. runtime] $(r t H)$ <br> [rst. P On t.] (PtH): Clear [rst. P On t.] (PtH) |  |
| MOn- | [1.2 MONITORING] (continued) |  |
| CnFS $\begin{aligned} & \text { nO } \\ & \text { CnFO } \\ & \text { CnF1 } \\ & \text { CnF2 } \end{aligned}$ | [Config. active] <br> View of the active configuration. <br> [In progress] (nO): Transitory state (configuration changing) <br> [Config. $\mathbf{n}^{\circ} 0$ ] (CnF0): Configuration 0 active <br> [Config. $\mathbf{n}^{\circ 1}$ ] (CnF1): Configuration 1 active <br> [Config. $\mathbf{n}^{\circ} 2$ ] (CnF2): Configuration 2 active |  |
| CFpS <br> * <br> nO <br> CFP1 <br> CFP2 <br> CFP3 | [Utilised param. set] <br> Configuration parameter status (can be accessed if parameter sw itching has been enabled, see page 229). <br> [None] (nO): Not assigned <br> [Set N$\left.{ }^{\circ} 1\right]$ (CFP1): Parameter set 1 active <br> [Set No2] (CFP2): Parameter set 2 active <br> [Set №3] (CFP3): Parameter set 3 active |  |


| Code | Name/Description ${ }^{\text {a }}$ |
| :---: | :---: |
| ALGr $\begin{aligned} & -- \\ & 1-- \\ & -2- \\ & 12- \\ & --3 \\ & 1-3 \\ & -23 \\ & 123 \end{aligned}$ | [Alarm groups] <br> Current impacted alarm group numbers. <br> Group of alarms could be user defined in [INPUTS / OUTPUTS CFG] (I_O-) page 125. <br> [--] $(---)$ : No alarm group impacted <br> [1-] (1--): Alarm group 1 <br> [-2-] (-2-): Alarm group 2 <br> [12-] (12-): Alarmgroup 1 and 2 <br> [-3] (--3): Alarm group 3 <br> [1-3] (1-3): Alarmgroup 1 and 3 <br> [-23] (-23): Alarmgroup 2 and 3 <br> [123] (123): Alarm group 1, 2 and 3 |
| $\begin{aligned} & \text { SPd1 } \\ & \text { or } \\ & \text { SPd2 } \\ & \text { or } \\ & \text { QSPd3 } \end{aligned}$ | [Cust. output value] <br> [Cust. output value] (SPd1), [Cust. output value] (SPd2) or [Cust. output value] (SPd3) depending on the [Scale factor display] (SdS) parameter, page 104 ([Cust. output value] (SPd3) in the factory setting) |
| ALr- | [ALARMS] <br> List of current alarms. <br> If an alarm is present, a $\checkmark$ appears on the graphic display terminal. |
| nOAL PtCL EtF USA CtA FtA F2A SrA tSA tS2 tS3 UPA FLA tHA AG1 AG2 AG3 PEE PFA AP3 SSA tAd tJA bOA ULA OLA rSdA ttHA ttla dLdA FqLA | [No alarm] (nOAL) <br> [PTC alarm] (PtCL) <br> [External fault] (EtF) <br> [UnderV.al.] (USA) <br> [l attained] (CtA) <br> [Freq. Th. attain.] (FtA) <br> [Freq. Th. 2 attained] (F2A) <br> [Freq.ref.att] (SrA) <br> [Th.m ot. att.] (tSA) <br> [Th.mot2 att.] (tS2) <br> [Th.mot3 att.] (tS3) <br> [Underv. prev.] (UPA) <br> [HSP attain.] (FLA) <br> [AI. ${ }^{\circ} \mathrm{C}$ drv] (tHA) <br> [Alarm group 1] (AG1) <br> [Alarm group 2] (AG2) <br> [Alarm group 3] (AG3) <br> [PID error al] (PEE) <br> [PID fdbk al.] (PFA) <br> [AI3 AI. 4-20m A] (AP3) <br> [Lim T/l att.] (SSA) <br> [Th.drv.att.] (tAd) <br> [IGBT alarm] (tJA) <br> [Brake R. al.] (bOA) <br> [Underload. Proc. Al.] (ULA) <br> [Overload. Proc. AI.] (OLA) <br> [Rope slack alarm] (rSdA) <br> [High torque alarm] (ttHA) <br> [Low torque alarm] (ttLA) <br> [Dynamic load alarm] (dLdA) <br> [Freq. meter Alarm] (FqLA) |


| Code | Name / Description | Unit |
| :---: | :---: | :---: |
| SSt- | [OTHER STATE] <br> List of secondary states. <br> This menu is visible only on graphic display terminal. |  |
|  | [In m otor fluxing] (FL <br> [PTC Alarm] (PtCL) <br> [Fast stop in prog.] (FSt) <br> [Current Th. attained] (CtA) <br> [Freq. Th. attained] (FtA) <br> [Freq. Th. 2 attained] (F2A) <br> [Frequency ref. att.] (SrA) <br> [Motor th. state att.] (tSA) <br> [External fault alarm] (EtF) <br> [Auto restart] (AUtO) <br> [Remote] (FtL) <br> [Auto-tuning] (tUn) <br> [Undervoltage] (USA) <br> [Config. 1 act.] (CnF1) <br> [Config. 2 act.] (CnF2) <br> [HSP attained] (FLA) <br> [Set 1 active] (CFP1) <br> [Set 2 active] (CFP2) <br> [Set 3 active] (CFP3) <br> [In braking] (brS) <br> [DC bus loading] (dbL) <br> [High torque alarm] (ttHA) <br> [Low torque alarm] (ttLA) <br> [Forward] (MFrd) <br> [Reverse] (MrrS) <br> [Freq. metre Alarm] (FqLA) |  |
| dGt- | [DIAGNOSTICS] <br> This menu is visible only on graphic display terminal. |  |
| PF-H- | [FAULT HISTORY] <br> Show s the 8 last detected faults. |  |
| nOF ASF bLF brF CFF <br> CFI2 CnF COF CrF CSF dLF <br> EEF1 <br> EEF2 <br> EPF1 <br> EPF2 <br> FbE <br> FbES <br> FCF1 <br> FCF2 <br> HCF <br> HdF <br> ILF <br> InF1 <br> InF2 <br> InF3 <br> InF4 <br> InF <br> InF9 | [Past fault 1] <br> Fault record 1 ( 1 is last). <br> [No fault] (nOF): No detected fault stored <br> [Angle error] (ASF): Angle setting detected fault [Brake control] (bLF): Brake's motor 3-phases loss [Brake feedback] (brF): Brake contactor detected error [Incorrect config.] (CFF): Invalid configuration at pow er on [Bad conf] (CFIZ): Configuration transfer detected error [Com. network] (CnF): NET option communication interruption [CAN com .] (COF): CANopen® communication interruption [Capa.charg] (CrF): Load relay detected fault [Ch.sw. fault] (CSF): Channel sw itching detected error [Load fault] (dLF): Dynamic load detected error [Control EEprom] (EEF1): Control EEprom detected error [Pow er Eeprom] (EFF): Pow er EEprom detected error [External fault LI/Bit] (EPF1): External detected fault from LI or local link [External fault com.] (EPF2): External interruption fromcommunication board [FB fault] (FbE): Function block detected error [FB stop fly.] (FbES): Function block stop detected error [Out. contact. stuck] (FCF1): Output contactor: closed contactor [Out. contact. open.] (FCF2): Output contactor: opened contactor [Cards pairing] (HCF): Hardw are configuration detected error [IGBT desaturation] (HdF): Hardw are detected error [Option int link] (ILF): Option internal link interruption [Rating error] (InF1): Unknow ndrive rating [PWR Calib.] (InF2): Unknow nor incompatible pow er board [Int.serial link] (InF3): Internal serial link communication interruption [Int.Mfg area] (InF4): Invalid industrialization zone [Internal-option] (InF [Internal-Imeasure] (InF9): Current measurement circuit detected error |  |


| Code | Name / Description | Unit |
| :---: | :---: | :---: |
| $\begin{gathered} \hline \text { InFA } \\ \text { InFb } \\ \text { InFE } \\ \text { LCF } \\ \text { LFF3 } \\ \text { ObF } \\ \text { OCF } \\ \text { OHF } \\ \text { OLC } \\ \text { OLF } \\ \text { OPF1 } \\ \text { OPF2 } \\ \text { OSF } \\ \text { OtFL } \\ \text { PHF } \\ \text { PtFL } \\ \text { SAFF } \\ \text { SCF1 } \\ \text { SCF3 } \\ \text { SCF4 } \\ \text { SCF5 } \\ \text { SLF } \\ \text { SLIF } \\ \text { SLF2 } \\ \text { SLF3 } \\ \text { SOF } \\ \text { SHF } \end{gathered}$ | [Internal-m ains circuit] (InFA): Input phase loss circuit detected error <br> [Internal- th. sensor] (InFb): Thermal sensor detected error (OC or SC) <br> [Internal-CPU] (InFE): CPU detected fault (ram, flash, task ...) <br> [Input contactor] (LCF): Line contactor detected error <br> [AI3 4-20m A loss] (LFF3): Al3 4-20 mA loss <br> [Overbraking] (ObF): Overbraking <br> [Overcurrent] (OCF): Overcurrent <br> [Drive overheat] (OHF): Drive overheating <br> [Proc.Overload Flt] (OLC): Torque overload <br> [Motor overload] (OLF): Motor overload <br> [1 output phase loss](OPF1): Motor 1-phase loss <br> [3out ph loss] (OPF2): Motor 3-phases loss <br> [Mains overvoltage] (OSF): Oversupply detected fault <br> [PTC fault] (OtFL): Motor overheating detected error from PTCL: standard product <br> [Input phase loss] (PHF): Main input 1-phase loss <br> [LI6=PTC probe] (PtFL) : PTCL detected error (OC or SC) <br> [Safety] (SAFF): Safety function <br> [M otor short circuit] (SCF1): Motor short circuit (hard detection) <br> [Ground short circuit] (SCF3): Direct ground short-circuit (hard detection) <br> [IGBT short circuit] (SCF4): IGBT short-circuit (hard detection) <br> [M otor short circuit] (SCF5): Load short-circuit during lgon load sequence (hard detection) <br> [Modbus com.] (SLF1): Modbus local serial communication interruption <br> [PC com.] (SLF2): PC Softw are communication interruption <br> [HMI com.](SLF3): Remote terminal communication interruption <br> [Overspeed] (SOF): Overspeed <br> [Speed fdback loss] (SPF): Speed feedback loss <br> [Torque/currentlim] (SSF): Torque current limitation detected fault <br> [IGBT overheat] (tJF): IGBT overheating <br> [Auto-tuning] (tnF): Tune detected fault <br> [Pr.Underload FIt] (ULF): Torque underload <br> [Undervoltage] (USF): Undervoltage |  |
| HS1 <br> tUn <br> dCb <br> rdY <br> nSt <br> rUn <br> ACC <br> dEC <br> CLI <br> FSt <br> FLU <br> nLP <br> CtL <br> Obr <br> SOC <br> USA <br> tC <br> St <br> FA <br> YES <br> EP <br> FLt <br> SS1 <br> SLS <br> StO <br> SMS <br> GdL | [Drive state] <br> HMI Status of the detected fault record 1. <br> [Auto-tuning] (tUn): Auto-tuning <br> [In DC inject.] (dCb): Injection braking <br> [Ready] (rdY): Drive ready <br> [Freew heel] (nSt): Freew heel stop control <br> [Drv running] (rUn): Motor in steady state or run command present and zero reference <br> [In accel.] (ACC): Acceleration <br> [In decel.] (dEC): Deceleration <br> [Current lim .] (CLI): Current limit <br> (in case of using a synchronous motor, if the motor does not start, follow the procedure page 112) <br> [Fast stop] (FSt): Fast stop <br> [Mot. fluxing] (FLU): Fluxing function is activated <br> [no mains V.] (nLP): Control is pow ered on but the DC bus is not loaded <br> [control.stop] (CtL): Controlled stop <br> [Dec. adapt.] (Obr): Adapted deceleration <br> [Output cut] (SOC): Stand by output cut <br> [UnderV.al.] (USA): Undervoltage alarm <br> [In mfg.test] (tC): TC indus mode activated <br> [in autotest] (St): Self test in progress <br> [autotesterr] (FA):Self test detected error <br> [Autotest OK] (YES): Self test OK <br> [eeprom test] (EP): Self test Eeprom detected error <br> [In fault] (FLt): Product has detected a fault <br> [SS1 active] (SS1): Safety function SS1 <br> [SLS active] (SLS): Safety function SLS <br> [STO active] (StO): Safety function STO <br> [SMS active] (SMS): Safety function SMS <br> [GdL active] (Gdl): Safety function GdL |  |
| Ep1 | [ETA state word] <br> DRIVECOM status register of detected fault record 1 (same as [ETA state word] (EAA) page 57). |  |
| IP1 | [ETI state word] <br> Extended status register of detected fault record 1 (see the communication parameters file). |  |


| Code | Name / Description | Unit |
| :---: | :---: | :---: |
| CMP1 | [Cmd word] <br> Command register of detected fault record 1 (same as [Cmd word] (CMd) page 56). |  |
| LCP1 | [Motor current] <br> Estimated motor current of detected fault record 1 (same as [M otor current] (LCr) page 50) | A |
| rFp1 | [Output frequency] <br> Estimated motor frequency of detected fault record 1 (same as [Output frequency] ( $r$ Fr) page $\underline{50}$ ). | Hz |
| rtp 1 | [Elapsed time] <br> Eapsed run time of detected fault record 1 (same as [Elapsed time] (rtH) page 62). | ${ }^{\text {h }}$ |
| ULp1 | [Mains voltage] <br> Main voltage of detected fault record 1 (same as [Mains voltage] (ULn) page 50). |  |
| tHP1 | [Motor thermal state] <br> Motor thermal state of detected fault record 1 (same as [Motor thermal state] ( $\mathrm{tH} \boldsymbol{r}$ ) page $\underline{50}$ ). |  |
| dCC1 | [Command Channel] <br> Command channel of detected fault record 1 (same as [Com mand channel] (CMdC) page 56). |  |
| drC1 | [Channel ref. active] <br> Reference channel of detected fault record 1 (same as [Channel ref. active] (rFCC) page 56). |  |
| Sr11 | [Saf01 Reg n-1] SAF1 Register x (1 is last) |  |
| Sr21 | [Saf02 Reg n-1] SAF2 Register x (1 is last) |  |
| SrA1 | [SF00 Reg n -1] SFOO Register x (1 is last) |  |
| Srb1 | [SF01 Reg n -1] SF01 Register x (1 is last) |  |
| SrC1 | [SF02 Reg n -1] SF02 Register x (1 is last) |  |
| Srd1 | [SF03 Reg n -1] SF03 Register x ( 1 is last) |  |
| SrE1 | [SF04 Reg $\mathrm{n}-1]$ SF04 Register x (1 is last) |  |
| SrF1 | $\begin{aligned} & \text { [SF05 Reg n-1] } \\ & \text { SF05 Register } \times \text { (1 is last) } \end{aligned}$ |  |
| SrG1 | [SF06 Reg n-1] SF06 Register $\times$ ( 1 is last) |  |
| SrH1 | [SF07 Reg n-1] SF07 Register x ( 1 is last) |  |
| Srl1 | $\begin{aligned} & \text { [SF08 Reg n-1] } \\ & \text { SF08 Register } \times \text { ( } 1 \text { is last) } \end{aligned}$ |  |
| SrJ1 | $\begin{aligned} & \text { [SF09 Reg n-1] } \\ & \text { SF09 Register } \times \text { (1 is last) } \end{aligned}$ |  |
| srk1 | [SF10 Reg $\mathrm{n}-1]$ SF10 Register x (1 is last) |  |
| SrL1 | [SF11 Reg n -1] SF11 Register x (1 is last) |  |


| Code | Name/Description | Unit |
| :---: | :---: | :---: |
| pFH- | [FAULT HISTORY] (continued) <br> Show s the 8 last detected faults. |  |
| dP2 | [Past fault 2] <br> [Saf1 Reg n-2] (Sr12), [Saf2 Reg n-2] (Sr22), [SF00 Reg n-2] (SrA2), [SF01 Reg n-2] (Srb2), and [SF02 Reg n-2] (SrC2) to [SF11 Reg n-2] (SrL2) may be visible with this parameter. <br> Identical to [Past fault 1] (dP1) page 64. |  |
| dP3 | [Past fault 3] <br> [Saf1 Reg n-3] (Sr13), [Saf2 Reg n-3] (Sr23), [SF00 Reg n-3] (SrA3), [SF01 Reg n-3] (Srb3), and [SF02 Reg n-3] (SrC3) to [SF11 Reg n-3] (SrL3) may be visible with this parameter. Identical to [Past fault 1] (dP1) page 64. |  |
| dP4 | [Past fault 4] <br> [Saf1 Reg n-4] (Sr14), [Saf2 Reg n-4] (Sr24), [SF00 Reg n-4] (SrA4), [SF01 Reg n-4] (Srb4), and [SF02 Reg n-4] (SrC4) to [SF11 Reg n-4] (SrL4) may be visible with this parameter. Identical to [Past fault 1] (dP1) page 64 . |  |
| dP5 | [Past fault 5] <br> [Saf1 Reg n-5] (Sr15), [Saf2 Reg n-5] (Sr25), [SF00 Reg n-5] (SrA5), [SF01 Reg n-5] (Srb5), and [SF02 Reg n-5] (SrC5) to [SF11 Reg n-5] (SrL5) may be visible with this parameter. Identical to [Past fault 1] (dP1) page 64. |  |
| dP6 | [Past fault 6] <br>  and [SF02 Reg $\mathrm{n}-6$ ] ( $\mathrm{SrC}_{\text {果) }}$ ) to [SF11 Reg $\mathrm{n}-6$ ] ( $\mathrm{SrL}_{\mathrm{F}}$ ) may be visible with this parameter. Identical to [Past fault 1] (dP1) page 64. |  |
| dP7 | [Past fault 7] <br> [Saf1 Reg n-7] (Sr17), [Saf2 Reg n-7] (Sr27), [SF00 Reg n-7] (SrA7), [SF01 Reg n-7] (Srb7), and [SF02 Reg n-7] (SrC7) to [SF11 Reg n-7] (SrL7) may be visible with this parameter. Identical to [Past fault 1] (dP1) page 64. |  |
| dP8 | [Past fault 8] <br> [Saf1 Reg n-8] (Sr18), [Saf2 Reg n-8] (Sr28), [SF00 Reg n-8] (SrA8), [SF01 Reg n-8] (Srb8), and [SF02 Reg $\mathrm{n}-8$ ] (SrC8) to [SF11 Reg n -8] (SrL8) may be visible with this parameter. Identical to [Past fault 1] (dP1) page 64. |  |


| Code | Name / Description | Unit |
| :---: | :---: | :---: |
| dGt- | [DIAGNOSTICS] (continued) |  |
| PFL- | [CURRENT FAULT LIST] |  |
| nOF | [No fault] (nOF): No detected fault stored |  |
| ASF | [Angle error] (ASF): Angle setting detected fault |  |
| bLF | [Brake control] (bLF): Brake's motor 3-phases loss |  |
| brF | [Brake feedback] (brF): Brake contactor detected error |  |
| CFF | [Incorrect config.] (CFF): Invalid configuration at pow er on |  |
| CFI2 | [Bad conf] (CFI2): Configuration transfer detected error |  |
| CnF | [Com. network] (CnF): NET option communication interruption |  |
| COF | [CAN com.] (COF): CANopen® communication interruption |  |
| CrF | [Capa.charg] (CrF): Load relay detected fault |  |
| CSF | [Ch.sw. fault] (CSF): Channel sw itching detected error |  |
| dLF | [Load fault] (dLF): Dynamic load detected error |  |
| EEF1 | [Control EEprom] (EFF1): Control EEprom detected error |  |
| EEF2 | [Power Eeprom] (EEF2): Pow er EEprom detected error |  |
| EPF1 | [External fault LI/Bit] (EPF1): External detected fault from LI or local link |  |
| EPF2 | [External fault com.] (EPF2): External interruption fromcommunication board |  |
| FbE | [FB fault] (FbE): Function block detected error |  |
| FbES | [FB stop fly.] (FbES): Function block stop detected error |  |
| FCF1 | [Out. contact. stuck] (FCF1): Output contactor: closed contactor |  |
| FCF2 | [Out. contact. open.] (FCF2): Output contactor: opened contactor |  |
| HCF | [Cards pairing] (HCF): Hardw are configuration detected error |  |
| HdF | [IGBT desaturation] (HdF): Hardw are detected error |  |
| ILF | [Option int link] (ILF): Option internal link interruption |  |
| InF1 | [Rating error] (InF1): Unknow n drive rating |  |
| InF2 | [PWR Calib.] (InF2): Unknow n or incompatible power board |  |
| InF3 | [Int.serial link] (InF3): Internal serial link communication interruption |  |
| InF4 | [Int.Mfg area] (InF4) : Invalid industrialization zone |  |
| $\operatorname{lnF}$ | [Internal-option] (InF ${ }^{\text {m }}$ ) : Unknow n or incompatible option board |  |
| InF9 | [Internal-Im easure] (InF9) : Current measurement circuit detected error |  |
| InFA | [Internal-mains circuit] (InFA): Input phase loss circuit detected error |  |
| InFb | [Internal-th. sensor] (InFb): Thermal sensor detected error (OC or SC) |  |
| InFE | [Internal-CPU] (InFE) : CPU detected fault (ram, flash, task ...) |  |
| LCF | [Input contactor] (LCF): Line contactor detected error |  |
| LFF3 | [AI3 4-20m A loss] (LFF3): Al3 4-20 mA loss |  |
| ObF | [Overbraking] (ObF): Overbraking |  |
| OCF | [Overcurrent] (OCF): Overcurrent |  |
| OHF | [Drive overheat] (OHF): Drive overheating |  |
| OLC | [Proc.Overload Flt] (OLC): Torque overload |  |
| OLF | [Motor overload] (OLF): Motor overload |  |
| OPF1 | [1 output phase loss](OPF1): Motor 1-phase loss |  |
| OPF2 | [3out ph loss] (OPF2): Motor 3-phases loss |  |
| OSF | [Mains overvoltage] (OSF): Oversupply detected fault |  |
| OtFL | [PTC fault] (OtFL): Motor overheating detected error from PTCL: standard product |  |
| PHF | [Input phase loss](PHF): Main input 1-phase loss |  |
| PtFL | [LI6=PTC probe] (PtFL) : PTCL detected error (OC or SC) |  |
| SAFF | [Safety] (SAFF): Safety function |  |
| SCF1 | [Motor short circuit] (SCF1): Motor short circuit (hard detection) |  |
| SCF3 | [Ground short circuit] (SCF3): Direct ground short-circuit (hard detection) |  |
| SCF4 | [IGBT short circuit] (SCF4): IGBT short-circuit (hard detection) |  |
| SCF5 | [Motor s hort circuit] (SCF5): Load short-circuit during lgon load sequence (hard detection) |  |
| SLF1 | [Modbus com.] (SLF1): Modbus local serial communication interruption |  |
| SLF2 | [PC com.] (SLF2): PC Softw are communication interruption |  |
| SLF3 | [HMI com.] (SLF3): Remote terminal communication interruption |  |
| SOF | [Overspeed] (SOF): Overspeed |  |
| SPF | [Speed fdback loss] (SPF): Speed feedback loss |  |
| SSF | [Torque/currentlim] (SSF): Torque current limitation detected fault |  |
| tJF | [IGBT overheat] (tJF): IGBT overheating |  |
| tnF | [Auto-tuning] (tnF): Tune detected fault |  |
| ULF | [Pr.Underload FIt] (ULF): Torque underload |  |
| USF | [Undervoltage] (USF): Undervoltage |  |


| Code | Name / Description ${ }^{\text {a }}$ |
| :---: | :---: |
| AF- | [MORE FAULT INFO] <br> Additional detected fault information. |
| CnF | [Network fault] <br> Communication option card fault code. <br> This parameter is read-only. The fault code remains saved in the parameter, even if the cause disappears. The parameter is reset after the drive is disconnected and then reconnected. The values of this parameter depend on the netw ork card. Consult the manual for the corresponding card. |
| \\| - F-1 | [Internal link fault 1] <br> Communication interruption betw een option card 1 and drive. <br> This parameter is read-only. The fault code remains saved in the parameter, even if the cause disappears. The parameter is reset after the drive is disconnected and then reconnected. |
| SFFE | [Safety fault reg.] (1) <br> Safety function fault error register. <br> Bit0 $=1$ : Logic inputs debounce time-out (verify value of debounce time LIDT according to the application) <br> Bit1 Reserved <br> Bit2 $=1$ : Motor speed sign has changed during SS1 ramp <br> Bit3 $=1$ : Motor speed has reached the frequency limit threshold during SS1 ramp. <br> Bit4: Reserved <br> Bit5: Reserved <br> Bit6 = 1: Motor speed sign has changed during SLS limitation <br> Bit7 = 1: Motor speed has reached the frequency limit threshold during SS1 ramp. <br> Bit8: Reserved <br> Bit9: Reserved <br> Bit10: Reserved <br> Bit11: Reserved <br> Bit12: Reserved <br> Bit13 = 1: Not possible to measure the motor speed (verify the motor w iring connection) <br> Bit14 = 1: Motor ground short-circuit detected (verify the motor wiring connection) <br> Bit15 = 1: Motor phase to phase short-circuit detected (verify the motor wiring connection) |
| SAF1 | [Safety fault Reg1] (1) <br> Safety fault register 1. <br> Application control error register. <br> Bit0 = 1: PWRM consistency detected error <br> Bit1 = 1: Safety functions parameters detected error <br> Bit2 $=1$ : Application auto test has detected an error <br> Bit3 $=1$ : Diagnostic verification of safety function has detected an error <br> Bit4 $=1$ : Logical input diagnostic has detected an error <br> Bit5 $=1:$ SMS or GDL safety functions detected error (Details in [SAFF Subcode 4] SF04 register page 71) <br> Bit6 = 1: Application $w$ atchdog management active <br> Bit7 = 1: Motor control detected error <br> Bit8 = 1: Internal serial link core detected error <br> Bit9 = 1: Logical input activation detected error <br> Bit10 = 1: Safe Torque Off function has triggered an error <br> Bit11 = 1: Application interface has detected an error of the safety functions <br> Bit12 = 1: Safe Stop 1 function has detected an error of the safety functions <br> Bit13 = 1: Safely Limited Speed function has triggered an error <br> Bit14 $=1$ : Motor data is corrupted <br> Bit15 = 1: Internal serial link data flow detected error |

(1) Hexadecimal values are displayed on the Graphic display terminal Example:
SFFE $=0 \times 0008$ in Hexadecimal
SFFE = Bit 3

| Code | Name / Description | Unit |
| :---: | :---: | :---: |
| SAF2 | [Safety fault Reg2] (1) <br> Safety fault register 2 <br> Motor Control error register <br> Bit0 = 1: Consistency stator frequency verification has detected an error <br> Bit1 = 1 : Stator frequency estimation detected error <br> Bit2 = 1: Motor control w atchdog management is active <br> Bit3 = 1: Motor control hardw are watchdog is active <br> Bit4 = 1: Motor control auto test has detected an error <br> Bit5 = 1: Chain testing detected error <br> Bit6 = 1: Internal serial link core detected error <br> Bit7 = 1 : Direct short-circuit detected error <br> Bit8 = 1: PWM driver detected error <br> Bit9 = 1: GDL internal detected error <br> Bit10 : Reserved <br> Bit11 = 1: Application interface has detected an error of the safety functions <br> Bit12 = 1 : Reserved <br> Bit13: Reserved <br> Bit14 = 1 : Motor data is corrupted <br> Bit15 = 1 : Internal serial link data flow detected error |  |
| SFOO | [SAFF Subcode 0] (1) <br> Safety fault subregister 00 <br> Appplication auto test error register <br> Bit0 : Reserved <br> Bit1 = 1: Ram stackoverflow <br> Bit2 = 1: Ram address integrity error <br> Bit3 $=1$ : Ram data access error <br> Bit4 = 1: Flash Checksum Error <br> Bit5 : Reserved <br> Bit6 : Reserved <br> Bit7 : Reserved <br> Bit8 : Reserved <br> Bit9 = 1 : Fast task overflow <br> Bit10 = 1 : Slow taskoverflow <br> Bit11 = 1: Application task overflow <br> Bit12 : Reserved <br> Bit13 : Reserved <br> Bit14 $=1$ : PWRM line is not activated during initialization phase <br> Bit15 = 1 : Application hardw are Watch Dog is not running after initialization |  |
| SF01 | [SAFF Subcode 1] (1) <br> Safety fault subregister 01 <br> Logical input diagnostics error register <br> Bit0 = 1: Management - state machine error <br> Bit1 = 1: Data required for test management are corrupted <br> Bit2 $=1$ : Channel selection detected error <br> Bit3 $=1$ : Testing - state machine detected error <br> Bit4 $=1$ : Test request is corrupted <br> Bit5 = 1: Pointer to test method is corrupted <br> Bit6 = 1 : Incorrect test action provided <br> Bit7 = 1 : Detected Error in results collecting <br> Bit8 = 1: LI3 detected error. Cannot activate safe function <br> Bit9 $=1:$ Ll4 detected error. Cannot activate safe function <br> Bit10 $=1:$ L15 detected error. Cannot activate safe function <br> Bit11 = 1 : LI6 detected error. Cannot activate safe function <br> Bit12 = 1 : Test sequence updated $w$ hile a diagnostic is in progress <br> Bit13 = 1 : Detected error in test pattern management <br> Bit14 : Reserved <br> Bit15 : Reserved |  |

(1) Hexadecimal values are displayed on the Graphic display terminal Example:
SFFE $=0 \times 0008$ in Hexadecimal
SFFE $=$ Bit 3

| Code | Name / Description | Unit |
| :---: | :---: | :---: |
| SFO2 | [SAFF Subcode 2] (1) <br> Safety fault subregister 02 <br> Application Watchdog Management detected error register <br> Bit0 $=1$ : Fast task detected error <br> Bit1 = 1: Slow task detected error <br> Bit2 $=1$ : Application task detected error <br> Bit3 =1: Background task detected error <br> Bit4 = 1: Safety fast tasK/input detected error <br> Bit5 = 1: Safety slow task/input detected error <br> Bit6 = 1: Safety app task/input detected error <br> Bit7 = 1: Safety app task/reatment detected error <br> Bit8 = 1: Safety background task detected error <br> Bit9 : Reserved <br> Bit10 : Reserved <br> Bit11 : Reserved <br> Bit12 : Reserved <br> Bit13 : Reserved <br> Bit14 : Reserved <br> Bit15 : Reserved |  |
| SFO3 | [SAFF Subcode 3] (1) <br> Safety fault subregister 03 <br> Bit0 = 1: Debounce time out <br> Bit1 = 1: Input not consistent <br> Bit2 =1: Consistency check - state machine detected error <br> Bit3 $=1$ : Consistency check - debounce timeout corrupted <br> Bit4 $=1$ : Response time data detected error <br> Bit5 = 1: Response time corrupted <br> Bit6 = 1: Undefined consumer queried <br> Bit7 = 1 : Configuration detected error <br> Bit8 $=1$ : Inputs are not in nominal mode <br> Bit9 : Reserved <br> Bit10 : Reserved <br> Bit11 : Reserved <br> Bit12 : Reserved <br> Bit13 : Reserved <br> Bit14 : Reserved <br> Bit15 : Reserved |  |
| SFO4 | [SAFF Subcode 4] (1) <br> Safety fault subregister 04 <br> [Safe Torque Off] StO detected error register <br> Bit0 = 1: No signal configured <br> Bit1 = 1: State machine detected error <br> Bit2 = 1 : Internal data detected error <br> Bit3 : Reserved <br> Bit4 : Reserved <br> Bit5 : Reserved <br> Bit6 : Reserved <br> Bit7 : Reserved <br> Bit8 = 1: SMS overspeed detected error <br> Bit9 = 1: SMS internal detected error <br> Bit10 : Reserved <br> Bit11 = 1 : GDL internal detected error 1 <br> Bit12 = 1: GDL internal detected error 2 <br> Bit13 : Reserved <br> Bit14 : Reserved <br> Bit15 : Reserved |  |

(1) Hexadecimal values are displayed on the Graphic display terminal Example:
SFFE $=0 \times 0008$ in Hexadecimal
SFFE = Bit 3

| Code | Name / Description | Unit |
| :---: | :---: | :---: |
| SF05 | [SAFF Subcode 5] (1) <br> Safety fault subregister 05 <br> [Safe Stop 1] SS1 detected error register <br> Bit0 = 1: State machine detected error <br> Bit1 = 1 : Motor speed sign changed during stop <br> Bit2 = 1: Motor speed reached trigger area <br> Bit3 $=1$ : Theoretical motor speed corrupted <br> Bit4 = 1: Unauthorized configuration <br> Bit5 = 1: Theoretical motor speed computation detected error <br> Bit6 : Reserved <br> Bit7 = 1: Speed sign check: consistency detected error <br> Bit8 = 1 : Internal SS1 request corrupted <br> Bit9 : Reserved <br> Bit10 : Reserved <br> Bit11 : Reserved <br> Bit12 : Reserved <br> Bit13 : Reserved <br> Bit14 : Reserved <br> Bit15 : Reserved |  |
| SFO | [SAFF Subcode 6] (1) <br> Safety fault subregister 06 <br> [Safely Limited Speed] SLS detected error register <br> Bit0 = 1 : State machine error register <br> Bit1 = 1 : Motor speed sign changed during limitation <br> Bit2 = 1 : Motor speed has reached the frequency limit threshold <br> Bit3 = 1 : Data corruption <br> Bit4 : Reserved <br> Bit5 : Reserved <br> Bit6 : Reserved <br> Bit7 : Reserved <br> Bit8 : Reserved <br> Bit9 : Reserved <br> Bit10 : Reserved <br> Bit11 : Reserved <br> Bit12 : Reserved <br> Bit13 : Reserved <br> Bit14 : Reserved <br> Bit15 : Reserved |  |
| SF07 | [SAFF Subcode 7] (1) <br> Safety fault subregister 07 <br> Application Watchdog Management detected error register <br> Bit0 : Reserved <br> Bit1 : Reserved <br> Bit2 : Reserved <br> Bit3 : Reserved <br> Bit4 : Reserved <br> Bit5 : Reserved <br> Bit6 : Reserved <br> Bit7 : Reserved <br> Bit8 : Reserved <br> Bit9 : Reserved <br> Bit10 : Reserved <br> Bit11 : Reserved <br> Bit12 : Reserved <br> Bit13 : Reserved <br> Bit14 : Reserved <br> Bit15 : Reserved |  |

(1) Hexadecimal values are displayed on the Graphic display terminal

Example:
SFFE $=0 \times 0008$ in Hexadecimal
SFFE = Bit 3

| Code | Name / Description | Unit |
| :---: | :---: | :---: |
| SF08 | [SAFF Subcode 8] (1) <br> Safety fault subregister 08 <br> Application Watchdog Management detected error register <br> Bit0 = 1: PWM task detected error <br> Bit1 = 1: Fixed task detected error <br> Bit2 = 1: ATMC w atchdog detected error <br> Bit3 = 1: DYNFCT w atchdog detected error <br> Bit4 : Reserved <br> Bit5 : Reserved <br> Bit6 : Reserved <br> Bit7 : Reserved <br> Bit8 : Reserved <br> Bit9 : Reserved <br> Bit10 : Reserved <br> Bit11 : Reserved <br> Bit12 : Reserved <br> Bit13 : Reserved <br> Bit14 : Reserved <br> Bit15 : Reserved |  |
| SF09 | [SAFF Subcode 9] (1) <br> Safety fault subregister 09 <br> Motor control Auto Test detected error register <br> Bit0 : Reserved <br> Bit1 = 1: Ram stack overflow <br> Bit2 = 1 : Ram address integrity detected error <br> Bit3 = 1: Ram data access detected error <br> Bit4 = 1 : Flash Checksum detected error <br> Bit5 : Reserved <br> Bit6 : Reserved <br> Bit7 : Reserved <br> Bit8 : Reserved <br> Bit9 = 1: 1ms task overflow <br> Bit10 = 1 : PWM task overflow <br> Bit11 = 1 : Fixed task overflow <br> Bit12 : Reserved <br> Bit13 : Reserved <br> Bit14 = 1 : Unw anted interruption <br> Bit15 = $1:$ Hardw are WD is not running after initialization |  |
| SF10 | [SAFF Subcode 10] (1) <br> Safety fault subregister 10 <br> Motor control direct short-circuit detected error register <br> Bit0 = 1 : Ground short circuit - Configuration detected error <br> Bit1 = 1: Phase to phase short circuit - Configuration detected error <br> Bit2 = 1: Ground short circuit <br> Bit3 = 1: Phase to phase short circuit <br> Bit4 : Reserved <br> Bit5 : Reserved <br> Bit6 : Reserved <br> Bit7 : Reserved <br> Bit8 : Reserved <br> Bit9 : Reserved <br> Bit10 : Reserved <br> Bit11 : Reserved <br> Bit12 : Reserved <br> Bit13 : Reserved <br> Bit14 : Reserved <br> Bit15 : Reserved |  |

(1) Hexadecimal values are displayed on the Graphic display terminal

Example:
SFFE $=0 \times 0008$ in Hexadecimal
SFFE $=$ Bit 3

| Code | Name/Description ${ }^{\text {a }}$ |
| :---: | :---: |
| SF11 | [SAFF Subcode 11] (1) <br> Safety fault subregister 11 <br> Motor Control dynamic check of activity detected error register <br> Bit0 $=1$ : Application requested a diagnostic of direct short circuit <br> Bit1 = 1: Application requested consistency verification of stator frequency estimation (voltage and current) <br> Bit2 = 1: Application requested diagnostic of SpdStat provided by Motor Control <br> Bit3 : Reserved <br> Bit4 : Reserved <br> Bit5 : Reserved <br> Bit6 : Reserved <br> Bit7 : Reserved <br> Bit8 = 1 : Motor Control safe diagnostic of direct short circuit is enabled <br> Bit9 $=1$ : Motor Control consistency check of stator frequency estimation is enabled <br> Bit10 = 1 : Motor Control diagnostic of SpdStat provided by Motor Control is enabled <br> Bit11 : Reserved <br> Bit12 : Reserved <br> Bit13 : Reserved <br> Bit14 : Reserved <br> Bit15 : Reserved |
| dGt- | [DIAGNOSTICS] (continued) |
| tAC | [IGBT alarm counter] <br> Transistor alarm time counter (length of time the "IGBT temperature" alarm has been active). |
| tAC2 | [Min. freq time] <br> Transistor alarmtime counter at minimum sw itching frequency (length of time the "IGBT temperature" alarm has been active after the drive has automatically reduced the switching frequency to the minimum value). |
| ntJ * | [IGBT alarm Nb] <br> Transistor alarm counter: number detected during lifecycle. Visible if [3.1 ACCESS LEVEl] (LAC) is set to [Expert] (Epr). |
| SEr- | [SERVICE MESSAGE] <br> See page 289. |
| $r F L t$ $\begin{aligned} & \text { no } \\ & \text { YES } \end{aligned}$ | [Reset past faults] <br> Reset all resetable previous detected faults. <br> [ No N ( nO ): Reset not active <br> [YES] (YES): Reset in progress |

These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from w ithin the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.
(1) Hexadecimal values are displayed on the Graphic display terminal Example:
SFFE $=0 \times 0008$ in Hexadecimal
SFFE = Bit 3

| Code | Name/Description ${ }^{\text {a }}$ |
| :---: | :---: |
| MOn- | [1.2 MONITORING] (continued) |
| COd- | [PASSWORD] <br> HMI Passw ord. <br> If you have lost your code, please contact BLEMO. |
| CSt | [State] <br> Status of the drive (lock/unlock). Information parameter, cannot be modified. <br> [Locked] (LC): The drive is locked by a password [Unlocked](ULC): The drive is not locked by a passw ord |
| COd | [PIN code 1] <br> Confidential code. <br> Enables the drive configuration to be protected using an access code. <br> When access is locked by means of a code, only the parameters in the [1.2 MONITORING] (MOn-) and <br> [1.1 SPEED REFERENCE] (rEF-) menus can be accessed. The MODE key can be used to sw itch betw een menus. <br> Note: Before entering a code, do not forget to make a careful note of it. <br> [OFF] (OFF): No access locking codes. <br> - To lock access, enter a code (2 to 9,999). The display can be incremented using the jog dial. Then press ENT. [ON] (On) appears on the screen to indicate that access has been locked. <br> [ON] (On): A code is locking access (2 to 9,999). <br> - To unlock access, enter the code (incrementing the display using the jog dial) and press ENT. The code remains on the display and access is unlocked until the next time the drive is turned off. Access will be locked again the next time the drive is turned on. <br> - If an incorrect code is entered, the display changes to [ON] (On), and access remains locked. <br> Access is unlocked (the code remains on the screen). <br> - To reactivate locking with the same code when access has been unlocked, return to [ON] (On) using the jog dial and then press ENT. [ON] (On) remains on the screen to indicate that access has been locked. <br> - To lock access with a new code when access has been unlocked, enter the new code (increment the display using the jog dial) and then press ENT. [ON] (On) appears on the screen to indicate that access has been locked. <br> - To clear locking when access has been unlocked, return to [OFF] (OFF) using the jog dial and then press ENT. <br> [OFF] (OFF) remains on the display. Access is unlocked and w ill remain so until the next restart. |
| COd2 <br> * <br> OFF <br> On $8888$ | [PIN code 2] <br> Confidential code 2. Visible if [3.1 ACCESS LEVEL] (LAC) is set to [Expert] (Epr). <br> The value [OFF] (OFF) indicates that no passw ord has been set [Unlocked] (ULC). <br> The value [ON] (On) indicates that the drive configuration 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 pow er supply is disconnected. <br> PIN code 2 is an unlock code know n only to BLEMO Product Support. |
| ULr <br> ULro <br> ULr1 | [Upload rights] <br> [Permitted] (ULr0): Means that SoMove or the graphic display terminal can save the whole configuration (password, protections, configuration). When the configuration is edited, only the non protected parameters w ill be accessible. [Not allow ed] (ULr1): Means that SoMove or the graphic display terminal cannot save the configuration |
| dllir <br> dLro <br> dLr1 <br> dLr2 <br> dLr3 | [Download rights] <br> [Locked drv] (dLr0): Locked drive: means that the configuration can be dow nloaded only in a locked drive which configuration has the same passw ord. If the passw ords are different, download is not permitted. <br> [Unlock. drv] (dLr1): Unlocked drive: means that the configuration can be dow nloaded only in a drive w ithout active passw ord <br> [Not allowed] (dLr2): Not allow ed: the configuration cannot be dow nloaded <br> [Lock/unlock] (dLr3): Lock. + Not: dow nload is permitted follow ing case 0 or case 1 |

These parameters only appear if the corresponding function has been selected in another menu. When the parameters can
$\square$ 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.

## Configuration Mode (ConF)

## What's in this Chapter?

This chapter contains the following topics:

| Topic | Page |
| :--- | :---: |
| Introduction | $\underline{78}$ |
| Organization tree | $\underline{79}$ |
| My Menu | $\underline{80}$ |
| Factory Settings | $\underline{81}$ |
| Macro Configuration | $\underline{82}$ |
| Full | $\underline{85}$ |

Introduction
Configuration mode includes 4 parts:

1. "My Menu" menu includes up to 25 parameters available for user customization us ing the graphic display terminal or SoMove software.
2. Store/recall parameter set: These 2 functions are used to store and recall customer settings.
3. [Macro configuration] (CFG) parameter which allows to load predefined values for applications (see page 82).
4. FULL: This menu provides access to all other parameters. It includes 10 sub-menus:
[SIMPLY START] (SIM-) page 85
[SETTINGS] (SEt-) page 89
[MOTOR CONTROL] (drC-) page 105
[INPUTS / OUTPUTS CFG] (I_O-) page 125
[COMMAND] (CtL-) page 154
[FUNCTION BLOCK] (FbM-) page 158
[ [APPLICATION FUNCT.] (FUn-) page 167
[FAULT MANAGEMENT] (FLt-) page 250

- [COMMUNICATION] (COM-) page 275
[ACCESS LEVEL] (LAC) page 280


## Organization tree

Displayed param eter values are given as examples.


## My Menu

| Code | Name / Description |
| :--- | :--- |
| COnF | [1.3 CONFIGURATION] |
| MYMn | $[$ MY MENU] |
|  | This menu contains the parameters selected in the [3.4 DISPLAY CONFIG.] (dCF-) menu on page 287. |

## Factory Settings

| Code | Name/Description ${ }^{\text {a }}$ ( Factory setting |
| :---: | :---: |
| COnF | [1.3 CONFIGURATION] |
| FCS- | [FACTORY SETTINGS] |
| FCSI | Choice of source configuration. <br> If the configuration switching function is configured, it w ill not be possible to access [Config 1] (CFG1) and [Config 2] (CFG2). <br> Note: To load the drive's presettings previously stored ([Config 1] (Str1) or [Config 2] (Str2)), select the source configuration [Config. Source] (FCSI) =[Config 1] (CFG1) or [Config 2] (CFG2) follow ed by a factory setting [Goto FACTORY SETTINGS] (GFS) $=$ [YES] (YES). <br> [Macro-Conf] (\\|n\|): Factory configuration, return to selected macro configuration <br> [Config 1] (CFG1): Configuration 1 <br> [Config 2] (CFG2): Configuration 2 |
| Y - ALL drM MOt COM dIS | [PARAMETER GROUP LIST] <br> Selection of menus to be loaded. <br> See the multiple selection procedure on page 33 for the integrated display terminal and page $\underline{24}$ for the graphic display terminal. Note: In factory configuration and after a return to "factory settings", [PARAM ETER GROUP LIST] w ill be empty. <br> [AII] (ALL): All parameters (the function blocks program will also be erased) <br> [Drive configuration] (drM): The [1 DRIVE MENU] (drI-) menu without [COMMUNICATION] (COM-). In the [2.4 DISPLAY CONFIG.] menu, [Return std name] (GSP) page 289 returns to [No] (nO). <br> [Motor param] (MOt): Motor parameters, see page 297. <br> The following selections can only be accessed if [Config. Source] (FCSI) is set to [Macro-Conf.] (\\|n\|). <br> [Comm.menu] (COM): The [COMMUNICATION] (COM-) menu without either [Scan. In1 address] (nMA1) to [Scan. In8 address] (nMA8) or [Scan.Out1 address] (nCA1) to [Scan.Out8 address] (nCA8). <br> [Display config.] (dIS): The [3.3 MONITORING CONFIG.] (MCF-) menu |
| GFS | [Goto FACTORY SETTINGS] |
| * |  |
| 72s |  |
| nO YES |  |
| SCSI | [Save config] ${ }^{\text {[No] (nO) }}$ |
| * | The active configuration to be saved does not appear for selection. For example, if it is [Config 0] (StrO), only [Config 1] (Str1) and [Config 2] (Str2) appear. The parameter changes back to [ No ] ( nO ) as soon as the operation is complete. |
|  | [ No ] ( nO ) : No <br> [Config 0] (Str0): Press and hold downthe ENT key for 2 s [Config 1] (Str1): Press and hold downthe ENT key for 2 s [Config 2] (Str2): Press and hold dow $n$ the $\boxminus N T$ key for 2 s |
| Stro |  |
| Str1 |  |
| Str2 |  |

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


## Macro Configuration



## *

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

2 s
To change the assignment of this parameter, press the ENT key for 2 s .

## Example of total return to factory settings

- [Config. Source] (FCS I) is setto [Macro-Conf] (\|n\|)
- [PARAMETER GROUP LIST] (FrY-) is set to [All] (ALL)
- [Goto FACTORY SETTINGS] (GFS) is set to [Yes] (YES)

Assignment of the inputs/outputs

| Input/ output | [Start/Stop] | [M. handling] | [Gen. Use] | [Hoisting] | [PID regul.] | [Netw ork C.] |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| [A11] | [Ref. 1 channel] | [Ref. 1 channel] | [Ref. 1 channel] | [Ref. 1 channel] | [Ref. 1 channel](PID reference) | [Ref. 2 channel] <br> ([Ref. 1 channe]] <br> = integrated <br> Modbus) (1) |
| [A12] | [No] | [Summingref. 2] | [Sum mingref. 2] | [No] | [PID feedback] | [No] |
| [A13] | [ No ] | [No] | [ No ] | [No] | [No] | [No] |
| [AO1] | [No] | [No] | [No] | [No] | [No] | [No] |
| [R1] | [No drive flt] | [No drive flt] | [No drive flt] | [No drive flt] | [No drive flt] | [No drive flt] |
| [R2] | [No] | [No] | [No] | [Brk control] | [No] | [No] |
| [LI1] (2-wire) | [Forw ard] | [Forw ard] | [Forw ard] | [Forw ard] | [Forw ard] | [Forw ard] |
| [LI2] (2-wire) | [Reverse] | [Reverse] | [Reverse] | [Reverse] | [Reverse] | [Reverse] |
| [LI3] (2-wire) | [No] | [2 presetspeeds] | [Jog] | [Fault reset] | [PID integral reset] | [Ref. 2 switching] |
| [L14] (2-wire) | [No] | [4 presetspeeds] | [Fault reset] | [External fault] | [2 presetPID ref.] ref.] | [Fault reset] |
| [LI5] (2-wire) | [No] | [8 presetspeeds] | [Torque limitation] | [No] | [4 presetPID ref.] | [No] |
| [L16] (2-wire) | [No] | [Fault reset] | [No] | [No] | [No] | [No] |
| [LI1] (3-wire) | [Drive running] | [Drive running] | [Drive running] | [Drive running] | [Drive running] | [Drive running] |
| [L12] (3-wire) | [Forw ard] | [Forw ard] | [Forw ard] | [Forw ard] | [Forw ard] | [Forw ard] |
| [LI3] (3-wire) | [Reverse] | [Reverse] | [Reverse] | [Reverse] | [Reverse] | [Reverse] |
| [L14] (3-wire) | [No] | [2 presetspeeds] | [Jog] | [Fault reset] | [PID integral reset] | [Ref. 2 switching] |
| [LI5] (3-wire) | [No] | [4 preset speeds] | [Fault reset] | [External fault] | $\begin{aligned} & \text { [2 presetPID } \\ & \text { ref.] } \end{aligned}$ | [Fault reset] |
| [L16] (3-wire) | [No] | [8 presetspeeds] | [Torque limitation] | [No] | $\begin{aligned} & \text { [4 presetPID } \\ & \text { ref.] } \end{aligned}$ | [No] |
| [LO1] | [No] | [No] | [No] | [No] | [No] | [No] |
| Graphic display terminal keys |  |  |  |  |  |  |
| F1 key | [ No ] | [No] | [ No ] | [ No ] | [No] | Control via graphic display terminal |
| $\begin{array}{\|l} \hline \begin{array}{l} \text { F2, F3, F4 } \\ \text { keys } \end{array} \\ \hline \end{array}$ | [No] | [No] | [No] | [No] | [No] | [ No ] |

In 3-w ire control, the assignment of inputs LI1 to LI6 shifts.
(1) To start with, integrated Modbus [Modbus Address] (Add) must first be configured, page $\underline{276}$.

Note: These assignments are reinitialized every time the macro configuration changes.

## Other configurations and settings

In addition to the assignment of inputs/outputs, other parameters are assigned only in the Hoisting macro configuration.

## Hoisting:

- [Movement type] (bSt) is set to [Hoisting] (UEr) page 194
- [Brake contact] (bCl) is set to [No] (nO) page 194
- [Brake impulse] (lOIP) is setto [Yes] (YES) page 194
- [Brake release IFW] (llbr) is setto 0 A page 194
- [Brake Release time] (brt) is setto 0 s page 194
- [Brake release freq] (blr) is setto [Auto] (AUtO) page 195
- [Brake engage freq] (bEn) is set to [Auto] (AUtO) page 195
- [Brake engage time] (bEt) is setto 0 s page 195
- [Engage at reversal] (bEd) is set to [No] (nO) page 195
- [Jump at reversal] (JdC) is set to [Auto] (AUtO) page $\underline{195}$
- [Time to restart] (ttr) is setto 0 s page 196
- [Current ramp time] (brr) is setto 0 s page 198
- [Low speed] (LSP) is set to Rated motor slip calculated by the drive, page 87
- [Output Phase Loss] (OPL) is setto [Yes] (YES) page 256 No further modifications can be made to this param eter.
- [Catch on the fly] (FLr) is setto [ No ] ( nO ) page 253 No further modifications can be made to this param eter.


## Return to factory settings:

Returning to factory settings with [Config. Source] (FCSI) is setto [Macro-Conf] (In I) page 81 will return the drive to the selected macro configuration. The [Macro configuration] (CFG) parameter does not change, although [Customized macro] (CCFG) dis appears .

Note: The factory settings that appear in the parameter tables corres pond to
[Macro configuration] (CFG) $=$ [Start/Stop] (StS). This is the macro configuration set at the factory.

## Example diagrams for use with the macro configurations

[Hoisting] (HSt) diagram

(1) Whithout integrated safety function, a contact on the Preventa module must be inserted in the brake control circuit to engage it $w$ hen the "Safe Torque Off" safety function is activated (see connection diagrams in the Installation manual).

## Full

| Code | Name / Description | Adjustment range | Factory setting |
| :---: | :---: | :---: | :---: |
| COnF | [1.3 CONFIGURATION] |  |  |
| FULL | [FULL] |  |  |
| SIM - | [SIMPLY START] |  |  |
| tCC | [2/3 wire control] |  | [2 w ire] (2C) |
| 82 | 1! WARNNG |  |  |
|  | UNANTICIPATED EQUIPMENT OPERATION <br> If this parameter is changed, the parameters [Reverse assign.] (rrs) and [2 wire type] (tCt) and the assignments of the digital inputs are reset to the factory setting. <br> Verify that this change is compatible with the type of wiring used. <br> Failure to follow these instructions can result in death, serious injury, or equipment damage. |  |  |

See [2/3 w ire control] (tCC) page $\underline{125}$.
[2 w ire] (2C)
2-w ire control (level commands): 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" w iring:

[3 w ire] (3C)
3-w ire control (pulse commands): A "forward" or "reverse" pulse is sufficient to command starting, a "stop" pulse is sufficient to command stopping.

Example of "source" w iring:

| +24 LI1 LI2 Llx | LI1: stop |
| :---: | :---: |
| -0--0-0-0-3 | LI2: forw ard |
|  | LIx: reverse |

## CFG

[Macro configuration]

|  |
| :--- | :--- |
| UNANTICIPATED EQUIPMENT OPERATION |
| Verify that the selected macro configuration is compatible with the type of wiring used. |
| Failure to follow these instructions can result in death, serious injury, or equipment damage. |

See [Macro configuration] (CFG) page 82.
StS
HdG
[Start/Stop] (StS): Start/stop
HdG [M.handling] (HdG): Handling

GEn (HSt): Hoisting

Pld
[Gen. Use] (GEn): General use
[PID regul.] (PId): PID regulation
[Network C.] ( $n \in \mathbf{t}$ ): Communication bus

| Code | Name / Description | Adjustment | Factory setting |
| :---: | :---: | :---: | :---: |
| $\begin{aligned} & \text { CCFG } \\ & \text { * } \\ & \\ & \text { nO } \\ & \text { nes }\end{aligned}$ | [Customized macro] <br> Read-only parameter, only visible if at least one macro configuration parameter has been modified. <br> [ No l ( nO ): No <br> [Yes] (YES): Yes |  |  |
| bFr | [Standard mot. freq] <br> This parameter modifies the presets of the follow ingparameters: [Rate dm 87, [Freq. threshold] (Ftd) page 102, [Rated motor freq.] (FrS) and [50Hz IEC] (50): Drive 50 Hz <br> [60Hz NEM A] ( 1 0): Drive 60 Hz | otor volt.] (UnS) belo Max frequency] | [50Hz IEC] (50) <br> w,[High speed] (HSP) page r). |
|  | This parameter is only accessible in this menu on 3-phase drives. <br> If one phase disappears, the drive sw itches to fault mode [Input phase loss] (PHF), but if 2 or 3 phases disappear, the drive continues to operate until it trips on an undervoltage detected fault (the drive trips in [Input phase loss] (PHF) if there is an input phase loss and if this leads to performance decrease). <br> See [Input phase loss] (IPL) page $\underline{256}$. <br> [Ignore] (nO): Detected fault ignored, to be used $w$ hen the drive is supplied via a single-phase supply or by the DC bus [Freewheel] (YES): With freewheel stop |  |  |
| n | Rated motor power given on the nameplate, in kW if [Standard mot. freq] (bFr) is set to [ 50 Hz IEC] (50), in HP if [Standard mot. freq] (bFr) is set to [60Hz NEMA] 60 ). <br> See [Rated motor power] ( nPr ) page 107. |  |  |
| Un $*$ | Rated motor voltage given on the nameplate. <br> ER24-...K/B: 100 to 240 V -ER24-.../4K/B: 200 to 480 V. <br> See [Rated motor volt.] (UnS) page 107. |  |  |
| nO $*$ | [Rated mot. current] <br> Rated motor current given on the nameplate. See [Rated mot. current] ( nCr ) page 107. | t | cording to drive rating and andard mot. freq] (bFr) |
| Fr | Rated motor frequency given on the nameplate. <br> The factory setting is 50 Hz , or preset to 60 Hz if [Standard mot. freq] (bFr) is set to 60 Hz . <br> This parameter is not visible if [Motor control type] (Ctt) page 105 is set to [Sync. mot.] (SYn). See [Rated motor freq.] (FrS) page 107. |  |  |
| nSP | Rated motor speed given on the nameplate. <br> This parameter is not visible if [Motor control type] (Ctt) page 105 is set to [Sync. mot.] (SYn). <br> See [Rated motor speed] (nSP) page 107. <br> 0 to $9,999 \mathrm{rpm}$ then 10.00 to 60.00 krpm on the integrated display terminal. <br> If, rather than the rated speed, the nameplate indicates the synchronous speed and the slip in Hz or as a \%, calculate the rated <br> speed as follow s: <br> Nominal speed $=$ Synchronous speed $\times \frac{100-\text { slip as a } \%}{100}$ <br> or <br> Nominal speed $=$ Synchronous speed $\times \frac{50-\text { slip in } \mathrm{Hz}}{50}(50 \mathrm{~Hz}$ motors $)$ <br> or <br> Nominal speed $=$ Synchronous speed $\times \frac{60-\text { slip in } \mathrm{Hz}}{60} \quad(60 \mathrm{~Hz}$ motors $)$ |  |  |


| Code | Name/Description $\quad$ Adjustment range | Factory setting |
| :---: | :---: | :---: |
| tFr | [Max frequency] 10 to 599 Hz <br> The factory setting is 60 Hz , or preset to 72 Hz if [Standard mot. freq] (b Fr ) is set to 60 Hz.  <br> The maximum value is limited by the follow ing conditions: <br> It must not exceed 10 times the value of [Rated $m$ otor freq.] (FrS). <br> See [Max frequency] (tFr) page 105. | 60 Hz |
| tUn () | [Auto tuning] <br> For asynchronous motors, see page 108. For synchronous motors, see page 113. | [No action] (nO) |
| tUS <br> tAb PEnd PrOG FAIL dOnE | [Auto tuning state] <br> This parameter is not saved at drive pow er off. It show s the Autotuning status since last power on See [Auto tuning state] (tUS) page 108. <br> [Not done] ( tAb ): Autotune is not done <br> [Pending] (PEnd): Autotune has been requested but not yet performed <br> [In Progress] (PrOG): Autotune is in progress <br> [Failed] (FAIL) : Autotune has detected a fault <br> [Done] (dOnE): The stator resistance measured by the auto-tuning function is used to control the | [Not done] (tAb) <br> motor |
| StUn <br> tAb <br> MEAS CUS | [Tune selection] <br> See [Tune selection] (StUn) page 108. <br> [Default] (tAb): The default stator resistance value is used to control the motor [Measure] (MEAS): The stator resistance measured by the auto-tuning function is used to contro [Custom] (CUS): The stator resistance set manually is used to control the motor | [Default] (tAb) <br> lthe motor |
| $\begin{gathered} 1+1 / \\ \text { (2 } \end{gathered}$ | [Mot. therm. current] 0.2 to $1.5 \ln (1)$ <br> Motor thermal protection current, to be setto the rated currentindicated onthe motor nameplate. See [Mot. therm. current] (\\|tll) page 90. | According to drive rating |
| $\begin{gathered} \mathrm{ACC} \\ \mathbf{( 1} \end{gathered}$ | [Acceleration] $\quad 0.00$ to 6,000 s (2) <br> Time to accelerate from0 to the [Rated motor freq.] (FrS) (page 86). To have repeatability in ramer parameter must be set according to the possibility of the application. <br> See [Acceleration] (ACC) page 89. | $3.0 \mathrm{~s}$ <br> amps, the value of this |
| dEC | [Deceleration] 0.00 to 6,000 s (2) <br>   <br> Time to decelerate fromthe [Rated motor freq.] (FrS) (page 86) to 0 . To have repeatability in ram parameter must be set according to the possibility of the application. <br> See [Deceleration] (dEC) page 89. | $3.0 \mathrm{~s}$ <br> ramps, the value of this |
| $\begin{gathered} \text { LSP } \\ \text { ( } \end{gathered}$ | [Low speed] 0 to 599 Hz <br> Motor frequency at minimum reference, can be set betw een 0 and [High speed] (HSP).  <br> See [Low speed] (LSP) page 8.  | $0$ |
| HSP () |  | $50 \mathrm{~Hz}$ <br> uency] (tFr). The factory |

(1) In corresponds to the rated drive current indicated in the Installation manual and on the drive nameplate.
(2) Range 0.01 to 99.99 s or 0.1 to 999.9 s or 1 to 6,000 s according to [Ramp increment] ( $\|$ in r) page $\underline{170}$. These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from w ithin the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.
 Parameter that can be modified during operation or when stopped.

2 s
To change the assignment of this parameter, press the ENT key for 2 s .

## Settings

## With integrated display terminal

It is recommend to stop the motor before modifying any of the settings.
From [anF menu


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

| Code | Name / Description | Adjustment range | Factory setting |
| :---: | :---: | :---: | :---: |
| FULL | [FULL] (continued) |  |  |
| SEt- | [SETTINGS] |  |  |
| Inr () <br> 0.01 <br> 0.1 <br> 1 | This parameter is valid for [Acceleration] (ACC), [Deceleration] (dEC), [Acceleration 2] (AC2) and [Deceleration 2] (dE2). See [Ramp increment] (IInr) page 170. <br> [0,01]: Ramp up to 99.99 seconds <br> [0,1]: Ramp up to 999.9 seconds <br> [1]: Ramp up to 6,000 seconds |  |  |
| ACC | [Acceleration] | 0.00 to 6,000 s (1) | 3.0 s |
| () | Time to accelerate from 0 to the [Rated motor freq.] (FrS) page 86. To have repeatability in ramps, the value of this parameter must be set according to the possibility of the application. See [Acceleration] (ACC) page 170. |  |  |
| dEC | [Deceleration] | 0.00 to 6,000 s (1) | 3.0 s |
| () | Time to decelerate fromthe [Rated motor freq.] (FrS) page 86 to 0 . To have repeatability in ramps, the value of this parameter must be set according to the possibility of the application. See [Decele ration] (dEC) page 170. |  |  |
| AC2 | [Acceleration 2] | 0.00 to 6,000 s (1) | 5 s |
| * <br> () | Time to accelerate from 0 to the [Rated motor freq.] (FrS) page 86 . To have repeatability in ramps, the value of this parameter must be set according to the possibility of the application. See [Accele ration 2] (AC2) page 171. |  |  |
| dE2 | [Deceleration 2] | 0.00 to 6,000 s (1) | 5 s |
| * <br> () | Time to decelerate fromthe [Rate d motor freq.] (FrS) page 86 to 0 . To have repeatability in ramps, the value of this parameter must be set according to the possibility of the application. See [Deceleration2] (dE2) page 171. |  |  |
| tA1 | [Begin Acc round] | 0 to 100\% | 10\% |
| * <br> () | Rounding of start of acceleration ramp as a \% of the [Acce le ration] (ACC) or [Acce leration 2] (AC2) ramp time. Visible if [Ramp type] (rPt) is set to [Customized] (CUS). See [Begin Acc round] (tA1) page 170. |  |  |
| tA2 | [End Acc round] | D to 100\% | 10\% |
| * <br> () | Rounding of end of acceleration ramp as a \% of the [Accele ration] (ACC) or [Acce leration 2] (AC2) ramp time. Can be set betw een 0 and $100 \%$ - [Begin Acc round] (tA1). <br> Visible if [Ramp type] ( $r \boldsymbol{P}_{\mathbf{t}}$ ) is set to [Customized] (CUS). See [End Acc round] (tA2) page 171. |  |  |
| tA3 | [Begin Dec round] | 0 to 100\% | 10\% |
| * <br> (1) | Rounding of start of deceleration ramp as a \% of the [Deceleration] (dEC) or [Deceleration 2] (dE2) ramp time. Visible if [Ramp type] (rPt) is set to [Customized] (CUS). See [Begin Dec round] (tA3) page 171. |  |  |
| tA4 | [End Dec round] | 0 to 100\% | 10\% |
| * <br> () | Rounding of end of deceleration ramp as a\% of the [Deceleration] (dEC) or [Deceleration 2] (dE2) ramp time. Can be set betw een 0 and 100\%-[Begin Dec round] ( $\mathrm{t} A 3$ 3). <br> Visible if [Ramp type] (rPt) is set to [Customized] (CUS). See [End Dec round] (tA4) page 171. |  |  |
| LSP | [Low speed] | 0 to 599 Hz | 0 Hz |
| () | Motor frequency at minimum reference, can be set betw een 0 and [High speed] (HSP) page 87. See [Low speed] (LSP) page 87. |  |  |
| HSP | [High speed] | 0 to 599 Hz | 50 Hz |
| () | Motor frequency at maximum reference, can be set between [Low speed] (LSP) and [Max frequency] (tFrr). The factory setting changes to 60 Hz if [Standard mot. freq] (bFr) is set to [60Hz NEMA] ( 0 ). See [High speed] (HSP) page 87. |  |  |


(1) Range 0.01 to 99.99 s or 0.1 to 999.9 s or 1 to $6,000 \mathrm{~s}$ according to [Ramp increment] (In Ir) page 170 .
(2) In corresponds to the rated drive current indicated in the Installation manual or on the drivenameplate. These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from w ithin the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter settings for [K speed loop filter] (SFC), [Speed prop. gain] (SPG) and [Speed time integral] (SIt)

The following parameters can be accessed if [Motor control type] (Ctt) page 105 is set to [SVCV] (UUC), [Sync. mot.] (SYn) or [Energy Sav.] (nLd).

General Case: Setting for [K speed loop filter] (SFC) $=0$
The regulator is an "IP" type with filtering of the speed reference, for applications requiring flexibility and stability (hoisting or high inertia, for example).

- [Speed prop. gain] (SPG) affects excessive speed.
- [Speed time integral] (S\|t) affects the passband and response time.

| Initial response | Reduction in SIT | Reduction in SIT |
| :---: | :---: | :---: |
|  | Reference division | Reference division |
| Initial response | Increase in SPG - | Increase in SPG |
| Reference division | Reference division | Reference division |

## Special case: Parameter [K speed loop filter] (SFC) is not 0

This parameter mustbe reserved for specific applications that require a short response time (trajectory positioning or servo control).

- When setto 100 as described above, the regulator is a "Pl" type, without filtering of the speed reference.
- Settings between 0 and 100 will obtain an intermediate function between the settings below and those on the previous page.

Example:Setting for [K speed loop filter] (SFC) $=100$

- [Speed prop. gain] (SPG) affects the passband and response time.
- [Speed time integral] (S|t) affects excessive speed.

| Initial response | Reduction in SIT | Reduction in SIT |
| :---: | :---: | :---: |
| Reference division | Reference division | Reference division |
| Initial response | Increase in SPG _- | Increase in SPG |
| Reference division | Reference division | Reference division |




2nd standstill injection time.
This parameter can be accessed if [Auto DC injection] (AdC) is set to [Yes] (YES).
See page 177.

| SFr |
| :---: |
|  |
| (l |

[Switching freq.]

| 2 to 16 kHz | 4.0 kHz |
| :--- | :--- |

## NOTICE

## DAMAGE TO THE MOTOR

Verify that the switching frequency of the drive does notexceed 4 kHz if the EMC filter is disconnected for operation of the drive in an IT mains.
Failure to follow these instructions can result in equipment damage.
This applies to the follow ing drive versions: ER24-...K/B
Sw itching frequency setting. See page 119.
Adjustment range: The maximum value is limited to 4 kHz if [Motor surge lim it] (SUL) parameter, page 120 is configured. Note: In the event of excessive temperature rise, the drive will automatically reduce the sw itching frequency and reset it once the temperature returns to normal.
CLI

| Current Limitation] | 0 to $1.5 \ln (1)$ | $1.5 \ln (1)$ |
| :--- | :--- | :--- |

## NOTICE

## OVERHEATING AND DAMAGE TO THE MOTOR

- Verify that the motor is properly rated for the maximum current to be applied to the motor.
() - Consider the duty cycle of the motor and all factors of your application including derating requirements in

Failure to follow these instructions can result in equipment damage.

[^0]

| Code | Name / Description | Adjustment range | Factory setting |
| :---: | :--- | :--- | :--- |
| JGt | [Jog delay] | 0 to 2.0 s | 0.5 s |
| }{} | Anti-repeat delay betw een 2 consecutive jog operations. See page $\frac{179 .}{}$ |  |  |
| . |  |  |  |


| Code | Name/Description | Adjustment range | Factory setting |
| :---: | :---: | :---: | :---: |
|  | [Preset speed 2] | 0 to 599 Hz | 10 Hz |
| * | Preset speed 2. See [Preset speed 2] (SP2) page 181. |  |  |
| (2) |  |  |  |
|  | [Preset speed 3] | 0 to 599 Hz | 15 Hz |
| * | Preset speed 3. See [Preset speed 3] (SP3) page 181. |  |  |
| () |  |  |  |
| SP4 | [Preset speed 4] | 0 to 599 Hz | 20 Hz |
| * | Preset speed 4. See [Preset speed 4] (SP4) page 181. |  |  |
| () |  |  |  |
| SP5 | [Preset speed 5] | 0 to 599 Hz | 25 Hz |
| * | Preset speed 5. See [Preset speed 5] (SP5) page 181. |  |  |
| $\text { ( })$ |  |  |  |
| SP 莌 | [Preset speed 6] | 0 to 599 Hz | 30 Hz |
| * | Preset speed 6. See [Preset speed 6] (SP page 181. |  |  |
| $(1)$ |  |  |  |
| SP7 | [Preset speed 7] | 0 to 599 Hz | 35 Hz |
| * | Preset speed 7. See [Preset speed 7] (SP7) page 181. |  |  |
| $()$ |  |  |  |
|  | [Preset speed 8] | 0 to 599 Hz | 40 Hz |
| * | Preset speed 8. See [Preset speed 8] (SP8) page 182. |  |  |
| SP9 | [Preset speed 9] | 0 to 599 Hz | 45 Hz |
| * | Preset speed 9. See [Preset speed 9] (SP9) page 182. |  |  |
| SP10 | [Preset speed 10] | 0 to 599 Hz | 50 Hz |
| * | Preset speed 10. See [Preset speed 10] (SP10) page 182. |  |  |
| $()$ |  |  |  |
|  | [Preset speed 11] | 0 to 599 Hz | 55 Hz |
| * | Preset speed 11. See [Preset speed11] (SP11) page 182. |  |  |
| $()$ |  |  |  |
| SP12 | [Preset speed 12] | 0 to 599 Hz | 60 Hz |
| * | Preset speed 12. See [Preset speed 12] (SP12) page 182. |  |  |
| $()$ |  |  |  |




| Code | Name / Description | Adjustment range | Factory setting |
| :---: | :---: | :---: | :---: |
| rP3 | [Preset ref. PID 3] | See page $\underline{\underline{214}}$ (2) | 600 |
| * | Preset PID reference. See page $\underline{214}$. |  |  |
| $()$ |  |  |  |
| rP4 | [Preset ref. PID 4] | See page 214 (2) | 900 |
| * | Preset PID reference. See page $2 \underline{14}$. |  |  |
| $()$ |  |  |  |




| Code | Name / Description | Adjustment range | Factory setting |
| :---: | :---: | :---: | :---: |
| () | 2nd skip frequency. This parameter helps to prevent prolonged operation w ithin an adjustable range around the regulated frequency. This function can be used to help to prevent a speed, w hich would cause resonance, being reached. Setting the function to 0 renders it inactive. See page 183. |  |  |
| JF3 | [3rd Skip Frequency] | 0 to 599 Hz | 0 Hz |
| (1) | 3rd skip frequency. This parameter helps to prevent prolonged operation within an adjustable range around the regulated frequency. This function can be used to help to prevent a speed, which would cause resonance, being reached. Setting the function to 0 renders it inactive. See page 183. |  |  |
| JFH | [Skip.Freq.Hysteresis] | 0.1 to 10 Hz | 1 Hz |
| * | Parameter visible if at least one skip frequency [Skip Frequency] (JPF), [Skip Frequency 2] (JF2) or [3rd Skip Frequency] (JF3) is different from 0. <br> Skip frequency range: betw een (JPF-JFH) and (JPF +JFH) for example. $\qquad$ This adjustment is common to the 3 frequencies (JPF, JF2, JF3). See page $\overline{183 .}$ |  |  |
| LUn | [UnId.Thr.Nom.Speed] | 20 to $100 \%$ of <br> [Rated mot. current] (nCr) | 60\% |
| * | Underload threshold at rated motor frequency ([Rate d m otor freq.] (FrS) page 86), as a \% of the rated motor torque. Visible only if [UnId T. Del. Detect] (ULt) page $\underline{270 \text { is not set to } 0 . ~}$ See page 270 . |  |  |
| டUL | [Unld.Thr.O.Speed] | 0 to [Unld.Thr.Nom.Speed] (LUn) | 0\% |
| * $(2)$ | Underload threshold at zero frequency, as a \% of the rated motor torque. Visible only if [Unld T. Del. Detect] (ULt) page 270 is not set to 0 . See page 270 . |  |  |
|  | [UnId. Freq.Thr. Det.] | 0 to 599 Hz | 0 Hz |
| * | Underload detection minimum frequency threshold. See page $\underline{270}$. |  |  |
| Srlo | [Hysteresis Freq.Att.] | 0.3 to 599 Hz | 0.3 Hz |
| * | Maximum deviation betw een the frequency reference and the motor frequency, which defines steady state operation. See page 270 . |  |  |
| FtU | [Underload T.B.Rest.] | 0 to 6 min | 0 min |
| * () | Minimum time permitted betw een an underload being detected and any automatic restart. In order for an automatic restart to be possible, the value of [Max. restart time] (tAr) page 252 must exceed that of this parameter by at least one minute. See page 271. |  |  |
| LOC | [OvId Detection Thr.] | $\begin{array}{\|l} \hline 70 \% \text { to } 150 \% \text { of } \\ \text { [Rated mot. current] (nCr) } \end{array}$ | 110\% |
| * $(2$ | Overload detection threshold, as a\% of the rated motor current [Rated mot. current] ( nCr ). This value must be less than the limit current in order for the function to w ork. See page 272. <br> Visible only if [OvId Time Detect.] (tOL) is not set to 0 . <br> This parameter is used to detect an "application overload". This is not a motor or drive thermal overload. |  |  |
| FtO | [Overload T.B.Rest.] | 0 to 6 min | 0 min |
| () | Minimum time permitted betw een an overload being detected and any automatic restart. In order for an automatic restart to be possible, the value of [Max. restart time] (tAr) page 252 must exceed that of this parameter by at least one minute. See page 272 . |  |  |
| LbC | [Load correction] | 0 to 599 Hz | 0 Hz |
| * | Rated correction in Hz. See [Load correction] (LbC) page 122. |  |  |


| Code | Name / Description $\quad$ Adjustment range $\quad$ Factory setting |
| :---: | :---: |
| FFM <br> () <br> Std rUn StP | [Fan Mode] <br> If [Fan Mode] (FFM) is set to [Never] (Stp), the fan of the drive is disabled. <br> Service life of electronic component is reduced. <br> [Standard] (Std): The fan starts and stops automatically according to the drive thermal state <br> [Never] (Stp): The fan is stopped |
| SdS | [Scale factor display] <br> Used to display a value in proportion to the output frequency [Output frequency] ( $r \boldsymbol{r} \boldsymbol{r}$ ): the machine speed, the motor speed, etc. <br> The display w ill show $\text { [Cust. output value] }(S P d 3)=\frac{\text { SScale factor display] (SdS) } \times \text { [Output frequency] }(r \mathbb{F} r \text { ) }}{1000} \text { to } 2 \text { decimal places }$ <br> - If [Scale factor display] (SdS) y 1 , [Cust. output value] (SPd1) is displayed (possible definition $=0.01$ ) <br> - If $1<$ [Scale factor display] (SdS) y 10, [Cust. output value] (SPd2) is displayed (possible definition $=0.1$ ) <br> - If [Scale factor display] (SdS) $>10$, [Cust. output value] (SPd3) is displayed (possible definition =1) <br> - If [Scale factor display] $(S d S)>10$ and [Scale factor display] (SdS) x[Output frequency] ( $r \boldsymbol{F} \boldsymbol{r}$ ) $>9,999$ : <br> example: for 24,223, display w ill show 24.22 <br> - If [Scale factor display] (SdS) $>10$ and [Scale factor display] (SdS) x[Output frequency] $(\boldsymbol{r} \boldsymbol{F} \boldsymbol{r})>65,535$, display locked at 65.54 <br> Example: Display motor speedfor <br> 4-pole motor, $1,500 \mathrm{rpm}$ at 50 Hz (synchronous speed): <br> [Scale factor display] (SdS) = 30 <br> [Cust. output value] $(\mathrm{SPd} 3)=1,500$ at [Output frequency] $(\mathbf{r} F \mathbf{F})=50 \mathrm{~Hz}$ |

(1) In corresponds to the rated drive current indicated in the Installation manual or on the drive nameplate.
(2) If a graphic display terminal is not in use, values greater than $9,999 \mathrm{w}$ ill be displayed on the 4 -digit display $w$ ith a period mark after the thousand digit, example: 15.65 for 15,650. 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.

Parameter that can be modified during operation or when stopped.

To change the assignment of this parameter, press the ENT key for 2 s .

## Motor control

The parameters in the [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 113 , which may cause the motor to start up.
- Parameters containing the sign (》) in the code column, which can be modified with the drive running or stopped.
Note : We recommend to perform auto-tuning if one of the following parameters are modified from their factory setting.


\begin{tabular}{|c|c|}
\hline Code \& Name / Description ${ }^{\text {a }}$ Adjustment range ${ }^{\text {a }}$ ( Factory setting <br>
\hline UF5

SYn
UFq

nLd \& | [V/F 5pts] (UF5): 5-segment V/Fprofile: As [Standard] (Std) profile but also supports the avoidance of resonance (saturation). |
| :--- |
| Note: U0 is the result of an internal calculation based on motor parameters and multiplied by UFr (\%). U0 can be adjusted by modifying UFr value. |
| [Sync. mot.] (SYn): For synchronous permanent magnet motors with sinusoidal electromotive force (EMF) only. This selection makes the asynchronous motor parameters inaccessible, and the synchronous motor parameters accessible. | <br>

\hline
\end{tabular}

Asynchronous motor parameters

| Code | Name/Description $\quad$ Adjustment range ${ }^{\text {a }}$ Factory setting |
| :---: | :---: |
| ASY- | [ASYNC. MOTOR] <br> Only visible if [Motor control type] (Ctt) page 105 is not set to [Sync. mot.] (SYn). |
| nPr $*$ | [Rated motor power] This parameter cannot be accessed if [Motor control type] (Ctt) page 105 is set to [Sync. mot.] (SYn). Rated motor power given on the nameplate, in kW if [Standard mot. freq] (bFr) is set to [50Hz IEC] (50), in HP if [Standard mot. freq] (bFr) is set to [60Hz NEM A] ( 60 ). |
| $\begin{gathered} \mathrm{COS} \\ * \end{gathered}$ | [Motor 1 Cosinus Phi] 0.5 to 1 According to drive rating <br> Nominal motor cos phi. <br> This parameter can be accessed if [M otor param choice] (MPC) is set to [Mot Cos] (COS).   |
| UnS $*$ | [Rated motor volt.] 100 to 480 V According to drive rating and <br> [Standard mot. freq] (bFr) <br> This parameter cannot be accessed if [Motor control type] (Ctt) page 105 is set to [Sync. mot.] (SYn). <br> Rated motor voltage given on the nameplate.   |
| nCr * | [Rated mot. current] 0.25 to 1.5 ln (1) According to drive rating and <br> [Standard mot. freq] (bFr) <br> This parameter cannot be accessed if [Motor control type] (Ctt) page 105 is set to [Sync. mot.] (SYn). <br> Rated motor current given on the nameplate.   |
| $\begin{gathered} \hline \text { FrS } \\ * \end{gathered}$ | [Rated motor freq.] 10 to 800 Hz 50 Hz <br> This parameter cannot be accessed if [Motor control type] (Ctt) page 105 is set to [Sync. mot.] (SYn).   <br> Rated motor frequency given on the nameplate.   <br> The factory setting is 50 Hz , or preset to 60 Hz if [Standard mot.freq] (bFr) is setto 60 Hz.   |
| nSP | [Rated motor speed] <br> This parameter cannot be accessed if [Motor control type] (Ctt) page 105 is set to [Sync. mot.] (SYn). <br> 0 to $9,999 \mathrm{rpm}$ then 10.00 to 65.53 krpm on the integrated display terminal. <br> 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 follow s: <br> Nominal speed $=$ Synchronous speed $\times \frac{100-\text { slip as a } \%}{100}$ <br> or <br> Nominal speed $=$ Synchronous speed $\times \frac{50-\text { slip in } \mathrm{Hz}}{50}(50 \mathrm{~Hz}$ motors $)$ <br> or <br> Nominal speed $=$ Synchronous speed $\times \frac{60-\text { slip in } \mathrm{Hz}}{60}(60 \mathrm{~Hz}$ motors $)$. |




If [Motor control type] (Ctt) page 105 is set to [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 upflux when it is pow ered up.
In [Not cont.] (FnC) mode, fluxing occurs when the motor starts up.
The flux current is greater than [Rated mot. current] ( nCr ) (configured rated motor current) when the flux is established and is then adjusted to the motor magnetizing current.

## FnC

[Not cont.] (FnC): Non-continuous mode
[Continuous] (FCt): Continuous mode. This option is not possible if [Auto DC injection] (AdC) page 176 is [Yes] (YES) or if [Type of stop] (Stt) page 173 is [Freewheel] (nst).
[ No ] (FnO): Function inactive. This option is not possible if [Brake assignment] (bLC) page 194 is not [ No ] ( nO ).
If [Motor control type] (Ctt) page 105 is set to [Sync. mot.] (SYn), the [Motor fluxing] (FLU) parameter causes the alignment of the rotor and not the fluxing.
If [Brake assignment] (bLC) page $\underline{194}$ is not [No] (nO), the [Motor fluxing] (FLU) parameter has no effect.

| Code | Name / Description | Adjustment range | Factory setting |
| :---: | :---: | :---: | :---: |
| MPC | [Motor param choice] |  | [Mot Power] (nPr) |
| * |  |  |  |
| nPr | [Mot Power] (nPr) |  |  |
| cos | [Mot Cos] (COS) |  |  |

(1) In corresponds to the rated drive current indicated in the Installation manual and 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 w ithin the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.
(1) Parameter that can be modified during operation or when stopped.

2 s
To change the assignment of this parameter, press the ENT key for 2 s .

## Asynchronous motor parameters:Expert mode


(1) On the integrated display unit: 0 to 9,999 then 10.00 to $65.53(10,000$ to 65,535$)$.

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

## Synchronous motor parameters

These parameters can be accessed if[Motor control type] (Ctt) page 105 is setto [Sync. mot.] (SYn). In this case, the asynchronous motor parameters cannot be accessed.

Once the drive is chosen:
1-Enter the motor nameplate.

## 2 - Perform the tune.

- Do an [Auto tuning] (tUn)
- Check the state of the synchronous motor saliency (See page 113.)

If [Saliency mot. state] (SMOt) displays [Med salient] (MLS) or [High salient] (HLS)

- follow the procedure below "3-Improve the tune result" and
- follow the the procedure below "4-Adjust PHS"

Or if [Saliency mot. state] (SMOt) displays [Low salient] (LLS)

- follow the the procedure below "4-Adjust PHS"

3 - Improve the tune results.

| NOTICE |
| :--- |
| OVERHEATING AND DAMAGE TO THE MOTOR |
| - Verify that the motor is properly rated for the maximum current to be applied to the motor. |
| - Consider the duty cycle of the motor and all factors of your application including derating requirements in |
| determining the currentlimit. |
| Failure to follow these instructions can result in equipment damage. |

- Set [PSI align curr. max] (MCr) conforming to the maximum motor current. The maximum value of [PSI align curr. max] (MC rr) ) is limited by [Current Limitation] (CLI). Without inform ation set [PSI align curr. max] (MCr) to [Auto] (AUtO) (see page 116)
- Do a second (tUn) after the (MCr) modification.


## 4 - Adjust PHS.

Adjust [Syn. EMF constant](PHS) to have optimal behavior (See page 116.)

- Start the motor at minimal stable frequency available on the machine (without load).
- Check and note the [\% error EMF sync] (rdAE) value. (See page 117)
- If the [\% error EMF sync] (rdAE) value is lower than 0\%, then [Syn. EMF constant] (PHS) may be increased.
- If the [\% error EMF sync] (rdAE) value is upper than 0\%, then [Syn. EMF constant] (PHS) may be reduced.
[\% error EMF sync] (rdAE) value should be closed to 0\%.
- Stop the motor for modify PHS in accordance with the value of the rdAE (previously noted).


## Advices:

The drive mustbe chosento have enough current according to the need of behavior, but not too much, to have enough accuracy in the current measurement, especially with the high frequencysignal injection (see [HF inj. activation] (HF I) page 116).
Perform ances maybe higher on high saliency motors by activating high frequency injection function (see [HF inj. activation] (HF I) page 116).

| Code | Name / Description | Adjustment range | Factory setting |
| :---: | :---: | :---: | :---: |
| dirC- | [MOTOR CONTROL] (continued) |  |  |
| SYN- | [SYNCHRONOUS MOTOR] |  |  |
| $\begin{gathered} \hline \mathrm{nCrS} \\ * \end{gathered}$ | Rated synchronous motor current given on the nameplate. |  |  |
| $\begin{gathered} \text { PPnS } \\ * \end{gathered}$ | [Pole pairs] <br> Number of pairs of poles on the synchronous motor. | 1 to 50 | According to drive rating |
| nSPS <br> * <br> (2) | Rated motor speed given on the nameplate. |  |  |
| $\begin{gathered} \mathrm{tqS} \\ * \end{gathered}$ | [Motor torque] <br> Rated motor torque given on the nameplate. | 0.1 to 6,553.5 Nm | According to drive rating |
| tUn | [Auto tuning] |  | [ No ] ( nO ) |
| () | A W ARNING |  |  |
| 12s | UNEXPECTED MOVEMENT <br> Autotuning moves the motor in order to tune the control loops. <br> - Only start the system if there are no persons or obstructions in the zone of operation. <br> Failure to follow these instructions can result in death, serious injury, or equipment damage. |  |  |
| no YES CLr | During autotuning, the motor makes small movements, noise developmen <br> Auto-tuning is only performed if no stop command has been activated. assigned to a logic input, this input must be set to 1 (active at 0 ). <br> Auto-tuning takes priority over any run or prefluxing commands, $w$ hich sequence. <br> - If auto-tuning detects a fault, the drive displays [No action] ( nO ) and, [Autotune fault mgt] (tnL) page 268, may switch to [Auto-tuning] <br> - Auto-tuning may last for 1 to 2 seconds. Do not interrupt the process. <br> Note:Motor thermal state has a big influence on tune result. Make the tune To redo a tune of the motor, $w$ ait that it is completely stopped and cold. Set then redo the motor tuning. <br> The use of the motor tuning without doing a [Erase tune] (CLr) first is used In any case, the motor has to be stopped before performing a tune operation. Cable length has an influence on the Tune result. If the cabling is modified, <br> [No action] (nO): Auto-tuning not in progress <br> [Do tune] (YES): Auto-tuning is performed immediatly if possible, then the p to [No action] (nO). If the drive state does not allow the tune operation imm the operation must be done again. <br> [Erase tune] (CLr): The motor parameters measured by the auto-tuning fu values are used to control the motor. [Auto tuning status] (tUS) is set to | t and oscillations of thes <br> a "freewheel stop" or <br> will be taken into acc <br> depending on the con <br> tn F) fault mode. <br> Wait for the display to <br> w ith the motor stoppe first [Auto tuning] <br> to get the thermal st . <br> it is necessary to redo <br> parameter automaticaly diately, the paramet <br> nction are reseted. Th <br> [Not done] ( $\mathrm{t} A \mathrm{~b}$ ). | systemare normal. <br> ast stop"function has been <br> tafter the auto-tuning <br> uation of <br> ange to [No action] (nO). <br> and cold. <br> to [Erase tune] (CLr), <br> estimation of the motor. <br> e tune operation. <br> changes <br> changes to [ No ] ( nO ) and <br> default motor parameters |
| tUS | [Auto tuning state] [Not done] (tAb) |  |  |
|  | (for information only, cannot be modified) |  |  |
|  | This parameter is not saved at drive pow er off.lt show s the Autotuning status since last poweron. |  |  |
| tAb | [Not done] (tAb): Autotune is not done |  |  |
| PEnd | [Pending] (PEnd): Autotune has been requested but not yet performed |  |  |
| PrOG | [In Progress] (PrOG): Autotune is in progress |  |  |
| FAIL | [Failed] (FAIL): Autotune has detected a fault |  |  |


| Code | Name / Description ${ }^{\text {a }}$ Adjustment rang | Fac |
| :---: | :---: | :---: |
| StUn | [Tune selection] <br> (for information only, cannot be modified) <br> Note: Tune of the motor w ill increase significantly the performances. <br> [Default] (tAb): The default values are used to control the motor [Measure] (MEAS): The values measured by the auto-tuning function are used to control the mo [Custom] (CUS): The values set manually are used to control the motor |  |
| tUnU | [Auto tuning usage] <br> This parameter show s the way used to modify the motor parameters according to its estimated the <br> [No] ( nO ): No thermal state estimation <br> [Therm Mot] ( tM ) : Statoric thermal state estimation based on nominal current and current consum [Cold tun] (Ct): Statoric thermal state estimation based on statoric resistance measured at the fir at each pow er up | mal state. <br> d by the motor cold tune and tune done |
| AUt | [Automatic autotune] | [ No ] ( nO ) |
|  | UNEXPECTED MOVEMENT <br> If this function is activated, autotuning is perform ed each time the drive is switched on. <br> - Verify that activating this function does not result in unsafe conditions. <br> Failure to follow these instructions can result in death, serious injury, or equipment damage. |  |
| nO $Y E S$ | The motor must be stopped $w$ hen switching on the drive. <br> [Autom atic autotune] (AUt) is forced to [Yes] (YES) if [Auto tuning usage] (tUnU) is set to of motor statoric resistance measured during the tune is used to estimate the thermal state of the <br> [ $\mathrm{No} \mathrm{]}$ ( nO ): Function deactivated <br> [Yes] (YES): A tune is automatically done at each pow er up | old tun] (Ct). The value tor at pow er up. |
| $\begin{aligned} & \text { SMOt } \\ & * \\ & \\ & \\ & \text { LOS } \\ & \text { LLS } \\ & \text { MLS }\end{aligned}$ | [Saliency mot. state] <br> (for information only, cannot be modified) Information on synchronous motor saliency. <br> This parameter can be accessed if [Tune selection] (StUN) is set to [Measure] (MEAS). <br> Note: In case of motor w ith low saliency, the standard control law is advised. <br> [ No l ( nO ): Tune not done <br> [Low salient] (LLS): Low saliency level (Recommended configuration: [Angle setting type] <br> [PSIO align] (PSIO) and [HF inj. activation] (HFI) = [No] (nO)). <br> [Med salient] (MLS): Medium saliency level ([Angle setting type] (ASt) =[SPM align] (SPM <br> [HF inj. activation] (HFl) = [Yes] (YES) could work). <br> [High salient] (HLS): High saliency level ([Angle setting type] (ASt) = [IPM align] (IPMA) <br> [HF inj. activation] (HFI) = [Yes] (YES) is possible). | St $)=[$ PSI align $]$ (PSI) <br> is possible. <br> possible. |
| ASt | [Angle setting type] | PSSIO align.] (PSIO) |
| * IPMA SPMA PSII PSIO nO | [IPM align] (IPMA): Alignment for IPM motor. Alignment mode for Interior-buried Permanent Magnet motor (usually, this kind of motor has a high saliency level). It uses high frequency injection, which is less noisy than standard alignment mode. <br> [SPM align] (SPMA): Alignment for SPM motor. Mode for Surface-mounted Permanent Magnet motor (usually, this kind of motor has a medium or low saliency level). It uses high frequency injection, whichis less noisy than standard alignment mode. [PSI align] (PSI): Pulse signal injection. Standard alignment mode by pulse signal injection. <br> [PSIO align] (PSIO): Pulse signal injection - Optimized. Standard optimized alignment mode by pulse signal injection. The phase shiftangle measurement time is re duced after the first run order or tune operation, even if the drive has been turned off. [No align] : No alignment |  |


(1) In corresponds to the rated drive current indicated in the Installation manual and on the drive nameplate.
(2) On the integrated display unit: 0 to 9,999 then 10.00 to $65.53(10,000$ to 65,536$)$.

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

Parameter that can be modified during operation or when stopped.

Synchronous motor: Expert mode


| Code | Name / Description | Adjustment range | Factory setting |
| :---: | :---: | :---: | :---: |
| Slr | [Boost level align.] | 0 to 200\% | 100\% |
| * | Current level in \% of [Nominallsync.] (nCrS) for high frequency phase-shiftangle measurement SPMA type. |  |  |
| rdAE | [\% error EMF sync] | -3276.7 to 3275.8 \% |  |
|  | Ratio D-Axis Current <br> Use rdAE to asjust [Syn. EMF constant] (PHS), rdAE should be closed to 0 . <br> If the [\% error EMF sync] (rdAE) value is lower than 0\%, then [Syn. EMF constant] (PHS), may be increased. If the [\% error EMF sync] (rdAE) value is upper than 0\%, then [Syn. EMF constant] (PHS), may be reduced. |  |  |

(1) On the integrated display unit: 0 to 9,999 then 10.00 to $65.53(10,000$ to 65,536$)$.
*
These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from w ithin the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

Parameter that can be modified during operation or when stopped.

| Code | Name / Description | Adjustment range | Factory setting |
| :---: | :---: | :---: | :---: |
| drir - | [MOTOR CONTROL] (continued) |  |  |
| SPG | [Speed prop. gain] | 0 to 1,000\% | 40\% |
| * () | Speed loop proportional gain. <br> Visible if [Motor control type] (Ctt) is not set to [Standard] (Std), [V/F 5pts] (UFS) or [V/F Quad.] (UFq). |  |  |
| SPGU | [UF inertia comp.] | 0 to 1,000\% | 40\% |
| * <br> () | Visible if [Motor control type] (Ctt) is set to [Standard] (Std), [V/F 5pts] (UFS) or [VF Quad.] (UFq). |  |  |
| Slt | [Speed time integral] | 1 to $65,535 \mathrm{~ms}$ | 63 ms |
| * <br> () | Visible if [Motor control type] (Ctt) is not set to [Standard] (Std), [V/F 5pts] (UFS) or [V/F Quad.] (UFq). |  |  |
| SFC | [K speed loop filter] | 0 to 100 | 65 |
| * | Speed filter coefficient (0(IP) to 100(Pl)). |  |  |
| () |  |  |  |
| FFH | [Spd est. filter time] | 0 to 100 ms | 6.4 ms |
| * | Accessible in Expert mode only. Frequency to filter the estimated speed. |  |  |
| CrtF | [Cur. ref. filter time] | 0 to 100 ms | 3.2 ms |
| * | Accessible in Expert mode only. <br> Filter time of the current reference filter [of control law (if [ No l ( nO ): stator natural frequency)]. |  |  |
| UFr | [IR compensation] | 0 to 200\% | 100\% |
| () | Used tooptimize torque at very low speed, or to adapt to special cases (for example: for motors connected in parallel, decrease [IR compensation] (UFr)). If there is insufficient torque at low speed, increase [IR compensation] (UFir). A too high value can avoid the motor to start (locking) or change the current limiting mode. |  |  |
| SLP | [Slip compensation] | $0 \text { to } 300 \%$ | 100\% |
| * | This parameter cannot be accessed if [Motor control type] (Ctt) is set to [Sync. mot.] (SYn). <br> This parameter is written at $0 \%$ when [Motor control type] (Ctt) is set to [VF Quad.] (UFq). <br> Adjusts the slip compensation around the value set by the rated motor speed. <br> The speeds given on motor nameplates are not necessarily exact. <br> If slip setting is low er than actual slip: The motor is not rotating at the correct speed in steady state, but at a speed low er than the reference. <br> If slip setting is higher than actual slip: The motor is overcompensated and the speed is unstable. |  |  |
| U1 | [U1] | 0 to 800 V according to rating | 0 V |
| * | V/F profile setting. <br> This parameter can be accessed if [Motor control type] (Ctt) is set to [V/F 5pts] (UF5). |  |  |
| F1 | [F1] | 0 to 599 Hz | 0 Hz |
| * | V/F profile setting. <br> This parameter can be accessed if [Motor control type] (Ctt) is set to [V/F 5pts] (UF5). |  |  |
| U2 | [U2] | 0 to 800 V according to rating | 0 V |
| * | V/F profile setting. <br> This parameter can be accessed if [Motor control type] (Ctt) is set to [V/F 5pts] (UF5). |  |  |
| F2 | [F2] | 0 to 599 Hz | 0 Hz |
| * | V/F profile setting. <br> This parameter can be accessed if [Motor control type] (Ctt) is set to [VF 5pts] (UF5). |  |  |


| Code | Name / Description | Adjustment range | Factory setting |
| :---: | :---: | :---: | :---: |
|  | [U3] | 0 to 800 V according to rating | 0 V |
| * | V/F profile setting. <br> This parameter can be accessed if [Motor control type] (Ctt) is set to [V/F 5pts] (UF5). |  |  |
|  | [F3] | 0 to 599 Hz | 0 Hz |
| * | V/F profile setting. <br> This parameter can be accessed if [Motor control type] (Ctt) is set to [V/F 5pts] (UF5). |  |  |
| U4 | [U4] | 0 to 800 V according to rating | 0 V |
| * | V/F profile setting. <br> This parameter can be accessed if [Motor control type] (Ctt) is set to [V/F 5pts] (UF5). |  |  |
| F4 | [F4] | 0 to 599 Hz | 0 Hz |
| * | V/F profile setting. <br> This parameter can be accessed if [Motor control type] (Ctt) is set to [V/F 5pts] (UF5). |  |  |
| U5 | [U5] | 0 to 800 V according to rating | 0 V |
| * | V/F profile setting. <br> This parameter can be accessed if [Motor control type] (Ctt) is set to [V/F 5pts] (UF5). |  |  |
| F5 | [F5] | 0 to 599 Hz | 0 Hz |
| * | V/F profile setting. <br> This parameter can be accessed if [Motor control type] (Ctt) is set to [V/F 5pts] (UF5). |  |  |
| CLI | [Current Limitation] | 0 to 1.5 ln (1) | $1.5 \mathrm{ln}(1)$ |
| $\begin{aligned} & * \\ & \text { () } \end{aligned}$ |  |  |  |
|  | OVERHEATING AND DAMAGE TO THE MOTOR <br> - Verify that the motor is properly rated for the maximum current to be applied to the motor. <br> - Consider the duty cycle of the motor and all factors of your application including derating requirements in determining the currentlimit. <br> Failure to follow these instructions can result in equipment damage. |  |  |

First current limitation
Note : If the setting is less than 0.25 In , the drive may lock in [Output Phase Loss] (OPL) fault mode if this has been enabled (see page 256). If it is less than the no-load motor current, the motor cannot run.

## SFt

[Switch. freq type]
[SFR type 1] (HF1)
The motor sw itching frequency will be modified (reduced) $w$ hen the internal temperature of the drive w ill be too high.
HF1
[SFR type 1] (HF1): Heating optimization
Allow s the systemto adapt the sw itching frequency according to the motor frequency.
HF2
[SFR type 2] (HF2): Motor noise optimization (for high sw itching frequency)
Allow s the systemto keep a constant chosen switching frequency [Switching freq.] (SFr) w hatever the motor frequency [Output frequency] ( $r \mathcal{F} r$ ).
In the event of overheating, the drive automatically decreases the switching frequency. It is restored to its original value when the temperature returns to normal.

| [Switching freq.] | 2 to 16 kHz | 4 kHz |
| :--- | :--- | :--- |



| Code | Name / Description $\quad$ Adjustment range $\quad$ Factory setting |
| :---: | :---: |
| nrd $\begin{array}{r} \text { nO } \\ \text { YES } \end{array}$ | [Noise reduction] <br> Random frequency modulation helps to prevent any resonance, which may occur at a fixed frequency. <br> [ No ] <br> (nO): Fixed frequency <br> [Yes] (YES): Frequency with random modulation |
| bOA $\begin{array}{r} n O \\ d Y n A \\ \text { StAt } \end{array}$ | [Boost activation] [Dynamic] (dYnA) <br>   <br> [Inactive] $(n \mathrm{OO}):$ No boost <br> [Dynam ic] (dYnA): Dynamic boost <br> [Static] (StAt): Static boost  |
| bOO | [Boost] This parameter can be accessed if [Boost activation] (bOA) is not set to [No] (nO). 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 allow s gradual adjustment up to the frequency set by [Action Boost] (FAb). Negative values apply particularly to tapered rotor motors. Magnetizing current Rositive [Boost] (bOO) Rated magnetizing current |
| FAb $*$ | [Action Boost] 0 to 599 Hz 0 Hz <br> This parameter can be accessed if [Boost activation] (bOA) is not set to [ No H ( nO ). <br> Frequency above which the magnetizing current is no longer affected by [Boost] (bOO).   |
| SUL | [Motor surge limit.] <br> This function limits motor overvoltages and is useful in the follow ing applications: <br> - NEMA motors <br> - Japanese motors <br> - Spindle motors <br> - Rew ound motors <br> This parameter can remain set to [ No ] ( nO ) for $230 / 400 \mathrm{~V}$ motors used at 230 V , or if the length of cable betw een the drive and the motor does not exceed: <br> -4 m w ith unshielded cables <br> -10 m w ith shielded cables <br> Note: When [Motor surge limit.] (SUL) is set to [Yes](YES), the maximum switching frequency [Switching freq.] (SFr) is modified, see page 120. <br> [ No l ( nO O : : Function inactive <br> [Yes] (YES): Function active |
| SOP  <br> $*$  <br> $*$  <br>  6 <br>  8 <br>  10 | [Volt surge limit. opt] $10 \mu \mathrm{~s}$ <br> Optimization parameter for transient overvoltages at the motor terminals. This parameter canbe accessedif [Motor surge limit.] <br> (SUL) is set to [Yes] (YES).  Optimization parameter for tran(SUL) is set to [Yes] (YES). <br> Set to 6,8 or $10 \mu \mathrm{~s}$, according to the follow ing table. <br> Note: This parameter is useful for ER24-.../4K/B. |

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.

The value of the [Volt surge limit. opt] (SOP) parameter corresponds to the attenuation time of the cable used. It is defined to help 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
[Volt surge limit. opt] (SOP) parameter and the length of the cable between the drive and the motor. For longer cable lengths, an output of the filter or a $\mathrm{dV} / \mathrm{dt}$ protection filter mustbe used.
For motors in parallel, the sum of all the cable lengths mustbe 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.
Example:Two $7.5 \mathrm{~kW}(10 \mathrm{HP})$ motors
Take the lengths on the $15 \mathrm{~kW}(20 \mathrm{HP})$ table row, which are shorter than those on the $7.5 \mathrm{~kW}(10 \mathrm{HP})$ row, and divide by the number of motors to obtain the length per motor (with unshielded "GORSE" cable and SOP $=6$, the result is $40 / 2=20 \mathrm{~m}$ maximum for each 7.5 kW ( 10 HP ) motor).
In special cases (for exam ple, different types of cable, different motor powers in parallel, different cable lengths in parallel, etc.), we recommendusing 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.

Tables giving the correspondence between the SOP parameter and the cable length, for 400 V supply mains

| ER24 | Motor |  | Cable crosssection (min) |  | Maximum cable length in meters |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Reference | Pow er |  |  |  | Unshielded "GORSE" cable Type H07 RN-F 4Gxx |  |  | Shielded "GORSE" cable Type GVCSTV-LS/LH |  |  | Shielded "BELDEN" cable Type 2950x |  |  |
|  | kW | HP | in $\mathrm{mm}^{2}$ | AWG | SOP = 10 | SOP = 8 | SOP = 6 | SOP = 10 | SOP = 8 | SOP = 6 | SOP = 10 | SOP = 8 | SOP = 6 |
| ER24-0.37/4K/B | 0.37 | 0.50 | 1.5 | 14 | 100 m | 70 m | 45 m | 105 m | 85 m | 65 m | 50 m | 40 m | 30 m |
| ER24-0.55/4K/B | 0.55 | 0.75 | 1.5 | 14 | 100 m | 70 m | 45 m | 105 m | 85 m | 65 m | 50 m | 40 m | 30 m |
| ER24-0.75/4K/B | 0.75 | 1 | 1.5 | 14 | 100 m | 70 m | 45 m | 105 m | 85 m | 65 m | 50 m | 40 m | 30 m |
| ER24-1.1/4K/B | 1.1 | 1.5 | 1.5 | 14 | 100 m | 70 m | 45 m | 105 m | 85 m | 65 m | 50 m | 40 m | 30 m |
| ER24-1.5/4K/B | 1.5 | 2 | 1.5 | 14 | 100 m | 70 m | 45 m | 105 m | 85 m | 65 m | 50 m | 40 m | 30 m |
| ER24-2.2/4K/B | 2.2 | 3 | 1.5 | 14 | 110 m | 65 m | 45 m | 105 m | 85 m | 65 m | 50 m | 40 m | 30 m |
| ER24-3.0/4K/B | 3 | - | 1.5 | 14 | 110 m | 65 m | 45 m | 105 m | 85 m | 65 m | 50 m | 40 m | 30 m |
| ER24-4.0/4K/B | 4 | 5 | 2.5 | 12 | 110 m | 65 m | 45 m | 105 m | 85 m | 65 m | 50 m | 40 m | 30 m |
| ER24-5.5/4K | 5.5 | 7.5 | 4 | 10 | 120 m | 65 m | 45 m | 105 m | 85 m | 65m | 50 m | 40 m | 30 m |
| ER24-7.5/4K | 7.5 | 10 | 6 | 8 | 120 m | 65 m | 45 m | 105 m | 85 m | 65 m | 50 m | 40 m | 30 m |
| ER24-11.0/4K | 11 | 15 | 10 | 8 | 115 m | 60 m | 45 m | 100 m | 75 m | 55 m | 50 m | 40 m | 30 m |
| ER24-15.0/4K | 15 | 20 | 16 | 6 | 105 m | 60 m | 40 m | 100 m | 70 m | 50 m | 50 m | 40 m | 30 m |

For 230/400 V motors used at 230 V , the [Motor surge limit.] (SUL) param eter can rem ain set to [ No ] (nO).

| Code | Name / Description | Adjustment range | Factory setting |
| :---: | :---: | :---: | :---: |
|  | [Braking level] | 335 to 820 V | According to drive rating voltage |
| () | Braking transistor command level. |  |  |
| $\mathrm{LbA}$ <br> * $\begin{array}{r} \text { nO } \\ \text { YES } \end{array}$ | 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 betw een the two motors. To do this, it varies the speed based on the torque. This parameter can only be accessed if [Motor control type] (Ctt) page 105 is set to [SVC V] (UUC). <br> [ No ] ( nO ): Function inactive <br> [Yes] (YES): Function active |  |  |
| LbC | [Load correction] | 0 to 599 Hz | 0 Hz |
| * | Rated correction in Hz . <br> This parameter can be accessed if [Load sharing] (LbA) is set to [Yes] (YES). |  |  |

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

[^1]
## Load sharing, parameters that can be accessed at expert level

Principle:


The load sharing factor K is determined by the torque and speed, with tw of factors K 1 and $\mathrm{K} 2(\mathrm{~K}=\mathrm{K} 1 \times \mathrm{K} 2)$.



| Code | Name / Description | Adjustment range | Factory setting |
| :---: | :---: | :---: | :---: |
| LbC1 <br> * <br> () | [Correction min spd] <br> This parameter can be accessed if [Load sharing] (LbA) is set to [Y Minimum speed for load correction in Hz. Below this threshold, no correctio speed if this w ould hamper rotation of the motor. | $0 \text { to } 598.9 \mathrm{~Hz}$ <br> Yes] (YES). <br> ions are made. Used to ca | 0 Hz <br> ncel correction at very low |
| LbC2 <br> * <br> () | [Correction max spd] <br> This parameter can be accessed if [Load sharing] (LbA) is set to [Yes] Speed threshold in Hz above w hichmaximum load correction is applied. | [Correction minspd] $(\mathrm{LbC1})+0.1$ at 599 Hz <br> (YES). | 0.1 Hz |
| LbC3 <br> * <br> () | [Torque offset] <br> This parameter can be accessed if [Load sharing] (LbA) is set to [Y Minimum torque for load correction as a \% of the rated torque. Below this th torque instabilities $w$ hen the torque direction is not constant. | $0 \text { to } 300 \%$ <br> Yes] (YES). <br> threshold, no corrections | $0 \%$ <br> are made. Used to avoid |
| $\begin{gathered} \hline \text { LbF } \\ * \\ \text { () } \end{gathered}$ | [Sharing filter] <br> This parameter can be accessed if [Load sharing] (LbA) is set to [Y Time constant (filter) for correction in ms . Used in the event of flexible mech | $0 \text { to } 20 \mathrm{~s}$ <br> Yes] (YES). <br> hanical coupling in orde | 100 ms <br> avoid instabilities. |

## *

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.

Parameter that can be modified during operation or when stopped.

## Inputs / outputs CFG

The parameters in the [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 |
| :---: | :---: | :---: | :---: |
| L 1 - | [LI1 CONFIGURATION] |  |  |
| L1A | [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. |  |  |
|  |  |  |  |
| no | [ $\mathrm{No} \mathrm{]}$ ( nO ): : Not assigned |  |  |
| rUn | [Run] (rUn): Run Enable |  |  |
| Frd | [Forw ard] (Frd): Forw ard operation |  |  |
| rrs | [Reverse] (rrS): Reverse operation |  |  |
| rPS | [Ramp switching] (rPS): Ramp sw itching |  |  |
| JOG | [Jog] (JOG): Jog operation |  |  |
| USP | [+Speed] (USP): + speed |  |  |
| dSP | [- speed] (dSP): - speed |  |  |
| PS2 | [2 presetspeeds] (PS2): 2 Preset speeds |  |  |
| PS4 | [4 preset speeds] (PS4): 4 Preset speeds |  |  |
| PS8 | [8presetspeeds] (PS8): 8 Preset speeds |  |  |
| rFC | [Ref. 2 switching] (rFC): Reference sw itching |  |  |
| nSt | [Freewheel stop] ( SSt ): Freewheel stop |  |  |
| dCl | [DC injection] (dCl): Injection DC stop |  |  |
| FSt | [Fast stop] (FSt): Fast stop |  |  |
| FLO | [Forced local] (FLO): Forced local mode |  |  |
| rSF | [Fault reset] (rSF): Fault reset |  |  |
| tuL | [Auto-tuning] (tUL): Auto-tuning |  |  |
| SPM | [Ref. memo.] (SPM): Save reference |  |  |
| FLI | [Pre Fluxing] (FLI): Motor fluxing |  |  |
| PAU | [Auto / manual] (PAU): Pl(D) auto-manu |  |  |
| PIS | [PID integral reset] (PIS): Integral shunting PI(D) |  |  |
| Pr2 | [2 preset PID ref.] (Pr2): 2 Preset P(D) references |  |  |
| Pr4 | [4 preset PID ref.] (Pr4): 4 Preset PI(D) references |  |  |
| tLA | [Torque limitation] (tLA): Permanent torque limitation |  |  |
| EtF | [External fault] (EtF): External fault |  |  |
| rCA | [Output contact. fdbk] (rCA): Dow nstream contactor feedback |  |  |
| CnF1 | [2 config. sw itching] (CnF1): Configuration sw itching 1 |  |  |
| CnF2 | [ 3 config. sw itching] (CnF2): Configuration sw itching 2 |  |  |
| CHA1 | [2 param eter sets] (CHA1): Parameter sw itching 1 |  |  |
| CHA2 | [3 param eter sets] (CHA2): Parameter sw itching 2 |  |  |
| tLC | [Activ. Analog torque limitation] (tLC): Torque limitation: Activation (analog input) by a logic input |  |  |
| CCS | [Cmd switching] (CCS): Command channel sw itching |  |  |
| InH | [Fault inhibition] (InH): Fault inhibition |  |  |
| PS14 | [16 preset speeds] (PS14.t) : 16 preset speeds |  |  |
| LC2 | [Current limit 2] (LC2): Current limitation sw itching |  |  |
| rCb | [Ref 1B switching] (rCb): Reference channel switching (1 to 1B) |  |  |
| $t r C$ | [Traverse control] (trC): Traverse control |  |  |
| bCI | [Brake contact] (bCI): Brake logic input contact |  |  |
| SAF | [Stop FW limit sw.] (SAF): Stop switch forward |  |  |
| SAr | [Stop RV limit sw.] (SArr): Stop switch reverse |  |  |
| dAF | [Slow down forward] (dAF): Slow dow n attained forw ard |  |  |
| dAr | [Slowdown reverse] (dAr):Slowdown attained reverse |  |  |
| CLS | [Disable lim itsw.] (CLS): Limits sw itches clearing |  |  |
| LES | [Drive lock (Line contact. ctrl)] (LES): Emergency stop |  |  |
| rer | [Init. traverse ctrl.] ( $r- \pm r)$ : Reload traverse control |  |  |
| SnC | [Counter w obble] (SnC): Counter w obble synchronization |  |  |
| rPA | [Prod.reset] (rPA): Reset Product |  |  |
| SH2 | [2 HSP] (SH2): High Speed 2 |  |  |
| SH4 | [ HSP] (SH4): High Speed 4 |  |  |
| FPS1 | [Preset spd2] (FPS1): Function key preset speed 1 assignment |  |  |
| FPS2 | [Preset spd3] (FPS2): Function key preset speed 2 assignment |  |  |
| FPr1 | [PID ref. 2] (FPr1): Function key preset PI 1 assignment |  |  |
| FPr2 | [PID ref. 3] (FPr2): Function key preset Pl 2 assignment |  |  |
| FUSP | +Speed] (FUSP): Function key faster assignment |  |  |
| FdSP | -Speed] (FdSP): Function key slow er assignment |  |  |
|  | +speed around ref.] (USI): + Speed around ref |  |  |
| USI |  |  |  |
| dSI | [+speed around ref.] (USI): + Speed around ref [-speed around ref.] (dSI): - Speed around ref |  |  |



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.

## 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 maybe greater than the maximum value:

Reference



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

## Range (output values): For analog inputs only:

This param eter is used to configure the reference range to $[0 \% \rightarrow 100 \%]$ or $[-100 \% \rightarrow+100 \%]$ in order to obtain a bidirectional output from a unidirectional input.




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

Delinearization: For analog inputs only:
The inputcan be delinearized by configuring an intermediate pointon the input/outputcurve of this input:


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

For range $-100 \% \rightarrow 100 \%$
Reference


\begin{tabular}{|c|c|c|c|}
\hline Code \& Name / Description \& Adjustment range \& Factory setting <br>
\hline Al1- \& \multicolumn{3}{|l|}{[A11 CONFIGURATION]} <br>
\hline Al1A

nO
AO1
Fr1
Fr2
SA2
PIF
tAA
dA2
PIM
FPI
SA3
Fr1b
dA3
FLOC
MA2
MA3
PES

IAO1 \& \multicolumn{3}{|l|}{| [Al1 assignment] |
| :--- |
| Read-only parameter, cannot be configured. |
| It displays all the functions associated with input Al1 in order to check, for example, for compatibility problems. |
| [ No ] (nO): Not assigned |
| [AO1 assignment] (AO1): Analog output AO1 |
| [Ref. 1 channel] (Fr1): Reference source 1 |
| [Ref. 2 channel] (Fr2): Reference source 2 |
| [Summing ref. 2] (SA2): Summing reference 2 |
| [PID feedback] (PIF): PI feedback (PI control) |
| [Torque limitation] (tAA): Torque limitation: Activation by an analog value |
| [Subtract. ref. 2] (dA2): Subtracting reference 2 |
| [Manual PID ref.] (PIM): Manual speed reference of the PI(D) regulator (auto-man) |
| [PID speed ref.] (FPI): Speed reference of the PI(D) regulator (predictive reference) |
| [Summing ref. 3] (SA3): Summing reference 3 |
| [Ref.1B channel] (Fr1b): Reference source 1B |
| [Subtract. ref. 3] (dA3): Subtracting reference 3 |
| [Forced local] (FLOC): Forced local reference source |
| [Ref. 2 multiplier] (MA2): Multiplying reference 2 |
| [Ref. 3 multiplier] (MA3): Multiplying reference 3 |
| [Weight input] (PES): Hoisting: External w eight measurement function |
| [IA01] (IA01): Function blocks: Analog Input 01 |
| ... |
| [IA10] (IA10): Function blocks: Analog Input 10 |} <br>

\hline All 1 t \& \multicolumn{2}{|l|}{\multirow[t]{2}{*}{| [Al1 Type] |
| :--- |
| [Voltage] (10U): Positive voltage input 0-10 V (negative values are interpreted as zero: the input is |}} \& [Voltage] (10U) <br>

\hline $10 \cup$ \& \& \& ( <br>

\hline UIL1 \& | [Al1 min value] |
| :--- |
| Al1 voltage scaling parameter of $0 \%$. | \& 0 to 10.0 V \& 0 V <br>

\hline UlH1 \& \multicolumn{2}{|l|}{Al1 voltage scaling parameter of $100 \%$.} \& 10.0 V <br>
\hline Al1F \& [Al1 filter] Interference filtering. \& 0 to 10.00 s \& 0 s <br>

\hline | Al1 L |
| :--- |
| POS |
| nEG | \& \multicolumn{3}{|l|}{| [Al1 range] [0-100\%] (POS): Positive logical |
| :--- |
| [+/-100\%] (nEG): Positive and negative logical |} <br>


\hline Al1E \& \multicolumn{3}{|l|}{| Input delinearization point coordinate. Percentage of the physical input signal. $0 \%$ corresponds to [AI1 min value] (ULL1). |
| :--- |
| 100\% corresponds to [Al1 max value] (UHH1). |} <br>


\hline Al1S \& \multicolumn{3}{|l|}{| Output delinearization point coordinate (frequency reference). |
| :--- |
| Percentage of the internal frequency reference corresponding to the [Al1 Interm. point X] (A11E) percentage of physical input signal. |} <br>

\hline I \& \multicolumn{3}{|l|}{[INPUTS / OUTPUTS CFG] (continued)} <br>
\hline Al2 \& \multicolumn{3}{|l|}{[A12 CONFIGURATION]} <br>
\hline Al2A \& \multicolumn{3}{|l|}{[AI2 assignment] Identical to [Al1 assignment] (A11A) page 133.} <br>

\hline \[
$$
\begin{array}{r}
\hline \text { Al2t } \\
10 \mathrm{n} \\
\mathrm{n} 10 \mathrm{O} \\
\hline
\end{array}
$$

\] \& \multicolumn{3}{|l|}{| [AI2 Type] | [Voltage $+/-](\mathrm{n} 10 \mathrm{U})$ |
| :--- | :--- |
| $[\mathrm{Voltage}](10 \mathrm{U}):$ Positive voltage input $0-10 \mathrm{~V}$ (negative values are interpreted as zero: the input is |  |
| $[$ unidirectional) |  |
| $[$ Voltage $+/-](\mathrm{n} 10 \mathrm{U})$ : Positive and negative voltage input $+/-10 \mathrm{~V}$ (the input is bidirectional) |  |} <br>


\hline UIL2 \& | [Al2 min value] |
| :--- |
| A12 voltage scaling parameter of $0 \%$. | \& 0 to 10.0 V \& 0 V <br>

\hline
\end{tabular}

| Code | Name / Description $\quad$ Adjustment range | Factory setting |
| :---: | :---: | :---: |
| U1H2 | [Al2 max. value] <br> Al2 voltage scaling parameter of $100 \%$. | 10.0 V |
| Al2F | [Al2 filter] | 0 s |
| Al2L | [Al2 range] <br> This parameter is forced to $[0-100 \%$ ] (POS) and can not be accessed if [A12 Type] (AI2t) (page +/-] (n10U). <br> [0-100\%] (POS): Positive logical <br> [ $+/-100 \%$ ] ( nEG ): Positive and negative logical | [0-100\%] (POS) <br> 133) is set to [Voltage |
| Al2E | [Al2 Interm. point X] <br> Input delinearization point coordinate. Percentage of the physical input signal. <br> $0 \%$ corresponds to [Min value] if the range is $0 \rightarrow 100 \%$ $0 \% \text { corresponds to } \frac{[M a x \text { value }]+[M \text { in value }]}{2} \text { if the range is }-100 \% \rightarrow+100 \% \text {. }$ $100 \% \text { corresponds to [Max value]. }$ | 0\% |
| Al2S | [Al2 Interm. point Y] <br> Output delinearization point coordinate (frequency reference). <br> Percentage of the internal frequency reference corresponding to the [AI2 Interm. point X] (A12E input signal. | $0 \%$ <br> percentage of physical |
| I | [INPUTS / OUTPUTS CFG] (continued) |  |
| Al3- | [A3 CONFIGURATION] |  |
| Al3A | [AI3 assignment] Identical to [Al1 assignment] (A11A) page 133. |  |
| $\begin{array}{r} \text { Al3t } \\ 0 A \end{array}$ | [Al3 Type] <br> [Current] (0A):Current input 0-20 mA | [Current] (OA) |
| CrL3 | [AI3 min. value] <br> A 3 Current scaling parameter of $0 \%$. | 0 mA |
| CrH3 | [AI3 max. value] <br> AB current scaling parameter of $100 \%$. | $20.0 \mathrm{~mA}$ |
| Al3F | [Al3 filter] <br> 0 to 10.00 s <br> Interference filtering. | 0 s |
| Al3L <br> POS nEG | [Al3 range] <br> [0-100\%] (POS): Unidirectional input <br> [+/- 100\%] (nEG): Bidirectional input <br> Example: On a 4-20 mA input. <br> 4 mA corresponds to reference $-100 \%$. <br> 12 mA corresponds to reference $0 \%$. <br> 20 mA corresponds to reference $+100 \%$. <br> Since Al3 is, in physical terms, a bidirectional input, the [+/-100\%] (nEG) configuration must only be is unidirectional. A bidirectional signal is not compatible with a bidirectional configuration. | [0-100\%] (POS) <br> used if the signal applied |
| Al3E |  | 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.


## Load slip detection :



The drive will detect an error and display the error code [Load slipping] (AnF) in the following cases:

- As soon as the RUN order is received, if the sign of the output frequency and the speed feedback are in opposite wayduring [ANF Time Thd.] (tAnF).
- During operation:
- if the speed feedback is in the same direction than the output frequency
- and the speed feedback is over [ANF Detection level] (LAnF).
- and,
"if [ANF Direction check] (dAnF) is setto [Over] (OUErr), the difference between the output frequency and the speedfeedback is over [ANF Frequency Thd.] (FAnF) during [ANF Time Thd.] (TAnF) (Overspeed detection).
or,
"if [ANF Direction check] (dAnF) is set to [Both] (bOth), the difference between the output frequency and the speed feedback is over [ANF Frequency Thd.] (FAnF) or below - [ANF Frequency Thd.] (FAnF) during [ANF Time Thd.] (tAnF) (Overspeed or underspeeddetection).



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.

| Code | Name / Description | Adjustment range | Factory setting |
| :---: | :---: | :---: | :---: |
| I__O- | [INPUTS / OUTPUTS CFG] (continued) |  |  |
| r 1 - | [R1 CONFIGURATION] |  |  |
| r1 | [R1 Assignment] |  | [No drive flt] (FLt) |
| no | [ No ] (nO): Not assigned |  |  |
| Fut rUn | [No drive flt] (FLt): Drive fault detection status (relay normally energized, and de-energized in the event of an error)[Drv running] (rUn): Drive running |  |  |
| FtA | [Freq. Th. attain.] (FtA): Frequency threshold attained ([Freq. threshold] (Ftd) page 102) |  |  |
| FLA | [HSP attain.] (FLA): High speed attained |  |  |
| CtA | [lattained] (CtA): Current threshold attained ([Current threshold] (Ctd) page 102) |  |  |
| SrA | [Freq.ref.att] (SrA): Frequency reference attained |  |  |
| tSA | [Th.mot. att.] (tSA): Motor 1 thermal state attained |  |  |
| PEE | [PID erroral] (PEE): PID error alarm |  |  |
| PFA | [PID fdbk al] (PFA): PID feedback alarm |  |  |
| F2A | [Freq. Th. 2 attained] (F2A): Frequency threshold 2 attained ([Freq. threshold 2] (F2d) page 102) |  |  |
| tAd | [Th. drv.att.] (tAd): Drive thermal state attained |  |  |
| ULA | [Pro.Undload] (ULA): Underload alarm |  |  |
| OLA | [Ovid.P.AIrm] (OLA): Overload alarm |  |  |
| rSdA | [Rope slack] (rSdA): Rope slack (see [Rope slack config.] (rSd) parameter page 205) |  |  |
| ttHA | [High tq. att.] (ttHA):Motor torque overshooting high threshold [High torque thd.] (ttll) page $\frac{102}{102}$ |  |  |
| ttLA | [Low tq. att.] (LtLA): Motor torque undershooting low threshold [Low torque thd.] (ttL) page $\underline{102}$ |  |  |
| MFrd | [Forw ard] (MFrd): Motor in forw ard rotation[Reverse] (MrrS): Motor in reverse rotation |  |  |
| Mrrs |  |  |  |
| tS2 | [Th.m ot2 att] (tS2): Motor 2 thermal threshold (TTD2) reached |  |  |
| tS3 | [Th.m ot3 att] (tS3): Motor 3 thermal threshold (TTD3) reached |  |  |
| AtS | [Neg Torque] (AtS) : Negative torque (braking) |  |  |
| CnFo | [Cnfg. 0 act.] (CnFO): Configuration 0 active |  |  |
| CnF1 | [Cnfg. 1 act.] (CnF1): Configuration 1 active[Cnfg. 2 act.] (CnF2): Configuration 2 active |  |  |
| CnF2 |  |  |  |
| CFP1 | [Set 1 active] (CFP1): Parameter set 1 active |  |  |
| CFP2 | [Set 2 active] (CFP2): Parameter set2active |  |  |
| CFP3 | [Set 3 active] (CFP3): Parameter set 3 active [DC charged] (dbl): DC bus charging |  |  |
| abl |  |  |  |
| brs | [DC charged] (dbL): DC bus charging [In braking] (brS): Drive braking |  |  |
| PrM | [P. removed] (PrM): Drive locked by "Safe Torque Off" input[Fr.met. alar.] (FqLA): Measured speed threshold attained [Pulse warning thd.] (FqL) page 102 |  |  |
| FqLA |  |  |  |
| MCP | [I present] (MCP): Motor current present |  |  |
| LSA | [Lim it sw. att] (LSA): Limit sw itch attained |  |  |
| dLaA | [Load alarm] (dLdA): Load variation detection (see page 267)[Alarm Grp 1] (AGI): Alarm group 1 |  |  |
| AG1 |  |  |  |
| AG2 | [Alarm Grp 2] (AG2): Alarm group 2[Alarm Grp 3] (AG3): Alarm group 3 |  |  |
| AG3 |  |  |  |
| PLA | [LI6=PTC al.] (PLA): LI6 = PTCL alarm |  |  |
| EFA | [Ext. fault al] (EFA): External fault alarm[Under V. al.] (USA): Undervoltage alarm |  |  |
| USA |  |  |  |
| UPA | [Uvolt warn] (UPA): Undervoltage threshold |  |  |
| tha |  |  |  |
| SSA |  |  |  |
| tJA | [IGBT al.] (tJA): Thermal junction alarm[AI3 AI. 4-20] (AP3): Al3 4-20 mA loss alarm |  |  |
| AP3 |  |  |  |
|  | [Ready] (rdY): Ready to start |  |  |
| r 1 - | [R1 CONFIGURATION] (continued) |  |  |
| r1 d | [R1 Delay time] | 0 to $60,000 \mathrm{~ms}$ | 0 ms |
|  | The change in state only takes effect once the configured time has elapsed, w hen the information becomes true. The delay cannot be set for the [ $N$ o drive flt] ( $F \mathrm{~L} \mathbb{t}$ ) assignment, and remains at 0 . |  |  |
| r1S | [R1 Active at] |  | [1] (POS) |
| $\begin{aligned} & \text { POS } \\ & \text { nEG } \end{aligned}$ | Configuration of the operating logic: <br> [1] (POS): State $1 w$ hen the information is true <br> [0] ( nEG ): State 0 w hen the information is true <br> Configuration [1] (POS) cannot be modified for the [No drive flt] (FLt) assignment. |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |



(1) 0 to $9,999 \mathrm{~ms}$ then 10.00 to 60.00 s on the integrated display terminal.

## 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, when setto 0 , this output corresponds to the AO1 min. value ( 0 V , or 0 mA for example), and when set to 1 to the AO1 max. value ( 10 V , or 20 mA for example).
The electrical characteristics of this analog output remain unchanged. As these characteristics are different from logic output characteristics, check that it is still compatible with the intended application.

| Code | Name / Description | Adjustment range | Factory settin |
| :---: | :---: | :---: | :---: |
| I | [INPUTS / OUTPUTS CFG] (continued) |  |  |
| d○1- | [D01 CONFIGURATION] |  |  |
| d○1 $\begin{gathered} \text { bLC } \\ \text { LLC } \\ \text { OCC } \\ \text { EbO } \\ \text { tSY } \\ \text { dCO } \\ \text { OLO1 } \\ \text { OL10 } \end{gathered}$ | [DO1 assignment] <br> Identical to [R1 Assignment] (r1) page 138 w ith the addition as these selections can only be configured in the [APPLICATI <br> [Brk control] (bLC): Brake contactor control <br> [Input cont.] (LLC): Line contactor control <br> [Output cont] (OCC): Output contactor control <br> [End reel] (EOO): End of reel(traverse control function) <br> [Sync. w obble](tSY): "Counter w obble" synchronization <br> [DC charging] (dCO): DC bus precharging contactor control [OL01] (OL01): Function blocks: Logical Output 01 <br> ... <br> [OL10] (OL10): Function blocks: Logical Output 10 | g parameter values (FUn-) menu): | [No] (nO) <br> w $n$ for information |
| d○1d | [D01 delay time] | 0 to 60,000 ms (1) | 0 ms |
|  | The delay cannot be setfor the [No drive flt] (FLt), [Brk control] (bLC), [Output cont.] (OCC) and [Input cont.] (LLC) assignments, and remains at 0 . <br> The change in state only takes effect once the configured time has elapsed, when the information becomes true. |  |  |
| dO1S | [D01 active at] |  | 1] (POS) |
| $\begin{aligned} & \text { POS } \\ & \text { nEG } \end{aligned}$ | Configuration of the operating logic: <br> [1] (POS): State 1 w hen the information is true <br> [0] ( nEG ): State 0 w hen the information is true <br> The configuration [1] (POS) cannot be modified for the [No drive flt] (FLt), [Brk control] (bLC) and [Input cont.] (LLC) assignments. |  |  |
| dO 1 H | [D01 holding time] | 0 to 9,999 ms | 0 ms |
|  | The holding time cannot be set for the [No drive flt] (FLt), [Brk control] (bLC) and [Input cont] (LLC) assignments, and remains at 0 . <br> The change in state only takes effect once the configured time has elapsed, $w$ hen the information becomes false. |  |  |

(1) 0 to $9,999 \mathrm{~ms}$ then 10.00 to 60.00 s on the integrated display terminal.

## Configuration of analog output

## Minimum and maximum values (output values):

The minimum output value, in volts, corresponds to the lowerlimit of the assigned parameter and the maxim um value corresponds to its upper limit. The minimum value maybe greater than the maximum value.



## 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 param eters are given in \%. 100\% corresponds to the total variation range of the configured parameter, so: $100 \%$ = upper limit-lower limit For exam ple, [Sign. torque] (Stq) which varies between -3 and +3 times the rated torque, $100 \%$ corresponds to 6 times the rated torque.

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

Upper limit of the assigned parameter


Low er limit of the assigned parameter

## Application example 2

The value of the motor current at the AO1 output is to be transferred with 0-20 m A, range 2 In motor, In motor being the equivalent of a 0.8 In drive.
The [I motor] ( OC r ) parameter varies between 0 and 2 times the rated drive current, or a range of 2.5 times the rated drive current.
[Scaling AO1 min] (ASL1) mustnot modify the lower limit, which therefore remains at its factory setting of 0\%.
[Scaling AO1 max] (ASH1) mustmodify the upperlimitby $0.5 x$ the rated motor torque, or $100-100 / 5=80 \%$ (new value = lowerlimit + (range $\times$ ASH1).
 also be accessed and adjusted from w ithin the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

The following submenus group the alarm sinto 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 displayterminal (see [3.3 MONITORING CONFG.] (MCF-) menu page 284) and viewed via the [1.2 MONITORING] (MOn-) menu page 47.

When one or a number of alarms selected in a group occurs, this alarm group is activated.

| Code | Name / Description |
| :---: | :---: |
| I__O- | [INPUTS / OUTPUTS CFG] (continued) |
| A1 C- | [ALARM GRP1 DEFINITION] |
| PLA <br> USA <br> CtA <br> FtA <br> F2A <br> SrA <br> tSA <br> tS2 <br> tS3 <br> UPA <br> FLA <br> tHA <br> PEE <br> PFA <br> AP3 <br> SSA <br> tAd <br> tJA <br> ULA <br> OLA <br> rSdA <br> ttHA <br> ttLA <br> FqLA <br> dLdA | Selection to be made from the follow ing list: <br> [LI6=PTC al.] (PLA): LI6 = PTCL alarm <br> [Ext. fault al.] (EFA): External fault alarm <br> [Under V.al.] (USA): Undervoltage alarm <br> [I attained] (CtA): Current threshold attained ([Current threshold] (Ctd) page 102) <br> [Freq.Th.att.] (FtA): Frequency threshold attained ([Freq. threshold] (Ftd) page 102) <br> [Freq. th. 2 attained] (F2A): Frequency threshold 2 attained ([Freq. threshold 2] (F2d) page 102) <br> [Freq.ref.att] (SrA): Frequency reference attained <br> [Th.mot. att.] (tSA): Motor 1 thermal state attained <br> [Th.m ot2 att] (tS2): Motor 2 thermal state attained <br> [Th.m ot3 att] (tS3): Motor 3 thermal state attained <br> [Uvolt warn] (UPA): Undervoltage threshold <br> [HSP attain.] (FLA): High speed attained <br> [AI. ${ }^{\circ} \mathrm{C}$ drv] (tHA): Drive overheating <br> [[PID erroral] (PEE): PID error alarm <br> [PID fdbk al.] (PFA): PID feedback alarm <br> [AI3 AI. 4-20] (AP3): Alarm indicating absence of $4-20 \mathrm{~mA}$ signal on input AI3 <br> [Lim T/I att.] (SSA): Torque limit alarm <br> [Th. drv.att.] (tAd): Drive thermal state attained <br> [IGBT alarm] (tJA): IGBT alarm <br> [Underload. Proc. AI.] (ULA): Underload alarm <br> [Overload. Proc. AI.] (OLA): Overload alarm <br> [Rope slack alarm] (rSdA): Rope slack (see [Rope slack config.] (rSd) parameter page 205) <br> [High torque alarm] (ttHA):Motor torque overshooting high threshold [High torque thd.] (tHH) page 102. <br> [Low torque alarm] (ttLA): Motor torque undershooting low threshold[Low torque thd.] (ttL) page 102. <br> [Freq. meter Alarm] (FqLA): Measured speed threshold attained: [Pulse warning thd.] (FqL) page 102. <br> [Dynam ic load alarm] (dLdA): Load variation detection (see [DYNAMIC LOAD DETECT.] (dLd-) page 267). <br> See the multiple selection procedure on page 33 for the integrated display terminal, and page $\underline{24}$ for the graphic display terminal. |
| A2C- | [ALARM GRP2 DEFINITION] |
|  | Identical to [ALARM GRP1 DEFINITION] (A1C-) page 145. |
| A3C- | [ALARM GRP3 DEFINITION] |
|  | Identical to [ALARM GRP1 DEFINITION] (A1C-) page 145. |

## Command

The parameters in the [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 sentusing the following channels:

| Com mand | Reference |
| :--- | :--- |
| Terminals: logic inputs LI or analog inputs used as logic inputs LA | Terminals: analog inputs AI, pulse input |
| Function blocks | Function blocks |
| Remote display terminal | Remote display terminal |
| Graphic display terminal | Graphic display terminal |
| Integrated Modbus | Integrated Modbus |
| Integrated CANopen® | Integrated CANopen® |
| Communication card | Communication card |
|  | $+/-$ speed via the terminals |
|  | $+/-$ speed via the graphic display terminal |



Note: [LA1] (LA1) and [LA2] (LA2) can be used as 2 logic inputs in source mode only.

-     + 24 V powersupply (max. 30 V )
- State 0 if $<7.5 \mathrm{~V}$, state 1 if $>8.5 \mathrm{~V}$.

Note: The stop keys on the graphic displayterminal or remote display can be programmed as non-priority keys. A stop key can only have priority if the [Stop Key priority] (PSt) parameter in the [COMMAND] (Ct--) menu, page 154 is setto [Yes] (YES).

The behavior of the ER24 can be adapted according to requirements:

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

In these configurations, control via the communication bus is perform ed 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): The command and the reference can come from different channels. This configuration both simplifies and extends use via the communicationinterface. Commands maybe 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 logicinputs. Application functions can be assigned to the bits inthis word. More than onefunction can be assigned to the samebit.
Note: Stop commands from the graphic displayterminal or remote displayterminal remain active even if the terminals are not the active command channel.

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


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

- Terminals, graphic displayterminal, integrated Modbus, integrated CANopen®, communication card

Fr1b, for SEP and IO:

- Terminals, graphic display terminal, integrated Modbus, integrated CANopen®, com munication card

Fr1b, for SIM:

- Terminals, only accessible if Fr1 = terminals

Fr2:

- Terminals, graphic displayterminal, integrated Modbus, integrated CANopen®, communication card, and +/- speed
Note: [Ref.1B channel] (Fr1b) and [Ref 1B switching] ( rCb ) must be configured in the [APPLICATION FUNCT.] (Fun-) menu.

Reference channel for [Not separ.] (SIM), [Separate] (SEP) and [I/O profile] (IO) configurations, PID configured with PID references at the terminals

[Ref. 2 switching]


Parameter:
The black square represents the factory setting assignment
(1) Ramps not active if the PID function is active in automatic mode.

Fr1:

- Terminals, graphic displayterminal, integrated Modbus, integrated CANopen®, com munication card Fr1b, for SEP and IO:
- Terminals, graphic displayterminal, integrated Modbus,integrated CANopen®,communication card

Fr1b, for SIM:

- Terminals, only accessible if Fr1 = terminals

SA2, SA3, dA2, dA3:

- Terminals only

Fr2:

- Terminals, graphic displayterminal, integrated Modbus, integrated CANopen $®$, com munication card, and +/- speed

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

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

Reference and command, notseparate
The command channel is determined by the reference channel. Parameters Fr1, Fr2, rFC, FLO and FLOC are common to reference and command.
Example: If the reference is Fr1 = Al1 (analog input at the terminals), control isvia LI (logic inputat the terminals).

[Ref. 2 channel]

Key:


Parameter:
The black square represents the factory setting assignment

## Command channel for [Separate] (SEP) configuration

Separate reference and comm and
Parameters FLO and FLOC are common to reference and command.
Example: If the reference is inforced localmodevia Al1 (analog inputat the terminals), commandinforced 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 square represents the factory setting assignment, except for [Profile].

Cd1, Cd2:

- Terminals, graphic display terminal, integrated Modbus, integrated CANopen®, com munication card


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

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.
[Cmd channel 1]


Key:


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

Cd1, Cd2:

- Terminals, graphic displayterminal, integrated Modbus, integrated CANopen®, com munication card

A command or an action can be assigned:

- To a fixed channel by selecting an LII input or a Cxxx bit:
- By selecting, for example, LI3, this action willbetriggered by LI3 regardless of which command channel is switched.
- By selecting, for example, C214, this action will 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, for example, Cd11, this action will be triggered by:

Ll12 if the terminals channel is active
C111 if the integrated Modbus channel is active
C211 if the integrated CANopen ${ }^{8}$ channel is active
C311 if the communication card channel is active

If the active channel is the graphic displayterm inal, the functions and commands assigned to CDxxswitchable internal bits are inactive.

Note: Cd06 to Cd13 can only be used for switching between 2 networks. They do not have equivalentlogic inputs.

| Terminals | Integrated Modbus | Integrated CANopen® | Com munication cardInternal bit, can be <br> sw itched |  |
| :--- | :--- | :--- | :--- | :--- |
|  |  |  |  | CD00 |
| LI2 (1) | C101 (1) | C201 (1) | C301 (1) | CD01 |
| L13 | C102 | C202 | C302 | CD02 |
| L14 | C103 | C203 | C303 | CD03 |
| L15 | C104 | C204 | C304 | CD04 |
| L16 | C105 | C205 | C305 | CD05 |
| - | C106 | C206 | C306 | CD06 |
| - | C107 | C207 | C307 | CD07 |
| - | C109 | C208 | C308 | CD08 |
| - | C1110 | C210 | C309 | CD09 |
| - | C112 | C211 | C310 | CD10 |
| - | C113 | C213 | C312 | CD12 |
| - | C114 | C214 | C313 | CD13 |
| LA11 | C115 | C215 | C314 | CD14 |
| LA12 |  |  | C315 | CD15 |
| - | OL01 to OL10 |  |  |  |

(1) If [2/3 w ire control] (tCC) page 85 is set to [ 3 wire ] (3C), LI2, C101, C201 and C301 cannot be accessed.

## 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:

|  | Drive w ith or w ithout option |
| :---: | :---: |
| [LAl1] (LAl1) to [LAl2] (LAl2) | Logical inputs |
| [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 |
| [CD00] (Cd00) to [CD10] (Cd10) | In [I/O profile] (IO) configuration |
| [CD11] (Cd11) to [CD15] (Cd15) | Regardless of configuration |
| [OL01] (OL01) to [OL10] (OL10) | Regardless of configuration |

Note: In [I/O profile] (IO) configuration, LI1 cannot beaccessed and if[2/3 wire control] (tCC) page 85 is set to [3 wire] (3C), LI2, C101, C201 and C301 cannot be accessed either.

## A WARNING

## LOSS OF CONTROL

Inactive communication channels are not monitored (no error detection in the event of a communication interruption).
Verify that using the commands and functions assigned to bits C101 to C315 does not result in unsafe conditions in the event of a communication interruption.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

| Code | Name / Description | Adjustment range | Factory setting |
| :---: | :---: | :---: | :---: |
| FULL | [FULL] (continued) |  |  |
| CtL- | [COMMAND] |  |  |
| Fr1 A11 A12 A13 LCC Mdb CAn nEt PI AIU1 OAO1 OA10 | [Ref. 1 channel] <br> [A11] (A11): Analog input A1 <br> [AI2] (A12): Analog input A2 <br> [AI3] (A13): Analog input A3 <br> [HMI] (LCC): Graphic display terminal or remote display terminal source <br> [Modbus] (Mdb): Integrated Modbus <br> [CANopen] (CAn): Integrated CANopen® <br> [Com. card] (nEt): Communication card (if inserted) <br> [RP] (PI): Pulse input <br> [AI virtual 1] (AIU1): Virtual analog input 1 w ith the jog dial (only available if [Profile] (CHCF) is not set to [Not separ.] (SIM)) <br> [OA01] (OA01): Function blocks: Analog Output 01 … <br> [OA10] (OA10): Function blocks: Analog Output 10 |  |  |
| rln | [RV Inhibition] <br> Inhibition of movement in reverse direction, does not apply to direction requests sent by logic inputs. <br> Reverse direction requests sent by logic inputs are taken into account. <br> Reverse direction requests sent by the graphic display terminal are not taken into account. <br> Reverse direction requests sent by the fieldbus are not taken into account. <br> Any reverse speed reference originating fromthe PID, summing input, etc., is interpreted as a zero reference $(0 \mathrm{~Hz})$. <br> [No] <br> (nO) <br> [Yes] (YES) |  |  |
| PSt | [Stop Key priority] ${ }^{\text {[Yes] (YES) }}$ |  |  |
| 2s | A W ARNING |  |  |
|  | LOSS OF CONTROL <br> This function dis ables the Stop keys of the Remote Display Terminalif the setting of the parameter [Command channel] (CMdC) is not [HMI] (HMI). <br> Only set this parameter to [ No ] ( nO ) if you have implemented appropriate alternative stop functions. <br> Failure to follow these instructions can result in death, serious injury, or equipment damage. |  |  |

This w illbe afreew heelstop. If the active command channel is the graphic display terminal, the stop w illbe performed according to the [Type of stop] (Stt) page 173 irrespective of the configuration of [Stop Key priority] (PSt).
[ 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.

## A WARNING

## UNANTICIPATED EQUIPMENT OPERATION

Disabling [I/O profile] (IO) resets the drive to the factory settings.

- Verify that restoring the factory settings is compatible with the type of wiring used.

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

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). [I/O profile] (IO): /O profile



Can be used to copy the current reference and/or the command by means of sw itching, in order to avoid speed surges, for example.
If [Profile] (CHCF) page 154 is set to [Not separ.] (SIM) or [Separate] (SEP), copying willonly be possible from channel 1 to channel2.
If [Profile] (CHCF) is set to [I/O profile] (IO), copying will be possible in both directions.
A reference or a command cannot be copied to a channel on the terminals.
The referencecopiedis [Frequency ref.] (FrH) (beforeramp) unless the destination channel referenceis setvia + /-speed. In this case, the reference copied is [Output frequency] ( $\mathbf{r F r}$ r) (after ramp).
nO [No] (nO): No copy
SP
[Reference] (SP): Copy reference
[Command] (Cd): Copy command
[Cmd + ref.] (ALL): Copy command and reference

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.

2 s
To change the assignment of this parameter, press the ENT key for 2 s .

As the graphic displayterminal maybe selected as the command and/or reference channel, its action modes can be configured.
The parameters on this page can onlybe accessed on the graphic displayterminal, and not on the integrated displayterminal.
Comments:

- The dis playterminal command/reference is only active if the command and/or reference channels from the terminal are active with the exception of $[\mathrm{T} / \mathrm{K}]$ ( Ft ) (command via the displayterminal), which takes priority over these channels. Press $[\mathbf{T} / \mathrm{K}](\mathrm{Ft})$ (command via the displayterminal) again to revert control to the selected channel.
- Command and reference via the displayterminal are impossible if the latter is connected to more than one drive.
- The JOG, presetspeed and +/- speed functions can only be accessed if [Profile] (CHCF) is set to [Not separ.] (SIM).
- The presetPID reference functions can only be accessed if[Profile] (CHCF) is setto [Not separ.] (SIM) or [Separate] (SEP).
- The [T/K] (Ft) (command via the display terminal) can be accessed regardless of the [Profile] (CHCF).
 also be accessed and adjusted from w ithin the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.


## Function Block Management



\begin{tabular}{|c|c|c|}
\hline Code \& Name / Description \({ }^{\text {a }}\) Adjustment range \& Factory setting \\
\hline FbrM \& [FB start mode] \& [ No ] ( nO ) \\
\hline 2 s \& \begin{tabular}{l}
A W ARNING \\
UNANTICIPATED EQUIPMENT OPERATION \\
Depending on the setting of this parameter, function blocks maybe immediately execu \\
- Verify that this setting does not resultin unsafe conditions. \\
Failure to follow these instructions can result in death, serious injury, or equipm \\
Allow s to choose the different ways of starting the Function blocks application. \\
Note: Modifications of this parameter are not taken into account if the Function blocks application is \\
[ No ] ( nO ): Function blocks application is controlled by [FB command] (FbCd) parameter \\
[Yes] (YES): Function blocks application sw itches to Run automatically at drive pow er on \\
[LII] (LI1): Function blocks application switches to Run on a rising edge of the logic input. It sw itc the logic input. \\
[...] (...): See the assignment conditions on page 153 (not [OL10] (OL01) to [OL10] (OL10)
\end{tabular} \& \begin{tabular}{l}
d. \\
nt damage. \\
unning. \\
to Stop on falling edge of
\end{tabular} \\
\hline \multirow[t]{2}{*}{FbSM} \& [Stop FB Stop motor] \& ES) \\
\hline \& \begin{tabular}{l}
A W ARNING \\
LOSS OF CONTROL \\
If [Stop FB stop motor] (FbSM) is set to [ No ] ( nO ), the motor will not stop when the stopped. \\
- Only setthis parameter to [ No ] \((\mathrm{nO})\) if you have implemented appropriate alternative Failure to follow these instructions can result in death, serious injury, or equipm \\
Allow s to setup the w ay of working of the drive w hen function blocks are stopped. \\
[Ignore] (nO): The drive does not stop \\
[Freew heel] (YES): Motor stops in freew heel \\
[Ramp stop] (rMP): Ramp stop \\
[Fast stop] (FSt): Fast stop \\
[DC injection] (dCl): DC injection
\end{tabular} \& \begin{tabular}{l}
ogram will be \\
top functions. damage.
\end{tabular} \\
\hline \begin{tabular}{l}
FbdF \\
StOP IGn
\end{tabular} \& \begin{tabular}{l}
[FB on drive fault] \\
Behavior of function blocks w hen the drive trips. \\
[Stop] (StOP): Function blocks stops when the drive trips, outputs are realeased \\
[Ignore] (IGn): Function blocks continue to w orkwhen the drive trips (except CFF and INFE)
\end{tabular} \& [Stop] (StOP) \\
\hline Flo \& [INPUTS ASSIGNMENTS] \& \\
\hline ILO1

no
FLt
FtA
F2A
Fr1
Fr2
Cd1
Cd2
Fr1b
YES

LII \& \begin{tabular}{l}
[Logic input 1 assignment] <br>
Possible assignment for the Function block logic input. <br>
[ No ] (nO): Not assigned <br>
[No drive flt] (FLt): Drive fault detection status (relay normally energized, and de-energized in the <br>
[Freq. Th. attain.] (FtA): Frequency threshold attained ([Freq. threshold] (Ftd) page 102) <br>
[Freq. Th. 2 attained] (F2A): Frequency threshold 2 attained ([Freq. threshold 2] (F2d) p <br>
[Ref. 1 channel] (Fr1) Reference source 1 <br>
[Ref. 2 channel] (Fr2) Reference source 2 <br>
[ch1 active] (Cd1): Command channel = channel 1 (for [Cmd switching] (CSS)) <br>
[ch2 active] (Cd2): Command channel = channel 2 (for [Cmd sw itching] (CSS)) <br>
[Ref.1B channel] (Fr\|b): Reference channel = channel 1b (for [Ref. 2 switching] ( rFC )) <br>
[Yes] (YES): Yes <br>
[LII] (LI1): Logical input LI1 <br>
[...] (...): See the assignment conditions on page 153

 \& 

[ No ] ( nO ) <br>
vent of an error)
102)
\end{tabular} <br>

\hline I L - - \& \multicolumn{2}{|l|}{| [Logic input x assignment] |
| :--- |
| All the Function Blocks logic inputs available on the drive are processed as in the example for [Logic input 1 assignment] (ILO1) above, up to [Logic input 10 assignment] (IL10). |} <br>

\hline
\end{tabular}

| Code | Name/Description | Adjustment range | Factory setting |
| :---: | :---: | :---: | :---: |
| 1 AO 1 | [Analog input 1 assignment] |  | [No] (nO) |
|  | Possible assignment for the Function block analog input. |  |  |
| nO | [ No ] ( nO ): Not assigned |  |  |
| A11 | [AI1] (A11): Analog input A1 |  |  |
| A12 | [AI2] (A12): Analog input A2 |  |  |
| A13 | [AI3] (A13): Analog input A3 |  |  |
| $\bigcirc \mathrm{Or}$ | [I motor] (OCIr): Motor current |  |  |
| OFr | [Motor freq.] (OFr) : Motor speed |  |  |
| OrP | [Ram p. out] (OrP): Ramp output |  |  |
| tra | [Motor torq.] (tra): Motor torque |  |  |
| Stq | [Sign torque] (Stq) : Signed motor torque |  |  |
| Ors | [Sign ram p] (OrS): Signed ramp output |  |  |
| OPS | [PID ref.] (OPS): PI(D) reference |  |  |
| OPF | [PID feedbk] (OPF): Pl(D) feedback |  |  |
| OPE | [PID error] (OPE): PI(D) error |  |  |
| OPI | [PID output] (OP I): $\mathrm{Pl}(\mathrm{D})$ integral |  |  |
| OPr | [Mot. power] (OPr): Motor pow er |  |  |
| tHr | [Mot. therm al] (tHr) : Motor thermal state |  |  |
| tHd | [Drv thermal] (tHd): Drive thermal state |  |  |
| tqMS | [Torque 4Q] (tqMS) : Signedmotor torque |  |  |
| UPdt | [+/-Speed] (UPdt): Up/Dow n function is assigned by Lix |  |  |
| UPdH | [+/-spd HMI] (UPdH): Up/Dow n function is assigned by graphic display terminal or remote display terminal |  |  |
| LCC | [HMI] (LCC): Graphic display terminal or remote display terminal source |  |  |
| Mdb | [Modbus] (Mdb): Integrated Modbus |  |  |
| CAn | [CANopen] (CAn): Integrated CANopen® |  |  |
| nEt | [Com. card] ( $n \in \mathbb{L}$ ): Communication option board source |  |  |
| OFS | [Sig. o/p frq.] (OFS): Signed output frequency |  |  |
| tHr2 | [Mot therm 2] (tHr2): Motor 2 thermal state |  |  |
| tHr3 | [Mot therm 3] (tHr3): Motor 3 thermal state |  |  |
| tqL | [Torque lim.] (tqL): Torque limitation[Motor volt.] (UOP): Motor voltage |  |  |
| UOP |  |  |  |
| PI | [RP] (PI): Pulse input |  |  |
| AlU1 dO1 | [AI virtual 1] (A\|U1): Virtual analog input 1 with the jog dial [DO1] (dO1): Analog/logical output DO1 |  |  |
| AlU2 | [AI virtual 2] (AlU2): Virtual analog input 2 by the communication bus[OA01] (OA01): Function blocks: Analog Output 01 |  |  |
| OA01 |  |  |  |
| OA10 | [OA10] (OA10): Function blocks: Analog Output 10 |  |  |
| 1 - - - | [Analog input x assignment] |  | [ No] (nO) |
|  | All the Function blocks analog inputs available on the drive are processed as in the example for [IA01] (IA01) above, up to [IA10] (IA10). |  |  |
| FloM - | [FUNCTION BLOCKS] (continued) |  |  |
| FAd- | ADL containers contain Modbus logical adress of internal parameters of the drive. If the chosen adress is valid, the display shows the parameter name instead of the adress. |  |  |
| LAO1 | ADL Container 01 | 3,015 to 64,299 | 0 |
| LAO2 | ADL Container 02 | 3,015 to 64,299 | 0 |
| LAO3 | ADL Container 03 | 3,015 to 64,299 | 0 |
| LAO4 | ADL Container 04 | 3,015 to 64,299 | 0 |
| LA05 | ADL Container 05 | 3,015 to 64,299 | 0 |
|  | ADL Container 06 | 3,015 to 64,299 | 0 |
| LAO7 | ADL Container 07 | 3,015 to 64,299 | 0 |
| LA08 | ADL Container 08 | 3,015 to 64,299 | 0 |


| Code | Name / Description | Adjustment range | Factory setting |
| :---: | :---: | :---: | :---: |
| FbM- | [FUNCTION B LOCKS] (continued) |  |  |
| FloP - | [FB PARAMETERS] <br> Internal parameters available for the user program. |  |  |
| M001 <br> (1) <br> () | M001 Parameter saved in EEprom. |  |  |
| $\mathrm{MOO2}$ <br> (1) $()$ | M002 Parameter saved in EEprom |  |  |
| M003 <br> (1) <br> () | M003 Parameter saved in EEprom |  |  |
| $\overline{\mathrm{MOO}}$ <br> (1) <br> () | M004 Parameter saved in EEprom |  |  |
| $\mathrm{MOO5}$ <br> (1) $()$ |  |  |  |
| MOO <br> (1) <br> () | M006 Parameter w ritten in RAM |  |  |
| M007 <br> (1) <br> () | M007 Parameter w ritten in RAM |  |  |
| M008 <br> (1) <br> () | M008 Parameter w ritten in RAM |  |  |

(1) If a graphic display terminal is not in use, values greater than $9,999 \mathrm{w}$ ill be displayed on the 4-digit display w ith a period mark after the thousand digit, for example, 15.65 for 15,650. These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from w ithin the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming. Parameter that can be modified during operation or when stopped.
［APPLICATION FUNCT．］（FUn－）
Summary of functions：

| Code | Name | Page |
| :---: | :---: | :---: |
| （rEF－） | ［REFERENCE SWITCH．］ | 167 |
| （OAI－） | ［REF．OPERATIONS］ | 168 |
| （rPt－） | ［RAMP］ | 170 |
| （Stt－） | ［STOP CONFIGURATION］ | 173 |
| （AdC－） | ［AUTO DC INJECTION］ | 176 |
| （JOG－） | ［JOG］ | 178 |
| （PSS－） | ［PRESET SPEEDS］ | 181 |
| （UPd） | ［＋／－SPEED］ | 185 |
| （SrE－） | ［＋／－SPEED AROUND REF．］ | 187 |
| （SPM－） | ［MEMO REFERENCE］ | 188 |
| （FLI－） | ［FLUXING BY LI］ | 189 |
| （bLC－） | ［BRAKE LOGIC CONTROL］ | 194 |
| （ELM－） | ［EXTERNAL WEIGHT MEAS．］ | 200 |
| （HSH－） | ［HIGH SPEED HOISTING］ | $\underline{205}$ |
| （PId－） | ［PID REGULATOR］ | $\underline{210}$ |
| （Pr1－） | ［PID PRESET REFERENCES］ | $\underline{214}$ |
| （tOL－） | ［TORQUE LIMITATION］ | $\underline{216}$ |
| （CLI－） | ［2nd CURRENT LIMIT．］ | $\underline{218}$ |
| （12t－） | ［DYN CURRENT LIMIT］ | $\underline{219}$ |
| （LLC－） | ［LINE CONTACTOR COMM AND］ | $\underline{221}$ |
| （OCC－） | ［OUTPUT CONTACTOR CMD］ | $\underline{223}$ |
| （LPO－） | ［POSITIONING BY SENSORS］ | $\underline{227}$ |
| （MLP－） | ［PARAM．SET SWITCHING］ | $\underline{230}$ |
| （MMC－） | ［MULTIMOTORS／CONFIG．］ | $\underline{235}$ |
| （tロレ－） | ［AUTO TUNING BY LI］ | $\underline{236}$ |
| （tro－） | ［TRAVERSE CONTROL］ | $\underline{237}$ |
| （CHS－） | ［HSP SWITCHING］ | $\underline{244}$ |
| （dCC－） | ［DC BUS］ | $\underline{245}$ |

The parameters in the［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 maybe limited by the number of I/O and by the fact that some functions are incompatible with others. Functions that are not listed in the table below are fully compatible.

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

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

## A WARNING

UNANTICIPATED EQUIPMENT OPERATION
Multiple functions can be assigned to and simultaneously activated via a single input.

- Verify that assigning multiple functions to a single input does not resultin uns afe conditions.

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

It is only possible to assign one inputto several functions at [Advanced] (AdU) and [Expert] (EPr) levels. Before assigning a command, reference or function to an inputor output, the usermustcheck that this input or output has not already been assigned and that another input or outputhas not been assigned to an incompatible function.
The drive factory setting or macro configurations autom atically configure functions, which may help to prevent other functions being assigned.
In some case, it is necessary to unconfigure one or more functions in order to be able to enable another. Check the compatibility table below.

Stop functions have priority over run commands.
Speed references via logic comm and have priority over analog references.
Note: This compatibility table does not affect commands that can be assigned to the keys of the graphic displayterminal (see page 24).

Compatibility table

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Reference operations (page 168) |  |  | $\uparrow$ | (2) |  | $\uparrow$ | $\uparrow$ | $\uparrow$ |  |  |  |  |  |  |  |  |  |  |  |
| $\begin{aligned} & +/- \text { speed (3) } \\ & \text { (page 185) } \end{aligned}$ |  |  |  |  | $\bullet$ | $\bullet$ | $\uparrow$ | $\uparrow$ |  |  |  |  |  |  |  |  |  |  |  |
| $\begin{array}{\|l} \hline \begin{array}{l} \text { Preset speeds } \\ \text { (page 180) } \end{array} \\ \hline \end{array}$ | $\leftarrow$ |  |  |  |  | $\uparrow$ | $\uparrow$ | $\uparrow$ |  |  |  |  |  |  |  |  |  |  |  |
| PID regulator (page 210) | (2) |  |  |  | $\bullet$ | $\bullet$ | $\uparrow$ | $\uparrow$ | - |  |  |  |  |  |  | - | - | $\bullet$ | - |
| $\begin{array}{\|l} \hline \begin{array}{l} \text { Traverse control } \\ \text { (page 242) } \end{array} \\ \hline \end{array}$ |  | $\bullet$ |  | $\bullet$ |  | $\bullet$ | $\uparrow$ | $\uparrow$ |  |  |  |  |  |  |  | $\bullet$ | $\bullet$ |  |  |
| JOG operation (page 178) | $\leftarrow$ | - | $\leftarrow$ | $\bullet$ | $\bullet$ |  |  | $\uparrow$ | - | $\leftarrow$ |  |  |  |  |  | $\bullet$ | $\bullet$ |  |  |
| $\begin{aligned} & \text { Reference switching } \\ & \text { (page 167) } \end{aligned}$ | $\leftarrow$ | $\leftarrow$ | $\leftarrow$ | $\leftarrow$ | $\leftarrow$ |  |  | $\uparrow$ |  |  |  |  |  |  |  | $\uparrow$ |  |  |  |
| $\begin{aligned} & \text { Skip frequency } \\ & \text { (page 183) } \end{aligned}$ | $\leftarrow$ | $\leftarrow$ | $\leftarrow$ | $\leftarrow$ | $\leftarrow$ | $\leftarrow$ | $\leftarrow$ |  |  |  |  |  |  |  |  | $\leftarrow$ |  |  |  |
| $\begin{array}{\|l} \hline \text { Brake logic control } \\ \text { (page 194) } \end{array}$ |  |  |  | $\bullet$ |  | $\bullet$ |  |  |  |  | $\bullet$ | $\bullet$ | - |  |  |  |  |  |  |
| $\begin{array}{\|l} \hline \text { Auto DC injection } \\ \text { (page 176) } \end{array}$ |  |  |  |  |  | $\uparrow$ |  |  |  |  |  |  | $\uparrow$ |  | $\uparrow$ |  |  |  |  |
| $\begin{aligned} & \hline \text { Catch on the fly } \\ & \text { (page 253) } \end{aligned}$ |  |  |  |  |  |  |  |  | - |  |  |  |  |  |  |  |  |  |  |
| $\begin{aligned} & \hline \text { Output contactor } \\ & \text { command } \\ & \text { (page 223) } \end{aligned}$ |  |  |  |  |  |  |  |  | $\bullet$ |  |  |  |  |  |  |  |  |  |  |
| $\begin{aligned} & \hline \text { DC injection stop } \\ & \text { (page 173) } \end{aligned}$ |  |  |  |  |  |  |  |  | - | $\leftarrow$ |  |  |  | (1) | $\uparrow$ |  |  |  |  |
| $\begin{aligned} & \hline \text { Fast stop } \\ & \text { (page 173) } \end{aligned}$ |  |  |  |  |  |  |  |  |  |  |  |  | (1) |  | $\uparrow$ |  |  |  |  |
| $\begin{aligned} & \hline \begin{array}{l} \text { Freew heel stop } \\ \text { (page 173) } \end{array} \end{aligned}$ |  |  |  |  |  |  |  |  |  | $\leftarrow$ |  |  | $\leftarrow$ | $\leftarrow$ |  |  |  |  |  |
| +/- speed around a reference (page 187) |  |  |  | - | $\bullet$ | - | $\leftarrow$ | $\uparrow$ |  |  |  |  |  |  |  |  |  |  |  |
| High speed hoisting (page $\underline{\underline{205})}$ |  |  |  | $\bullet$ | $\bullet$ | $\bullet$ |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Load sharing (page 122) |  |  |  | $\bullet$ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Positioning by sensors (page 227) |  |  |  | $\bullet$ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

(1) Priority is given to the first of these tw o stop modes to beactivated.
(2) Only the multiplier reference is incompatible $w$ ith the PID regulator.
$\square$ Incompatible functions

Priority functions (functions which cannot be active at the same time):
$\leftarrow-\uparrow$ The function indicated by the arrow has priority over the other.

## Incompatible Functions

The following function will be inaccessible or deactivated after an Automatic restart.
This is only possible for control type if [ $2 / 3$ wire control] (tCC) is setto [2 wire] (2C) and if [2 wire type] (tCt) is setto [Level] (LEL) or [Fwd priority] (PFO). See [2/3 wire control] (tCC) page 85.

The [1.2 MONITORING] (MOn-) menupage 47 can be used to dis play the functions assigned to each input in order to check their compatibility.

When a function is assigned, $\mathrm{a} \checkmark$ appears on the graphic display term inal, as illustrated in the exam ple below:

| RDY $\quad$ Term 0.0 Hz | 0 A |  |
| :--- | :--- | :--- |
| APPLICATIONFUNCT. |  |  |
| REFERENCESWIICH. |  |  |
| REF. OPERATIONS |  |  |
| RAMP |  |  |
| STOP CONFIGURATION |  |  |
| AUTO DC INJECTION |  |  |
| Code $\quad \ll \quad \gg$ |  | Quick |

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 displayterminal:

| RDY $\quad$ Term $\quad+0.0 \mathrm{~Hz} \quad 0.0 \mathrm{~A}$ |
| :--- |
| INCOMPATIBILITY |
| Ineruncton cantoe assignea |
| because an incompatible |
| f unction is already selected. See |
| programming book. |
| ENT or ESC to continue |
|  |

- With the integrated displayterminal and the rem ote 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 key will display the functions that may already have been activated by this input, bit or channel.

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

- With the graphic displayterminal:


If the access level permits this new assignment, pressing ENT confirms the assignment.
If the access level does notpermit this new assignment, pressing ENT results in the following display:

| RUN Term $0.0 \mathrm{~Hz} \quad 0.0 \mathrm{~A}$ |
| :--- |
| ASSIGNIMENTFORBIDDEN |
| Un-assign thepresent <br> f unctions, or select <br> "Adv anced" access level <br>  |

- With the integrated displayterminal:

The code for the firstfunction, 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.

## REFERENCE SWITCHING

\begin{tabular}{|c|c|c|c|}
\hline Code \& Name / Description \& Adjustment range \& Factory setting <br>
\hline FUn- \& \multicolumn{3}{|l|}{[APPLICATION FUNCT.]} <br>
\hline rEF- \& \multicolumn{3}{|l|}{[REFERENCE SWITCH.]} <br>
\hline rCb

Fr1
Fr1b

LI \& \multicolumn{3}{|l|}{| [Ref 1B switching] |
| :--- |
| See the diagrams on pages 147 and 148. |
| If the assigned input or bit is at 0, [Ref. 1 channel] (Fr1) is active (see [Ref. 1 channel] (Fr1) page 154). |
| If the assigned input or bit is at 1, [Ref.1B channel] ( Fr 1 b ) is active. |
| [Ref 1B switching] (rCb) is forced to [ch1 active] (Fr1) if [Profile] (CHCF) is set to [Not separ.] (SIM) w ith [Ref. 1 channel] (Fr1) assigned via the terminals (analog inputs, pulse input). See [Ref. 1 channel] (Fr1) page 154 |
| [ch1 active] (Frll): No switching, [Ref.1 channel] (Fr1) active |
| [ch1B active] (Fr1b): No switching, [Ref.1B channel] (Fr1b) active |
| [LI1] (LI1): Logical input LI1 |
| [...] (...): See the assignment conditions on page 153 (not [Cd00] (CdOO) to [Cd15] (Cd15)). |} <br>

\hline Fr1b \& \multicolumn{3}{|l|}{\multirow[t]{13}{*}{}} <br>
\hline no \& \& \& <br>
\hline A11 \& \& \& <br>
\hline A12 \& \& \& <br>
\hline A13 \& \& \& <br>
\hline LCC \& \& \& <br>
\hline Mdb \& \& \& <br>
\hline CAn \& \& \& <br>
\hline nEt \& \& \& <br>
\hline $P 1$ \& \& \& <br>
\hline AlU1 \& \& \& <br>
\hline OA01 \& \& \& <br>
\hline OA10 \& \& \& <br>
\hline
\end{tabular}

## REFERENCE OPERATIONS

## Summing input / Subtracting input / Multiplier


$A=(F r 1$ or $\operatorname{Fr} 1 \mathrm{~b}+\mathrm{SA} 2+\mathrm{SA} 3-\mathrm{dA} 2-\mathrm{dA} 3) \times$ MA2 $\times$ 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 MFir multiplication variable, page 284 mustbe sent via the bus or graphic displayterminal.
- Revers al of the direction of operation in the event of a negative result can be inhibited (see [RV Inhibition] (SIn) page 154).


Parameters described in this page can be accessed by:

| Code | Name / Description | Adjustment range | Factory setting |
| :---: | :---: | :---: | :---: |
| dA3 | [Subtract. ref. 3] |  | [ No ] ( nO ) |
|  | Selection of a reference to be subtracted from [Ref.1 channel] (Fr1) or [Ref.1B channel] (Fr1b).ldentical to [Sum ming ref. 2] (SA2) page 168. Identical to [Summing ref. 2] (SA2) page 168. |  |  |
| MA2 | [Multiplier ref. 2] |  | [ No ] ( nO ) |
|  | Selection of a multiplier reference [Ref. 1 channel] (Fr1) or [Ref.1B channel] (Fr1b). Identical to [Summing ref. 2] (SA2) page 168. |  |  |
| MA3 | [Multiplier ref. 3] |  | [ No ] ( nO ) |
|  | Selection of a multiplier reference [Ref. 1 channel] (Fr1) or [Ref.1B channel] (Fr1b). Identical to [Summing ref. 2] (SA2) page 168. |  |  |

## RAMP

| Code | Name / Description | Adjustment range | Factory setting |
| :---: | :---: | :---: | :---: |
| FUn- | [APPLICATION FUNCT.] (continued) |  |  |
| r P L | [RAMP] |  |  |
| $\begin{array}{r} \text { rPPt } \\ \text { LIn } \\ \mathrm{S} \\ \mathrm{U} \\ \text { cUs } \end{array}$ | [Ramp type] <br> [Linear] (LIn) <br> [S ramp] (S) <br> [U ramp] (U) <br> [Customized] (CUS) <br> S ramps <br> The rounding coefficient is fixed, t1 $=0.6$ set ramp time (linear) $\mathrm{t} 2=0.4$ set ramp time (round) $\mathrm{t} 3=1.4$ set ramp time <br> The rounding coefficient is fixed, t1 $=0.5$ set ramp time (linear) $\mathrm{t} 2=1.0$ set ramp time (round) <br> $\mathrm{t} 3=1.5$ set ramp time <br> Customized ramps <br> $\mathrm{f}(\mathrm{Hz})$ <br> $\mathrm{f}(\mathrm{Hz})$ <br> tA1: adjustable from0 to 100\% <br> tA2: adjustable from0 to ( $100 \%$ - tA1) <br> tA3: adjustable from0 to $100 \%$ <br> tA4: adjustable from0 to ( $100 \%$ - tA3) <br> $\mathrm{t} 12=\mathrm{ACC}$ * (tA1(\%) / $100+\mathrm{tA} 2(\%) / 100+1)$ <br> $\mathrm{t} 34=\mathrm{DEC}$ * (tA3(\%) / $100+\mathrm{tA} 4(\%) / 100+1)$ |  | [Linear] (L In) |
| Inr () <br> (1) <br> 0.01 <br> 0.1 <br> 1 | [Ramp increment] <br> This parameter is valid for [Acceleration] (ACC), [Deceleration] (dEC), [Acceleration 2] (AC2) and [De celeration 2] (dE2). <br> [0,01]: Ramp up to 99.99 seconds <br> [0,1]: Ramp up to 999.9 seconds <br> [1]: Ramp up to 6,000 seconds |  |  |
| ACC | Time to accelerate from0 to the [Rated motor freq.] (FrS) (page $\underline{86}$ ). To have repeatability in ramps, the value of thi parameter must be set according to the possibility of the application. |  |  |
| dEC () <br> (1) | Time to decelerate fromthe [Rated motor freq.] (FrS) (page 86) to 0 . To have repeatability in ramps, the value of this parameter must be set according to the possibility of the application. |  |  |
| tA1 <br> * <br> () <br> (1) | Rounding of start of acceleration ramp as a \% of the [Acce le ration] (ACC) or [Acce leration 2] (AC2) ramp time. Can be set betw een 0 and 100\%. <br> This parameter can be accessed if the [Ramp type] ( $r P \mathbf{t}$ ) is [Customized] (CUS). |  |  |


| Code | Name / Description |  | Adjustment range | Factory setting |
| :---: | :---: | :---: | :---: | :---: |
| tA2 <br> * <br> (1) <br> (1) | Rounding of end of acceleration ramp as a\% of the [Acceleration] (ACC) or [Acceleration 2] (AC2) ramp time. Can be set betw een 0 and ( $100 \%$ - [Begin Acc round] ( tA 1 ) ). <br> This parameter can be accessed if the [Ramp type] ( $r \boldsymbol{P} \mathbf{t})$ is [Customized] (CUS). |  |  |  |
| tA3 <br> * <br> (1) <br> (1) | Rounding of start of deceleration ramp as a \% of the [Dece leration] (dEC) or [Deceleration 2] (dE2) ramp time. Can be set betw een 0 and $100 \%$. <br> This parameter can be accessed if the [Ramp type] ( $r \boldsymbol{P} \mathbf{t})$ is [Customized] (CUS). |  |  |  |
| tA4 <br> * <br> (1) <br> (1) | Rounding of end of deceleration ramp as a\% of the [Deceleration] (dEC) or [Deceleration 2] (dE2) ramp time. Can be set betw een 0 and ( $100 \%$ - [Begin Dec round] ( $\mathrm{t} A 3$ )). <br> This parameter can be accessed if the [Ramp type] ( $r \boldsymbol{P} \mathbf{t})$ is [Customized] (CUS). |  |  |  |
| Frt | [Ramp 2 threshold] <br> Ramp sw itching threshold The 2nd ramp is switched frequency is greater than Threshold ramp sw itching | the value of [R mp 2 thresho an be combined | 0 to 599 Hz according to rating <br> $(F r \mathbf{t})$ is not 0 ( 0 deactivates the fun itchass.](rPS) sw itching as follows: | $0 \mathrm{~Hz}$ <br> nction) and the output |
| rPS | [Ramp switch ass.] <br> Identical to [Ref.1B channel] (Fr1b) page 167. |  |  | [No] (nO) |
| AC2 * () (1) | Time to accelerate from 0 to the [Rated motor freq.] (FrS). To have repeatability in ramps, the value of this parameter must be set according to the possibility of the application. <br> This parameter can be accessed if [Ramp 2 threshold] ( $F r \mathbf{r}$ ) is greater than 0 or if [Ramp switch ass.] ( $r P S$ ) is assigned. |  |  |  |
| dE2 <br> * <br> (1) <br> (1) | Time to decelerate from[Rated $m$ otor freq.] (FrS) to 0 . To have repeatability in ramps, the value of this parameter must be set according to the possibility of the application. <br> This parameter can be accessed if [Ramp 2 threshold] (Frt) is greater than 0 or if [Ramp switch ass.] (rPS) is assigned. |  |  |  |


(1) The parameter can also be accessed in the [SETTINGS] (SEt-) menu.
(2) Range 0.01 to 99.99 s or 0.1 to 999.9 s or 1 to 6,000 s according to [Ram p increment] (Inr) page $\underline{170}$.

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

## STOP CONFIGURATION



| Code | Name / Description $\quad$ Adjustment range $\quad$ Factory setting |
| :---: | :---: |
| dC $\begin{array}{r} \mathrm{nO} \\ \mathrm{LI} \end{array}$ | [DC injection assign.] <br> A W ARNING <br> UNINTENDED MOVEMENT <br> - Do not use DC injection to generate holding torque when the motor is at a standstill. <br> - Use a holding brake to keep the motor in the stands tillposition. <br> Failure to follow these instructions can result in death, serious injury, or equipment damage. <br> DC injection braking is initiated when the assigned input or bit changes to state 1 . <br> If the input returns to state 0 and the run command is still active, the motor will only restart if [ $2 / 3 \mathrm{w}$ ire control] ( tCC ) page 85 is set to [2 wire] (2C) and if [2 wire type] (tCt) is set to [Level] (LEL) or [Fwd priority] (PFO). If not, a new run command must besent. <br> Note: This function cannot be used w ith certain other functions. Follow the instructions on page 163. <br> [ No ] ( nO ): Not assigned <br> [LI1] (LI1): Logical input LI1 <br> [...] (...): See the assignment conditions on page 153 |
| IdC <br> * <br> () <br> (1) (3) | [DC inject. level 1]NOT/CE 0.64 In (2) $1.41 \mathrm{ln}(2)$  <br> OVERHEATING AND DAMAGE TO THE MOTOR <br> Verify that the connected motor is properly rated for the DC injection current to be applied in term s of am ount <br> and time in order to avoid overheating and damage to the motor. <br> Failure to follow these instructions can result in equipment damage.   <br> Level of DC injection braking current activated via logic input or selected as stop mode. <br> This parameter can be accessed if [Type of stop] (Stt) is set to [DC injection] (dCl) or if [DC injection assign.] (dCl) is not [ No l ( nO ). |
| toll |  |


| Code | Name / Description | Adjustment range | Factory setting |
| :--- | :--- | :--- | :--- |
| IdC2 | [DC inject. level 2] | $0.1 \ln (2)$ to [DC inject. level 1] <br> (IdC) | 0.5 In (2) |
| $*$ | NOTICE |  |  |
| () | OVERHEATING AND DAMAGE TO THE MOTOR <br> Verify that the connected motor is properly rated for the DC injection current to be applied in term of amount <br> and time in order to avoid overheating and damage to the motor. <br> (1) (3) <br> Failure to follow these instructions can result in equipment damage. |  |  |



Maximum injection time [DC inject. le vel 2] (ICC2) for injection, selected as stop mode only. This parameter can be accessed if [Stop type] (Stt) is setto [DC injection] (dCl).

| dOtd | [Dis. operat opt code] | [Ramp stop] (rMp) |
| :---: | :---: | :---: |
|  | Disable operation stop mode. |  |
| nSt | [Freewheel] (nSt): Disable drive function |  |
| rMp | [Ramp stop] (rMp): Ramp stop then disable drive function |  |

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

## AUTO DC INJECTION

| Code | Name / Description | Adjustment range | Factorysetting |
| :---: | :---: | :---: | :---: |
| FUn- | [APPLICATION FUNCT.] (continued) |  |  |
| AdC- | [AUTO DC INJECTION] |  |  |
| AdC | [Auto DC injection] |  | [Yes] (YES) |
| (2) | HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH <br> If the parameter [Auto DC injection] (AdC) is set to [Continuous] (Ct), DC injection is always active, even if the motor does not run. <br> - Verify that using this setting does not result in unsafe conditions. <br> Failure to follow these instructions will result in death or serious injury. |  |  |
|  | MNARNNG |  |  |
|  | UNINTENDED MOVEMENT <br> - Do not use DC injection to generate holding torque when the motor is at a standstill. <br> - Use a holding brake to keep the motor in the standstill position. <br> Failure to follow these instructions can result in death, serious injury, or equipment damage. |  |  |

Automatic current injection on stopping (at the end of the ramp).
Note: There is an interlock betw een this function and [Motor fluxing] (FLU) page 95. If [Motor fluxing] (FLU) is set to [Continuous] (FCt), [Auto DC injection] (AdC) must be [No] (nO).
Note: [Auto DC injection] (AdC) is set to [No] (nO) when [M otor control type] (Ctt) page 105 is set to [Sync. mot.] (SYn).
[Auto DC injection] (AdC) is forced to [No] (nO) when [Brake as signment] (bLC) page 194 is not set to [No] (nO). 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.
[No] (nO): No injection
[Yes] (YES): Adjustable injection time
[Continuous] (Ct): Continuous standstill injection

| SdC1 | [Auto DC inj. level 1] | 0 to $1.2 \mathrm{ln}(2)$ | 0.7 ln (2) |
| :---: | :---: | :---: | :---: |
|  | NOT/CE |  |  |
|  | OVERHEATING AND DAMAGE TO THE MOTOR <br> Verify that the connected motor is properly rated for the DC injection current to be applied in terms of amount and time in order to avoid overheating and damage to the motor. <br> Failure to follow these instructions can result in equipment damage. |  |  |
|  | Level of standstill DC injection current [Auto DC injection] (AdC) is not [ No ] ( nO ). |  |  |
| tdC1 | [Auto DC inj. time 1] | 0.1 to 30 s | 0.5 s |
|  |  | CE |  |
| $*$ 『 (1) | OVERHEATING AND <br> Verify that the connected and time in order to avo Failure to follow thes | DC injection cu e motor. ipment dama | ied in terms of amount |

Standstill injection time. This parameter can be accessed if [Auto DC injection] (AdC) is not set to [No] (nO).
If [M otor control type] (Ctt) page $\underline{105}$ is set to [Sync. mot.](SYn), this time corresponds to the zero speed maintenance time.

(1) The parameter can also be accessed in the [SETTINGS] (SEt-) menu.
(2) In corresponds to the rated drive current indicated in the Installation manual and 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. Parameter that can be modified during operation or when stopped.

JOG


| Code | Name / Description | Adjustment range | Factorysetting |
| :---: | :--- | :--- | :--- |
| JGLL | [Jog delay] | 0 to 2.0 s | 0.5 s |
| * | Anti-repeat delay betw een 2 consecutive jog operations. <br> This parameter can be accessed if [JOG] (JOG) is not set to [No] (nO). <br> (1) |  |  |

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

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.

Parameter that can be modified during operation or when stopped.

To change the assignment of this parameter, press the ENT key for 2 s .

## PRESET SPEEDS

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

## Note:

You mustconfigure 2 and 4 speeds in order to obtain 4 speeds.
You mustconfigure 2, 4 and 8 speeds in order to obtain 8 speeds.
You mustconfigure 2,4, 8, and 16 speeds in order to obtain 16 speeds.

Combination table for presetspeed inputs

| 16 speeds <br> LI(PS16) | 8 speeds <br> LI(PS8) | 4 speeds <br> LI(PS4) | 2 speeds <br> LI(PS2) | Speed reference |
| :--- | :--- | :--- | :--- | :--- |
| 0 | 0 | 0 | 0 | Reference(1) |
| 0 | 0 | 0 | 1 | SP2 |
| 0 | 0 | 1 | 0 | $\mathrm{SP3}$ |
| 0 | 0 | 1 | 1 | $\mathrm{SP4}$ |
| 0 | 1 | 0 | 0 | $\mathrm{SP5}$ |
| 0 | 1 | 0 | 1 | $\mathrm{SP6}$ |
| 0 | 1 | 1 | 0 | $\mathrm{SP7}$ |
| 0 | 1 | 1 | 1 | $\mathrm{SP8}$ |
| 1 | 0 | 0 | 0 | $\mathrm{SP9}$ |
| 1 | 0 | 0 | 1 | $\mathrm{SP10}$ |
| 1 | 0 | 1 | 0 | $\mathrm{SP11}$ |
| 1 | 0 | 1 | 1 | $\mathrm{SP12}$ |
| 1 | 1 | 0 | 0 | $\mathrm{SP13}$ |
| 1 | 1 | 0 | 1 | $\mathrm{SP14}$ |
| 1 | 1 | 1 | 0 | $\mathrm{SP15}$ |
| 1 | 1 | 1 | 1 | $\mathrm{SP16}$ |

(1) See the diagram on page 147: Reference $1=(\mathrm{SP} 1)$.

| Code | Name / Description ${ }^{\text {a }}$ Adjustment range | Factory setting |
| :---: | :---: | :---: |
| FUn- | [APPLICATION FUNCT.] (continued) |  |
| PSS- | [PRESET SPEEDS] <br> Note: This function cannot be used with certain other functions. Follow the instructions on pag |  |
| $\begin{aligned} \hline \text { PS2 } \\ \substack{\text { no } \\ \text { LI1 }} \end{aligned}$ | [2 preset speeds] <br> [No] (nO): Not assigned <br> [LI1] (LI1): Logical input LI1 <br> [...] (...): See the assignment conditions on page 153 | $[\mathrm{No}](\mathrm{nO})$ |
| PS4 | [4 preset speeds] <br> Identical to [2 preset speeds] (PS2) page 181. <br> To obtain 4 speeds, you must also configure 2 speeds. | $\text { [ } \mathrm{No} \mathrm{l}(\mathrm{nO})$ |
| PS8 | [8 preset speeds] <br> Identical to [2 preset speeds] (PS2) page 181. <br> To obtain 8 speeds, you must also configure 2 and 4 speeds. | $\text { [ } \mathrm{No} \mathrm{l} \text { ( } \mathrm{nO} \text { ) }$ |
| PS16 | [16 preset speeds] <br> Identical to [2 preset speeds] (PS2) page 181. <br> To obtain 16 speeds, you must also configure 2,4 and 8 speeds. | [No] (nO) |
| SP2 <br> * <br> () <br> (1) | [Preset speed 2] 0 to 599 Hz <br> Preset speed 2. See the Combination table for preset PID references page 206.  | $10 \mathrm{~Hz}$ |
| SP3 * () (1) | [Preset speed 3] 0 to 599 Hz <br> Preset speed 3. See the Combination table for preset PID references page 206.  | $15 \mathrm{~Hz}$ |
| SP4 <br> * <br> () <br> (1) | [Preset speed 4] 0 to 599 Hz <br> Preset speed 4. See the Combination table for preset PID references page 206.  | $20 \mathrm{~Hz}$ |
| SP5 * () (1) | [Preset speed 5] 0 to 599 Hz <br> Preset speed 5. See the Combination table for preset PID references page $\underline{206 .}$  | $25 \mathrm{~Hz}$ |
| SP6 * (1) (1) | [Preset speed 6] 0 to 599 Hz <br> Preset speed 6. See the Combination table for preset PID references page 206.  | $30 \mathrm{~Hz}$ |
| SP7 <br> * <br> (1) <br> (1) | [Preset speed 7] 0 to 599 Hz <br> Preset speed 7. See the Combination table for preset PID references page $\underline{206 .}$  | $35 \mathrm{~Hz}$ |


| Code | Name / Description ${ }^{\text {a }}$ Adjustment range | Factory setting |
| :---: | :---: | :---: |
| SP8 * () <br> (1) | [Preset speed 8] 0 to 599 Hz <br> Preset speed 8. See the Combination table for preset PID references page 206.  | 40 Hz |
| SP9 <br> * <br> () <br> (1) | [Preset speed 9] $\quad 0$ to 599 Hz <br> Preset speed 9. See the Combination table for preset PID references page $\underline{206}$. | $45 \mathrm{~Hz}$ |
| SP10 <br> * (2) <br> (1) | [Preset speed 10] 0 to 599 Hz <br> Preset speed 10. See the Combination table for preset PID references page 206.  | $50 \mathrm{~Hz}$ |
| SP11 <br> * <br> () <br> (1) | [Preset speed 11] 0 to 599 Hz <br> Preset speed 11. See the Combination table for preset PID references page 206.  | $55 \mathrm{~Hz}$ |
| SP12 <br> * <br> (2) <br> (1) | [Preset speed 12] 0 to 599 Hz <br> Preset speed 12. See the Combination table for preset PID references page 206.  | $60 \mathrm{~Hz}$ |
| SP13 <br> * <br> () <br> (1) | [Preset speed 13] 0 to 599 Hz <br> Preset speed 13. See the Combination table for preset PID references page $\underline{206}$.  | $70 \mathrm{~Hz}$ |
| SP14 <br> * <br> () <br> (1) | [Preset speed 14] 0 to 599 Hz <br> Preset speed 14. See the Combination table for preset PID references page 206.  | $80 \mathrm{~Hz}$ |
| SP15 <br> * () <br> (1) | [Preset speed 15] 0 to 599 Hz <br> Preset speed 15. See the Combination table for preset PID references page 206.  | $90 \mathrm{~Hz}$ |
| SP16 <br> * <br> $(1)$ <br> (1) | [Preset speed 16] <br> Preset speed 16. <br> The appearance of these [Preset speed x ] (SPx) parameters is determined by the number of sp See the Combination table for preset PID references page 206. | $100 \mathrm{~Hz}$ <br> s configured. |


| Code | Name / Description | Adjustment range | Factory setting |
| :---: | :---: | :---: | :---: |
| JPF | [Skip Frequency] | 0 to 599 Hz | 0 Hz |
| ( | Skip frequency. This parameter helps to prevent prolonged operation within an adjustable range around the regulated frequency. This function can be used to help to prevent a critical speed, which would cause resonance, being reached. Setting the function to 0 renders it inactive. |  |  |
| JF2 | [Skip Frequency 2] | 0 to 599 Hz | 0 Hz |
|  | 2nd skip frequency. This parameter helps to prevent prolonged operation w ithin an adjustable range around the regulated frequency. This function can be used to help to prevent a critical speed, which would cause resonance, being reached. Setting the function to 0 renders it inactive. |  |  |
| JF3 | [3rd Skip Frequency] | 0 to 599 Hz | 0 Hz |
|  | 3rd skip frequency. This parameter helps to prevent prolonged operation within an adjustable range around the regulated frequency. This function can be used to help to prevent a critical speed, which would causeresonance, being reached. Setting the function to 0 renders it inactive. |  |  |
| JFH | [Skip.Freq.Hysteresis] | 0.1 to 10 Hz | 1 Hz |
| * | This parameter is visible if at least one skip frequency [Skip Frequency] (JPF), [Skip Frequency 2] (JF2) or [3rd Skip Frequency] (JF3) is different from 0. <br> Skip frequency range: betw een (JPF-JFH) and (JPF $+J F H$ ), for example. <br> This adjustment is common to the 3 frequencies (JPF, JF2, JF3). |  |  |

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

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

Two types of operations are available:

- Use of single action keys: Two logic inputs are required in addition to the operating direction(s). The input assigned to the "+ speed" command increases the speed, the input assigned to the "- speed" command decreases the speed.
- Use of double action keys: Only one logic inputassigned to "+ speed" is required.
+/- speed with double-press buttons:
Description: 1 button pressed twice ( 2 steps) for each direction of rotation. A contact closes each time the button is pressed.

|  | Released (-speed) | 1st press (speed m aintained) | 2nd press (faster) |
| :--- | :--- | :--- | :--- |
| Forw ard button | - | a | a and b |
| Reverse button | - | c | c and d |

Example of wiring:



Do not use this +/-speed type with 3-wire control.
Whichever type of operation is selected, the max. speed is set by [High speed] (HSP) (see page 87).

## Note:

If the reference is switched via [Ref. 2 switching] (rFC) (see page 155) from any one reference channel to another reference channel with "+/- speed", the value of reference [Output frequency] ( $r$ Fr) (after ramp) may be copied at the same time in accordance with the [Copy channel 1 --> 2] (COP) parameter (see page 156).

If the reference is switched via [Ref. 2 switching] (rFC) (see page 155) from one reference channel to any other reference channel with " $+/$ - speed", the value of reference [Output frequency] ( $r$ Fre) (after ramp) is copied at the same time.
This helps to prevent the speed being incorrectly reset to zero when switching takes place.
 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.

## +/- SPEED AROUND A REFERENCE

The reference is given by [Ref. 1 channel] (Fr1) or [Ref.1B channel] (Fr1b) with summing/subtraction/multiplication functions and preset speeds if relevant (see the diagram on page 147). For im proved clarity, we will call this reference A. The action of the +speed and -speed keys can be set as a \% of this reference $A$. On stopping, the reference ( $A+/$ speed) is not saved, so the drive restarts with reference $A_{+}$ only.
The maximum total reference is limited by [High speed] (HSP) and the minimum reference by [Low speed] (LSP), see page 87.

Example of 2-wire control:


| Code | Name / Description $\quad$ Adjustment range ${ }^{\text {a }}$ Factory setting |
| :---: | :---: |
| FUn- | [APPLICATION FUNCT.] (continued) |
| SrE- | [+/-SPEED AROUND REF.] <br> The function can be accessedfor reference channel [Ref. 1 channel] (Fr1). <br> Note: This function cannot be used with certain other functions. Follow the instructions on page 166. |
| USI $\begin{gathered} \text { no } \\ \text { LI1 } \end{gathered}$ | [+ speed assignment] <br> No] (nO): Not assigned <br> [LI1] (LI1): Logical input LI1 <br> [...] (...): See the assignment conditions on page 153 |
| dSI | [-Speed assignment] <br> See the assignment conditions on page $\underline{153}$ <br> Function active if the assigned input or bit is at 1. |
| $\begin{gathered} \text { SrP } \\ * \\ \text { ( } \end{gathered}$ | [+/-Speed limitation] 0 to $50 \%$ $10 \%$ <br> This parameter limits the variation range with $+/$ - speed as a \% of the reference. The ramps used in this function are [Acceleration 2] (AC2) and [Deceleration 2] (dE2). <br> This parameter can be accessedif + - speed is assigned. |
| AC2 * () | [Acceleration 2] 0.00 to $6,000 \mathrm{~s}(2)$ 5.00 s <br> Time to accelerate from 0 to the [Rated $m$ otor freq.] (FrS). To have repeatability in ramps, the value of this parameter must be set according to the possibility of the application. <br> This parameter can be accessed if [ $+/-$ speed] (tUd) is assigned. |
| dE2 <br> * <br> () <br> (1) |  <br> Time to decelerate fromthe [Rated motor freq.] (FrS) to 0 . To have repeatability in ramps, the value of this parameter must be set according to the possibility of the application. <br> This parameter can be accessed if [ $+/-$ speed] (tUd) is assigned. |

(1) The parameter can also be accessed in the [SETTINGS] (SEt-) menu.
(2) Range 0.01 to 99.99 s or 0.1 to 999.9 s or 1 to $6,000 \mathrm{~s}$ according to [Ram p increment] (Inr) page 170 .

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.

[^2]
## REFERENCE MEMORIZING

Saving a speed reference value using a logic input com mand lasting longer than 0.1 s .

- This function is used to control the speed of several drives alternately via a single analog reference and one logic input for each drive.
- It is also used to confirm a line reference (communication bus or network) on several drives via a logic input. This allows movements to be synchronized by getting rid of variations when the reference is set.
- The reference is acquired 100 ms after the rising edge of the request. Anew reference is not then acquired until a new requestis made.


| Code | Name / Description | Adjustment range | Factory setting |
| :---: | :---: | :---: | :---: |
| FUn- | [APPLICATION FUNCT.] (continued) |  |  |
| SPM- | [MEMO REFERENCE] |  |  |
| SPM $\begin{gathered} \mathrm{nO} \\ \text { LI1 } \end{gathered}$ | [Ref. memo ass.] <br> Assignment to a logic input. <br> Function active if the assigned input is at active state. <br> [ No ] (nO): Not assigned <br> [LI1] (LI1): Logical input LI1 <br> [...] (...): See the assignment conditions on page 153 |  |  |

FLUXING BY LOGIC INPUT


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

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

## BRAKE LOGIC CONTROL

Used to control an electrom agnetic 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 movement:

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

Instructions for brake logic control for a vertical hoisting application:

| A W ARNING |
| :--- |
| UNANTICIPATED EQUIPMENT OPERATION |
| Verify that the selected settings will notresultin the loss of control |
| of the load being lifted. |
| failure to follow these instructions can result in death, serious injury, or equipment damage. |

- [Brake impulse] (bIP): [Yes] (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, setbIP = $2 l l b r$ (for example, ascentalways with a loadand descentalways without a load).
- Brake release current ([Brake release IFW] (IIbr) and [Brake release I Rev] (IIrd) if [Brake impulse] $(\mathrm{bIP})=2 \| \mathrm{l} \mid$ ): 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.
- Acceleration time: For hoisting applications, it is advis able to set the acceleration ramps to more than 0.5 seconds. Ensure that the drive does notexceed the current limit.
The same recom mendation applies for deceleration.
Reminder:For a hoisting movement, a braking resistor should be used.
- [Brake Release time] (brt): Set according to the type of brake. It is the time required for the mechanical brake to release.
- [Brake release frequency] (blr), in open-loop mode only:Leave in [Auto] (AUtO), adjustif necessary.
- [Brake engage frequency] (bEn): Leave in [Auto] (AUtO), adjust if necessary.
- [Brake engage time] (bEt): Set according to the type of brake. It is the time required for the mechanical brake to engage.


## Instructions for brake logic control for a horizontal hoisting application:

- [Brake impulse] (lb\|P): No
- [Brake release IFW] (llbr): Set to 0.
- [Brake Release time] (brt): Set according to the type of brake. It is the time required for the mechanical brake to release.
- [Brake engage frequency] (bEn), in open-loop mode only: Leave in [Auto] (AUtO), adjust if necessary.
- [Brake engage time] ( $b \mathrm{Et}$ ): 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


Brake logic control, vertical movement in open-loop mode




| Code | Name / Description | Adjustment range | Factory setting |
| :---: | :--- | :--- | :--- |
| ttr | [Time to restart $]$ | 0.00 to 15.00 s | 0 s |
| * | Time betw een the end of a brake engage sequence and the start of a brake release sequence. |  |  |
| (2 |  |  |  |
| (1) |  |  |  |

(1) The parameter can also be accessed in the [SETTINGS] (SEt-) menu.
(2) In corresponds to the rated drive current indicated in the Installation manual and 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.

Parameter that can be modified during operation or when stopped.

## Brake control logic expert parameters

Following parameters for brake logic sequence are accessible in expert mode only.

| Code | Name / Description $\quad$ Adjustment range $\quad$ Factory setting |
| :---: | :---: |
| brHO * | [BRH b0] <br> Selection of the brake restart sequence if a run command is repeated while the brake is engaging. <br> [0] (0): The engage/release sequence is completely executed <br> [1] (1): The brake is released immediately <br> 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). <br> Note: If a run command is requested during the "ttr" phase, the complete brake control sequence is initialized. |
| $\begin{array}{ll}\text { lorH1 } \\ & \\ * & \\ & \\ & \\ & \\ & 1\end{array}$ | [BRH b1] <br> Deactivation of the brake contact in steady state fault. <br> $[0](0)$ : The brake contact in steady state fault is active (fault state if the contact is open during operation). The [Brake feedback] (brF) brake contact fault is monitored in all operating phases. <br> [1] (1): The brake contact in steady state fault is inactive. The [Brake feedback] (brF) brake contact fault is only monitored during the brake release and engage phases. |



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.

## 0

 Parameter that can be modified during operation or when stopped.
## EXTERNAL WEIGHT MEASUREMENT

## Load measurement

This function uses the inform ation supplied bya weight sensor to adapt the current
[Brake release IFW] (Illr) 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) or to the pulse-in input, according to the type of weight sensor.

Example: Measurement of the total weight of a hoisting winch and its load

The current[Brake release IFW](Ilor) is adapted in accordance with the curve below.


(1) In corresponds to the rated drive current indicated in the Installation manual and 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.

## HIGH SPEED HOISTING

This function can be used to optimize the cycle times for hoisting movements for zero or lightweight loads. It authorizes operation at "constant power" in order to reach a speed greater than the rated speed without exceeding the rated motor current.
The speed remains limited by the [High speed] (HSP) parameter page 87.

The function acts on the speed reference pedestal and not on the reference its elf.

Principle:


There are 2 possible operating modes:

- Speed reference mode: The maximum permissible speed is calculated bythe drive during a speed step that is set so that the drive can measure the load.
- Currentlimitation mode: The maximum permissible speed is the speed that supports current limitation in motor mode, in the "ascending" direction only. For the "descending" direction, operation is in Speed reference mode.


## Speed reference mode



OSP: Adjustable speed step for load measurement
tOS: Load measuring time

Two parameters are used to reduce the speed calculated by the drive, for ascending and descending.

## Current limiting mode



SCL: Adjustable speed thres hold, above which currentlimitation is active CLO: Current limitation for high-speed function

Note: The speed reached for a specific current will be lower in case of network undervoltage in com parison with nominal network voltage.

The Rope slack function can be used to help to prevent starting up at high speed when a load has been set down ready for lifting but the rope is still slack (as illustrated below).


The speed step (OSP parameters) described on page 202 is used to measure the load. The effective measurement cycle will not be triggered until the load reaches the adjustable threshold [Rope slack trq level] (rStL), which corresponds to the weight of the hook.

A logic output or a relay can be assigned to the indication of the rope slack state in the [INPUTS / OUTPUTS CFG] (I_O-) menu.

(1) In corresponds to the rated drive current indicated in the Installation manual and on the drive nameplate. also be accessed and adjusted from w ithin the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

## PID REGULATOR

## Block diagram

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

(1) Ramp AC2 is only active when the PID function starts up and during PID "wake-ups".

## PID feedback:

The PID feedback mustbe assigned to one of the analog inputs Al1 to Al3, to the pulse input, according to whether any extension cards have been inserted.

## PID reference:

The PID reference mustbe assigned to the following parameters: Presetreferences via logic inputs (rP2, rP3, rP4)
In accordance with the configuration of [Act. internal PID ref.] (PII) page 210:
Internal reference (rPI) or
Reference A ([Ref.1 channel] (Fr1) or [Ref.1B channel] (Fr1b), see page 154).

## Combination table for preset PID references:

| LI (Pr4) | LI (Pr2) | Pr2 = nO | Reference |
| :---: | :---: | :---: | :---: |
|  |  |  | rPI or A |
| 0 | 0 |  | rPI or A |
| 0 | 1 |  | rP2 |
| 1 | 0 |  | rP3 |
| 1 | 1 |  | rP4 |

A predictive speed reference can be used to initialize the speed on restarting the process.

## Scaling of feedback and references:

- [Min PID feedback] (PIF1), [Max PID feedback] (PIF2) parameters can be used to scale the PID feedback (sensorrange). This scale MUST be maintained for all other parameters.
- [Min PID reference] (PIP1), [Max PID reference] (PIP2) parameters can be used to scale the adjustmentrange, for example the reference. The adjustment range MUST remain within the sensor range.

The maxim um value of the scaling parameters is 32,767 . To facilitate installation, we recommend using values as close as possible to this maximum level, while retaining powers of 10 in relation to the actual values.

Example (see graph below): Adjustment of the volume in a tank, between $6 \mathrm{~m}^{3}$ and $15 \mathrm{~m}^{3}$.

- Sensor used $4-20 \mathrm{~mA}, 4.5 \mathrm{~m}^{3}$ for 4 mA and $20 \mathrm{~m}^{3}$ for 20 mA , with the result that PIF1 $=4,500$ and PIF2 $=20,000$.
- Adjustment range 6 to $15 \mathrm{~m}^{3}$, with the result that PIP1 $=6,000$ (min. reference) and PIP2 $=15,000$ (max.reference).
- Example references:
$-\mathrm{rP1}$ (internal reference) $=9,500$
- rP2 (presetreference) $=6,500$
- rP3 (presetreference) $=8,000$
- rP4 $($ presetreference $)=11,200$

The [3.4 DISPLAY CONFG.] menu can be used to customize the name of the unit displayed and its format.


## Other parameters:

- [PID wake up thresh.] (rSL) parameter: Can be used to set the PID error threshold, above which the PID regulator will be reactivated (wake-up) after a stop due to the max. time thres hold being exceeded at low speed [Low speed time out] (tLS).
- Reversal of the direction of correction [PID correct. reverse] (PIC): If [PID correct. reverse](PIC) is setto [ No ] ( nO ), the speed of the motor will increase when the error is positive (for example:pressure control with a compressor). If [PID correct. reverse] (PIC) is set to [Yes] (YES), the speed of the motor will decrease when the error is positive (for example:temperature control using a cooling fan).
- The integral gain maybe short-circuited by a logic input.
- An alarm on the PID feedback may be configured and indicated bya logic output.
- An alarm on the PID error may be configured and indicated by a logic output.


## "Manual - Automatic" Operation with PID

This function combines the PID regulator, the presetspeeds and a manual reference. Depending on the state of the logic input, the speed reference is given by the presetspeeds or by a manual reference inputvia the PID function.
Manual reference [Manual reference] (PIM):

- Analog inputs Al1 to Al3
- Pulse input

Predictive speed reference [Speed ref. assign.] (FPI):

- [Al1] (Al1): Analog input
- [Al2] (Al2): Analog input
- [AI3] (AI3): Analog input
- [RP] (PI): Pulse input
- [HMI] (LCC): Graphic displayterminal or remote display terminal
- [Modbus] (Mdb): Integrated Modbus
- [CANopen] (CAn): Integrated CANopen®
- [Com. card] ( nEt ): Communication card (if inserted)


## Setting up the PID regulator

## 1. Configuration in PID mode.

See the diagram on page 206.

## 2. Perform a test in factory settings mode.

To optimize the drive, adjust [PID prop. gain] (rPG) or [PID integral gain] (rIG) graduallyand independently, and observe the effect on the PID feedback in relation to the reference.
3. If the factory settings are unstable or the reference is incorrect.

- Perform a test with a speed reference in Manual mode (without PID regulator) and with the drive on load for the speed range of the system:
- In steadystate, the speed mustbe stable and comply with the reference, and the PID feedback signal mustbe stable.
- In transientstate, the speed mustfollow the ramp and stabilize quickly, and the PID feedback must follow the speed. If this is not the case, see the settings for the drive and/or sensor signal and wiring.
- Switch to PID mode.
- Set [Dec ramp adapt.] (brA) to [No] (nO) (no auto-adaptation of the ramp).
- Set [PID ramp] (PrP) to the minimum permitted by the mechanism withouttriggering an [Overbraking] (ObF).
- Set the integral gain [PID integral gain] (rIG) to minimum.
- Leave the derivative gain [PID derivative gain] (rdG) at 0 .
- Observe the PID feedback and the reference.
- Switch the drive ON/OFF a number of times or vary the load or reference rapidly a number of times.
- Set the proportional gain [PID prop. gain] (rPG) in order to ascertain the compromise between response time and stability in transient phases (slightovershoot and 1 to 2 oscillations before stabilizing).
- If the reference varies from the preset value in steady state, gradually increase the integral gain [PID integral gain] (rIG), reduce the proportional gain [PID prop. gain] (rPG) in the event of instability (pump applications), find a comprom ise between response time and static precision (see diagram).
- Lastly, the derivative gain maypermit the overshoot to be reduced and the response time to be im proved, although this will be more difficult to obtain a compromise in terms of stability, as it depends on 3 gains.
- Perform in-production tests over the whole reference range.

time

The oscillation frequencydepends on the system kinematics.

| Parameter | Rise time | Overshoot | Stabilization time | Static error |
| :--- | :---: | :---: | :---: | :---: |
| rPG $\nearrow$ |  | $\nearrow$ | $=$ |  |
| rIG $\nearrow$ |  |  | $\nearrow$ |  |
| rdG $\nearrow$ | $=$ |  |  |  |


| Code | Name / Description | Adjustment range | Factory setting |
| :---: | :---: | :---: | :---: |
| FUn- | [APPLICATION FUNCT.] (continued) |  |  |
| Pld- | [PID REGULATOR] <br> Note: This function cannot be used w ith certain other functions. Follow the instructions on page 163. |  |  |
| PIF <br> nO <br> A11 <br> A12 <br> A13 <br> PI <br> AlU1 <br> AlU2 <br> OA01 <br> OA10 | [ No ] ( nO ): Not assigned <br> [A11] (A11): Analog input A1 <br> [AI2] (A12): Analog input A2 <br> [A13] (A13): Analog input A3 <br> [RP] (PI): Pulse input <br> [AI virtual 1] (AIU1): Virtual analog input 1 by the communication bus [AI virtual 2] (AIU2): Virtual analog input 2 by the communication bus [OA01] (OA01): Function blocks: Analog Output 01 … <br> [OA10] (OA10): Function blocks: Analog Output 10 |  |  |
| AlC2 | [Al2 net. channel] [No] (nO) |  |  |
|  | [ No ] (nO): Not assigned <br> [Modbus] (Mdb): Integrated Modbus <br> [CANopen] (CAn): Integrated CANopen® <br> [Com.card] (nEt): Communication card (if inserted) |  |  |
| PIF1 | [Min PID feedback] | 0 to [Max PID feedback] (PIF2) (2) | 100 |
| * <br> () <br> (1) | Value for minimum feedback. |  |  |
| PIF2 <br> * <br> () <br> (1) | Value for maximum feedback. |  |  |
| PlP1 | [Min PID reference] | [Min PID feedback] (PIF1) to [Max PID reference] (PIP2) (2) | 150 |
| * <br> () <br> (1) | Minimum process value. |  |  |
|  | [Max PID reference] | $\begin{aligned} & \text { [Min PID reference] (PIP1) to } \\ & \text { [Max PID feedback] (PIF2) (2) } \end{aligned}$ | 900 |
| * <br> (1) <br> (1) | Maximum process value. |  |  |
| P\\|\| | [Act. internal PID ref.] <br> Internal PID regulator reference. <br> [ No ] ( nO ): The PID regulator reference is given by [Ref. 1 channel] (Fr1) or [Ref.1B channel] (Fr1b) with summing/subtraction/multiplication functions (see the diagram on page 206). <br> [Yes] (YES): The PID regulator reference is internal via [internal PID ref.] ( $\mathbf{r P I}$ ). |  |  |
| * <br> no <br> YES |  |  |  |



Parameters described in this page can be accessed by: DRI- $>$ CONF $>$ FULL $>$ FUN- $>$ PID-

| Code | Name / Description | Adjustment range | Factory setting |
| :---: | :---: | :---: | :---: |
| PAH | [Max fbk alarm] | [Min PID feedback] (PIF1) to [Max PID feedback] (PIF2) (2) | 1,000 |
| * | Maximum monitoring threshold for regulator feedback. |  |  |
| (1) |  |  |  |
| PEr | [PID error Alarm] | 0 to 65,535 (2) | 100 |
| * | Regulator error monitoring threshold. |  |  |
| $(1)$ <br> (1) |  |  |  |
| PIS | [PID integral reset] |  | [ No ] (nO) |
| * | If the assigned input or bit is at 0 , the function is inactive (the PID integral is enabled). <br> If the assigned input or bit is at 1 , the function is active (the PID integral is disabled). |  |  |
| nO | No] (nO): Not assigned |  |  |
| LI1 | [LI1] (LI1): Logical input LI1 |  |  |
| FPI | [Speed ref. assign.] |  | [ No ] ( nO ) |
| * | PID regulator predictive speed input. |  |  |
| nO | [ No ] ( nO ): Not assigned |  |  |
| Al1 | [AI1] (A11): Analog input A1 |  |  |
| Al2 | [AI2] (A12): Analog input A2 |  |  |
| Al3 | [AI3] (A13): Analog input A3 |  |  |
| LCC | [HMI] (LCC): Graphic display terminal or remote display terminal source |  |  |
| Mdb | [Modbus] (Mdb): Integrated Modbus |  |  |
| CAn | [CANopen] (CAn): Integrated CANopen® |  |  |
| $\underset{\mathrm{P}}{\mathrm{n}}$ | [Com. card] (nEt): Communication option board source |  |  |
| AlU1 | [RP] (PI): Pulse input |  |  |
| OA01 | [OA01] (OA01): Function blocks: Analog Output 01 |  |  |
|  | [OA10] (OA10): Function blocks: Analog Output 10 |  |  |
| OA10 |  |  |  |
| PSr | [Speed input \%] | 1 to 100\% | 100\% |
| * | Multiplying coefficient for predictive speed input. <br> This parameter cannot be accessed if [Speed ref. assign.] (FPI) is set to [No] (nO). |  |  |
|  |  |  |  |
| PAU | [Auto/Manual assign.] |  | [No] (nO) |
| * | If the assigned input or bit is at 0 , the PID is active. <br> If the assigned input or bit is at 1 , manual operation is active. |  |  |
| no | [ No ] ( nO ): Not assigned |  |  |
| LI 1 | [LI1] (LI1): Logical input LI1 |  |  |
| AC2 | [Acceleration 2] | 0.00 to 6,000 s (3) | 5 s |
| * <br> (1) | Time to accelerate from 0 to the [Rated motor freq.] (FrS). To have repeatability in ramps, the value of this parameter must be setaccording tothe possibility of the application. <br> Ramp AC2 is only active w hen the PID function starts up and during PID "w ake-ups". |  |  |
| (1) |  |  |  |



If the "PID" and "Low speed operating time" [Low speed time out] (tLS) functions are configured at the same time, the PID regulator may attempt to set a speed low er than [Low speed] (LSP).
This results in unsatisfactory operation, which consists of starting, operating at low speed then stopping, and so on... Parameter [PID wake up thresh.] (rSL) (restart error threshold) can be used to set a minimum PID error threshold for restarting after a stop at prolonged [Low speed] (LSP). [PID w ake up thresh.] (rSL) is a percentage of the PID error (value depends on [Min PID feedback] (PIF1) and [Max PID feedback] (PIF2), see [Min PID feedback] (PIF1) page 210). The function is inactive if [Low speed time out] (tLS) $=0$ or if [PID wake up thresh.] $(r S L)=0$.
(1) The parameter can also be accessed in the [SETTINGS] (SEt-) menu.
(2) If a graphic display terminal is not in use, values greater than $9,999 \mathrm{will}$ be displayed on the 4 -digit display w ith a period mark after the thousand digit, for example, 15.65 for 15,650.
(3) Range 0.01 to 99.99 s or 0.1 to 999.9 s or 1 to $6,000 \mathrm{~s}$ according to [Ramp increment] (IIn r) page 170 .

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

Parameter that can be modified during operation or when stopped.

To change the assignment of this parameter, press the ENT key for 2 s .

## PID PRESET REFERENCES

| Code | Name/Description ${ }^{\text {a }}$ Adjustment range | Factory setting |
| :---: | :---: | :---: |
| FUn- | [APPLICATION FUNCT.] (continued) |  |
| Pr\\|- | [PID PRESET REFERENCES] <br> Function can be accessed if [PID feedback ass.] (PIF) page 210 is assigned. |  |
| Pr2 $\begin{gathered} \text { no } \\ \text { LI1 } \end{gathered}$ | [2 preset PID ref.] <br> If the assigned input or bit is at 0 , the function is inactive. <br> If the assigned input or bit is at 1 , the function is active. <br> [No] (nO): Not assigned <br> [LI1] (LI1): Logical input LI1 <br> [...] (...): See the assignment conditions on page 153 |  |
| Pr4 | [4 preset PID ref.] <br> Check that [2 preset PID ref.] (Pr2) has been assigned before assigning this function. Identical to [2 presetPIDref.] (Pr2) page 212. <br> If the assigned input or bit is at 0 , the function is inactive. <br> If the assigned input or bit is at 1 , the function is active. |  |
|  | [Preset ref. PID 2] [Min PID reference] (PIP1) to <br> [Max PID reference] (PIP2) (2) | 300 |
| * <br> () <br> (1) | This parameter can be accessed if [2 preset PID ref.2] (Pr2) is assigned. |  |
| rP3 | [Preset ref. PID 3] [M in PID reference] (PIP1) to <br> [Max PID reference] (PIP2) (2) | 600 |
| * ( $)$ <br> (1) | This parameter can be accessed if [3 preset PID ref.] ( Pr 3$)$ is assigned. |  |
| rP4 | [Preset ref. PID 4] [Min PID reference] (PIP1) to <br> [Max PID reference] (PIP2) (2) | 900 |
| * <br> () <br> (1) | This parameter can be accessed if [4 preset PID ref.] (Pr4) is assigned. |  |

(1) The parameter can also be accessed in the [SETTINGS] (SEt-) menu.
(2) If a graphic display terminal is not in use, values greater than 9,999 w ill be displayed on the 4 -digit display $w$ ith a period mark after the thousand digit, for example, 15.65 for 15,650.

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

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 setby an analog input (Al orpulse)

If both types are enabled, the lowest value is taken into account. The two types of limitation can be configured or switched remotelyusing a logic inputor via the communication bus.



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

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

## 2ND CURRENT LIMITATION



First current limitation.
This parameter can be accessed if [Current limit 2] (LC2) is not set to [No] (nO). The adjustment range is limited to 1.5 In .
Note: If the setting is less than 0.25 ln , the drive may lock in [Output Phase Loss] (OPL) fault mode if this has been enabled (see [Output Phase Loss] (OPL) page 256). If it is less than the no-load motor current, the motor cannot run.
(1) In corresponds to the rated drive current indicated in the Installation manual and 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 w ithin the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

## DYN CURRENT LIMIT

The DTM ER24, is available w ith SoMove to set the BM P motors. To install the ER24 DTM (device type manager), you can dow nload and install our FDT (field device tool): SoMove lite on www.blemo.com.


| Code | Name / Description | Adjustment range | Factory setting |
| :---: | :---: | :---: | :---: |
| FUn- | [APPLICATION FUNCT.] (continued) |  |  |
| - 2t- | [DYN CURRENT LIMIT] |  |  |
|  | [ ${ }^{12 t}$ model activation] <br> Rt model activation for current limitation <br> [No] (nO): <br> [Yes] (YES): <br> $w$ hen $i^{2 t} \geqslant \operatorname{Max} \sum_{i 2 t,}\left[1^{2} t\right.$ overload level] $(I 2 t M)=100$ and current limitation is set to InMotor when $\mathrm{i}^{2} \mathrm{t} \leqslant \mathrm{Max} \sum{ }^{2} \mathrm{it}^{*} 90 \%$, $\quad\left[\mathrm{l}^{2}\right.$ t overload level] $(\mathrm{I} 2 \mathrm{tM})$ y 90 and the current limitation is set to CLI <br> This parameter can be accessed if [max time of $\left.{ }^{12 t}\right]$ (I2tt) is not set to $[0.00](0.00)$ |  |  |
| -2t\\| | [max current of ${ }^{2}$ tI] <br> Maximum current of ${ }^{1} t$ model. |  |  |
| 12tt | [max time of ${ }^{2}$ tI] <br> Maximum time of Ft model. | 0.00 to 655.35 | [0.00 ] (0.00) |

(1) In corresponds to the rated drive current indicated in the Installation manual or on the drive nameplate. also be accessed and adjusted from w ithin the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

## LINE CONTACTOR COMMAND

The line contactor closes every time a run command (forward or reverse) is sentand 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 supplymustbe provided via an external 24 V source.
Example circuit:


24 V power supply

Note: The "Run/Reset" key mustbe pressed once the "Emergencystop" key has been released.

Llp = Run command [Forward] (Frd) or [Reverse] (rrS)
LO-/LO+ = [Line contactor ass.] (LLC)
Lln = [Drive lock] (LES)
NOTICE
DAMAGE TO THE DRIVE
Do not use this function at intervals of less than 60 s .
Failure to follow these instructions can result in equipment damage.

| Code | Name / Description | Adjustment range | Factory setting |
| :---: | :---: | :---: | :---: |
| FUn- | [APPLICATION FUNCT.] (continued) |  |  |
| LLC- | [LINE CONTACTOR COMMAND] |  |  |
| LLC $\begin{array}{r} \text { nO } \\ \mathrm{LO} 1 \\ \mathrm{r} 2 \\ \mathrm{dO} \end{array}$ | [Line contactor ass.] <br> Logic output or control relay. <br> [ No ] ( nO ): Function not assigned (in this case, none of the function parameters can be accessed) <br> [LO1] (LO1): Logical output LO1 <br> [R2] (r2): Relay r2 <br> [d01] (dO1): Analog output AO1 functioning as a logic output. Selection can be made if [AO1 assignment] (AO1) page 144 is setto $[\mathrm{No}](\mathrm{nO})$ |  |  |
| LES | [Drive lock] <br> This parameter can be accessed if [Line contactor ass.] (LLC) is not set to [No] (nO). <br> The drive locks $w$ hen the assigned input or bit changes to 0 . <br> [ No l ( nO ): : Function inactive <br> [LI1] (LI1): Logical input LI1 <br> [...] (...): See the assignment conditions on page 153 |  |  |
| * $\begin{array}{r} \\ \\ \\ \\ \\ \text { LIO } \\ \\ \\ \text { no }\end{array}$ |  |  |  |
| 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 pow er circuit, the drive will lock w ith a [Line contactor] (LCF) detected fault. |  |  |

* 

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

## OUTPUT CONTACTOR COMMAND

This allows the drive to control a contactor located between the drive and the motor. The contactor is closed when a run command is applied. The contactor is opened when there is no longer any current in the motor.

Note: If the DC injection braking function is used, the output contactor does not close as long as DC injection braking is active

## Output contactor feedback

The corresponding logic input should be at 1 when there is no run command and at 0 during operation. In the event of an inconsistency, the drive trips in FCF2 if the output contactor fails to close (LIx at 1) and in FCF1 if it is stuck (Llx at 0).
The [Delay to motor run] ( dbS ) parameter can be used to delay tripping in fault mode when a run command is sentand the [Delay to open cont.] (dAS) parameter delays the detected fault when a stop command is set.

Note: FCF2 (contactor failing to close) can be reset by the run command changing state from 1 to 0 ( 0 --> 1 --> 0 in 3 -wire control).


The [Out. contactor ass.] (OCC) and [Output contact. fdbk] (rCA) functions can be used individually or together.

\begin{tabular}{|c|c|c|c|}
\hline Code \& Name / Description \& Adjustment range \& Factory setting \\
\hline FUn- \& \multicolumn{3}{|l|}{[APPLICATION FUNCT.] (continued)} \\
\hline OCC- \& \multicolumn{3}{|l|}{[OUTPUT CONTACTOR CMD]} \\
\hline OCC
\[
\begin{gathered}
\mathrm{nO} \\
\mathrm{LO} \\
\mathrm{r} 2 \\
\mathrm{dO}
\end{gathered}
\] \& \multicolumn{3}{|l|}{\begin{tabular}{l|l|}
\hline [Out. contactor ass.] \& {\([\mathrm{No}](\mathrm{nO})\)} \\
Logic output or control relay. \& \\
[ No ] (nO): Function not assigned (in this case, none of the function parameters can be accessed) \\
[LO1] (LO1): Logical output LO1 \\
[R2] (r2): Relay 2 \\
[dO1] (dO1): Analog output AO1 functioning as a logic output. Selection can be made if [AO1 assignment] (AO1) page 144 \\
is set to [No] (nO)
\end{tabular}} \\
\hline rCA

nO

LI1 \& \multicolumn{3}{|l|}{| [Output contact. fdbk] |
| :--- |
| The motor starts up when the assigned input or bit changes to 0 . |
| [ No ] (nO): Function inactive |
| [LI1] (LI1): Logical input LI1 |
| [...] (...): See the assignment conditions on page 153 |} <br>

\hline dbS \& [Delay to motor run] \& 0.05 to 60 s \& 0.15 s <br>

\hline * \& \multicolumn{3}{|l|}{| Time delay for: |
| :--- |
| Motor control follow ing the sending of a run command |
| Output contactor state monitoring, if the feedback is assigned. If the contactor fails to close at the end of the set time, the drive w ill lock in FCF2 mode. |
| This parameter can be accessed if [Out. contactor ass.] (OCC) is assigned or if [Output contact. fdbk] (rCA) is assigned. The time delay must be greater than the closing time of theoutput contactor. |} <br>

\hline dAS \& [Delay to open cont.] \& 0 to 5.00 s \& 0.10 s <br>

\hline * \& \multicolumn{3}{|l|}{| Time delay for output contactor opening command follow ing motor stop. |
| :--- |
| This parameter can be accessed if [Output contact. fdbk] (rCA) is assigned. |
| The time delay must be greater than the opening time of the output contactor. If it is set to 0 , the detected fault w ill not be monitored. |
| If the contactor fails to open at the end of the set time, the drive w ill lock in FCF1 fault mode. |} <br>

\hline
\end{tabular}

## *

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

## POSITIONING BY SENSORS

This function is usedfor managing positioning using position sensors or limit switches linked to logic inputs or using control word bits:

- Slowing down
- Stopping

The action logic for the inputs and bits can be configured on a rising edge (change from 0 to 1 ) or a falling edge (change from 1 to 0 ). The exam ple below has been configured on a rising edge:


The slowdown mode and stop mode can be configured.
The operation is identical for both directions of operation. Slowdown and stopping operate according to the same logic, described below.

## Example: Forward slowdown, on rising edge

- Forward slowdown takes place on a rising edge (change from 0 to 1 ) of the input or bit assigned to forward slowdown if this rising edge occurs in forward operation. The slowdown command is then stored, even in the event of a power outage. Operation in the opposite direction is authorized at high speed. The slowdown command is deleted on a falling edge (change from 1 to 0 ) of the input or bit assigned to forward slowdown if this falling edge occurs in reverseoperation.
- A bit or a logic inputcan be assigned to disable this function.
- Although forward slowdown is disabled while the disable input or bit is at 1 , sensor changes continue to be monitored and saved.

Example: Positioning on a limit switch, on rising edge


## A WARNING

## LOSS OF CONTROL

- Verify correct connection of the limitswitches.
- Verify the correct installation of the limits witches. The limit switches must be mounted in a positionfar enough away from the mechanical stop to allow for an adequate stopping distance.
- You mustrelease the limitswitches before you can use them.
- Verify the correct function of the limitswitches

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

## Operation with short cams:

## A W ARNING

## LOSS OF CONTROL

When operating for the first time or after a reset of the configuration to the factory settings, the motor must always be started outside of the Slowdown and Stop ranges.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

## A WARNING

## LOSS OF CONTROL

When the drive is switched off, it stores the range which it is currently in.
If the system is moved manuallywhile the drive is off, you mustrestore the original position before switching it on again.
Failure to follow these instructions can result in death, serious injury, or equipment damage.
In this instance, when operating for the firstime or after restoring the factory settings, the drive mustinitially be started outs ide the slowdown and stop zones in order to initialize the function.


## Operation with long cams:

In this instance, there is no restriction, which means that the function is initialized across the whole trajectory.


## Stop at distance calculated after deceleration limit switch

This function can be used to control the stopping of the moving part autom atically once a preset distance has been traveled after the slowdown limitswitch.

On the bas is of the rated linear speed and the speed estimated by the drive when the slowdown limits witch is tripped, the drive will induce the stop at the configured distance.
This function is useful in applications where one manual-reset overtravel limits witch is com mon to both directions. It will then only respond to help management if the distance is exceeded. The stop limit switch retains priority in respect of the function.

The [Deceleration type] (dSF) param eter can be configured to obtain either of the functions described below:


## Note:

- If the deceleration ramp is modified while stopping at a distance is in progress, this distance will notbe observed.
- If the direction is modified while stopping at a distance is in progress, this distance will notbe observed.


## A W ARNING

LOSS OF CONTROL
Verify that the configured distance is actuallypossible.
This function does not replace the limitswitch.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

| Code | Name / Description | Adjustment range | Factory setting |
| :---: | :---: | :---: | :---: |
| FUn- | [APPLICATION FUNCT.] (continued) |  |  |
| LPO- | [POSITIONING BY SENSORS] <br> Note: This function cannot be used w ith certain other functions. Follow the instructions on page 163. |  |  |
| SAF $\begin{gathered} \text { no } \\ \text { LII } \end{gathered}$ LI1 | [Stop FW limit sw.] <br> Stop sw itch forw ard. <br> [No] (nO): Not assigned <br> [LI1] (LI1): Logical input LI1 <br> [...] (...): See the assignment conditions on page 153 |  |  |
| SAr | [Stop RV limit sw.] <br> Stop sw itch reverse. Identical to [Stop FW lim it sw.] (SAF) above. |  |  |
| SAL | [Stop limit config.] |  | [Active low] (LO) |
| * | LOSS OF CONTROL <br> If [Stop limit config.] (SAL) is set to [Active high] (HIG), the stop command will be activated on active signaland the stop comm and will not be applied if the connection is removed. <br> Verify that using this setting does notresultin unsafe conditions. <br> Failure to follow these instructions can result in death, serious injury, or equipment damage. |  |  |

Stop sw itch activation level.
This parameter can be accessed if at least one limit sw itch or one stop sensor has been assigned. It def ines the positive or negative logic of the bits or inputs assigned to the stop.
[Active low] (LO): Stop controlled on a falling edge (change from 1 to 0 ) of the assigned bits or inputs [Active high] (HIG): Stop controlled on a rising edge (change from 0 to 1) of the assigned bits or inputs


This parameter can be accessed if at least one limit sw itch or one slowdown sensor has been assigned. It defines the positive or negative logic of the bits or inputs assigned to the slow down.
[Active low] (LO): Slow down controlled on a falling edge (change from1 to 0 ) of the assigned bits or inputs [Active high] (HIG): Slow dow n controlled on a rising edge (change from 0 to 1 ) of the assigned bits or inputs

| Code | Name / Description | Adjustment range | Factory setting |
| :---: | :---: | :---: | :---: |
| CLS | [Disable limit sw.] |  | [ No ] ( nO ) |
|  | 1 WARNING |  |  |
|  | LOSS OF CONTROL <br> If [Disable limit sw.] (CLS) is set to an input and activated, the limit switch management will be inhibited. Verify that activating this function does not resultin unsafe conditions. <br> Failure to follow these instructions can result in death, serious injury, or equipment damage. |  |  |

This parameter can be accessedif at least one limit sw itch or one sensor has been assigned.
The action of the limit switches is disabled $w$ hen the assigned bit or input is at 1 . If, at this time, the drive is stopped or being slow ed down by limit sw itches, it w ill restart up to its speed reference.

[ $\mathrm{No} \mathrm{]}$ ( nO ): Function inactive
[LI1] (LI1): Logical input LI1
[...] (...): See the assignment conditions on page 153
[Stop type]
[Ramp stop] (rMP)
This parameter can be accessed if at least one limit sw itch or one sensor has been assigned.
[Ramp stop] (rMP): Follow ramp
[Fast stop] (FSt): Fast stop (ramp time reduced by [Ramp divider] (dCF), see [Ramp divider] (dCF) page 93) [Freewheel] (nSt): Freew heel stop


* This parameter can be accessed if at least one limit sw itch or one sensor has been assigned and [Stop distance] (Std) is not setto [ No ] ( nO ).
Scaling factor applied to the stop distance to compensate, for example, a non-linear ramp.


## MStP

* 

[Temo Stop]
[ No ] ( nO )
[Memo Stop]
This parameter can be accessed if at least one limit sw itch or one sensor has been assigned.
With or whithout memorisation stop sw itch
[ No ] (nO): No memorisation of limit sw itch
[YES] (YES): Memorisation of limit sw itch

## [Priority restart]

[No] (nO)
*
This parameter can be accessed if at least one limit sw itch or one sensor has been assigned.
Priority given to the starting even if sw itch stop is activated.
[ No ] (nO): No priority restart if stop sw itchis activated
[YES] (YES): Priority to restart even if stop sw itch is activated
This parameter is forced to [No] ( nO ) if [Memo Stop] (MStP) is set to [YES] (YES). also be accessed and adjusted from w ithin the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

## PARAMETER SET SWITCHING

A set of 1 to 15 parameters from the [SETTINGS] (SEt-) menu on page 89 can be selected and 2 or 3 different values assigned. These 2 or 3 sets of values can then be switchedusing 1 or 2 logic inputs or control word bits. This switching can be perform ed during operation (motor running).
It can also be controlled on the basis of 1 or 2 frequency thresholds, wherebyeach threshold acts as a logic input ( $0=$ threshold not reached, $1=$ threshold reached).

|  | Values 1 | Values 2 | Values 3 |
| :---: | :---: | :---: | :---: |
| Parameter 1 | Parameter 1 | Parameter 1 | Parameter 1 |
| Parameter 2 | Parameter 2 | Parameter 2 | Parameter 2 |
| Parameter 3 | Parameter 3 | Parameter 3 | Parameter 3 |
| Parameter 4 | Parameter 4 | Parameter 4 | Parameter 4 |
| Parameter 5 | Parameter 5 | Parameter 5 | Parameter 5 |
| Parameter 6 | Parameter 6 | Parameter 6 | Parameter 6 |
| Parameter 7 | Parameter 7 | Parameter 7 | Parameter 7 |
| Parameter 8 | Parameter 8 | Parameter 8 | Parameter 8 |
| Parameter 9 | Parameter 9 | Parameter 9 | Parameter 9 |
| Parameter 10 | Parameter 10 | Parameter 10 | Parameter 10 |
| Parameter 11 | Parameter 11 | Parameter 11 | Parameter 11 |
| Parameter 12 | Parameter 12 | Parameter 12 | Parameter 12 |
| Parameter 13 | Parameter 13 | Parameter 13 | Parameter 13 |
| Parameter 14 | Parameter 14 | Parameter 14 | Parameter 14 |
| Parameter 15 | Parameter 15 | Parameter 15 | 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 [SETTINGS] (SEt-) menu, because anymodifications made in this menu ([SETTINGS] (SEt-)) will be loston the next power-up. The parameters can be adjusted during operation in the [PARAM. SET SWITCHING] (MLP-) menu, on the active configuration.

Note: Parameter setswitching cannotbe configured from the integrated dis playterminal.
Parameters can onlybe adjusted on the integrated displayterminal if the function has been configured previouslyvia the graphic displayterminal, by PC Software or via the bus or communication network. If the function has not been configured, the [PARAM. SET SWITCHING] (MLP-) menu and the [SET 1] (PS1-), [SET 2] (PS2-), [SET 3] (PS3-) submenus will not appear.


| Code | Name / Description | Adjustment range | Factory setting |
| :---: | :---: | :---: | :---: |
| MLP- | [PARAM. SET SWITCHING] (continued) |  |  |
| PS3- | [SET 3] |  |  |
| * <br> () <br> S301 <br> S315 | This parameter can be accessed if [3 parameter sets] (CHA2) is not [No] ( nO ) and if at least 1 parameter has been selected in [PARAMETER SELECTION]. <br> Identical to [SET 1] (PS1-) page 230. |  |  |

These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from w ithin the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.
(】 Parameter that can be modified during operation or when stopped.

Note: We recommend that a parameter setswitching test is carried outwhile stopped and a check is made to verify that it has been performedcorrectly.
Some parameters are interdependent and in this case may be restricted at the time of switching.
Interdependencies between parameters mustbe respected, even between different sets.
Example: The highest [Low speed] (LSP) must be below the lowest [High speed] (HSP).

## MULTIMOTORS / MULTICONFIGURATIONS

## Motor or configuration switching [MULTIMOTORS/CONFIG.] (MMC-)

The drive may contain up to 3 configurations, which can be saved using the
[FACTORY SETTINGS] (FCS-) menu, page 81.
Each of these configurations can be activated remotely, enabling adaptation to:

- 2 or 3 differentmotors 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 nextstop.
- In the event of motor switching, the following additional conditions apply:
- When the motors are switched, the power and control terminals concerned must alsobe switched as appropriate.
- The maximum power of the drive mustnotbe 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) state.

Menus and parameters switched in multimotor mode

- [SETTINGS] (SEt-)
- [MOTOR CONTROL] (drC-)
- [INPUTS / OUTPUTS CFG] (I_O-)
- [COMMAND] (Ctl-)
- [APPLICATION FUNCT.] (Fun-) with the exception of the [MULTIMOTORS/CONFIG.] function (to be configured once only)
- [FAULT MANAGEMENT] (FLt)
- [MY MENU]
- [USER CONFG.]: The name of the configuration specified by the user in the [FACTORY SETTINGS] (FCS-) menu

Menus and parameters switched in multiconfiguration mode
As in multimotor mode, except for the motor parameters that are common to the 3 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 param eters and motor parameters that can be accessed in expert mode
- Type of motor control

Note: No other menus or parameters can be switched.

## Transfer of a drive configuration to another one, with graphic display terminal, when the drive uses

 [MULTIMOTORS/CONFIG.] (MMC-) functionLet $A$ be the source drive and $B$ the drive addressed. In this example, switching is controlled bylogic input.

1. Connect graphic displayterminal to the drive A .
2. Put logic input LI ([2 Configurations] (CnF1)) and LI ([3 Configurations] (CnF2)) to 0 .
3. Download configuration 0 in a file of graphic display terminal (exam ple: file 1 of the graphic display terminal).
4. Put logic input LI ([2 Configurations] (CnF1)) to 1 and leave logic input $\mathrm{LI}([3$ Configurations] (CnF2)) to 0 .
5. Download configuration 1 in a file of graphic display terminal (exam ple: file 2 of the graphic display terminal).
6. Put logic input LI ([3 Configurations] (CnF2)) to 1 and leave logic input LI ([2 Configurations] (CnF1)) to 1.
7. Download configuration 2 in a file of graphic display terminal (exam ple:file 3 of the graphic displayterminal).
8. Connect graphic displayterminal to the drive B .
9. Put logic input LI ([2 Configurations] (CnF1)) and LI ([3 Configurations] (CnF2)) to 0 .
10. Make a factory setting of the drive $B$.
11. Download the configuration file 0 in the drive (file 1 of graphic displayterminal in this example).
12. Put logic input LI ([2 Configurations] (CnF1)) to 1 and leave logic input LI
([3 Configurations] (CnF2)) to 0.
13. Download the configuration file 1 in the drive (file 2 of graphic displayterminal in this example).
14. Put logic input LI ([3 Configurations] (CnF2)) to 1 and leave logic input LI
([2 Configurations] (CnF1)) to 1.
15. Download the configuration file 2 in the drive (file 3 of graphic displayterminal in this example).

Note: Steps 6, 7, 14 et 15 are necessary only if [MULTIMOTORS/CONFIG.] (MMC-) function is used with 3 configurations or 3 motors.


## Switching command

Depending on the number of motors or selected configurations (2 or 3), the switching command is sentusing one or two logic inputs. The table below lists the possible combinations.

| LI | LI | Num ber of configurations <br> or active m otors |
| :---: | :---: | :---: |
| $\mathbf{2}$ m otors or configurations | 3 m otors or configurations | 0 |
| 0 | 0 | 1 |
| 1 | 0 | 2 |
| 0 | 1 | 2 |
| 1 | 1 |  |

## Schematic diagram for multimotor mode

## NOTICE

## MOTOR OVERHEATING

The motor thermal state of each motor is not saved when drive is switched off. When the drive is switched on, it is not aware of the thermal state of the connected motor or motors.

- To enable correct temperature monitoring of the motors, install an external temperature sensor for each motor.
Failure to follow these instructions can result in equipment damage.

Configuration 0 if the 2 contacts are open


## Auto-tuning in multimotor mode

This auto-tuning can be performed:

- Manually using a logic input when the motorchanges.
- Automaticallyeach time the motor is activated for the $1^{\text {st }}$ time after switching on the drive, if the [Automatic autotune] (AUt) parameter on page 109 is set to [Yes] (YES).


## Motor thermal states in multimotor mode:

The drive helps to protect the three motors individually. Each thermal state takes into account all stop times, if the drive power is not switched off.

## Configuration information output

In the [INPUTS / OUTPUTS CFG] (I_O-) menu, a logic output can be assigned to each configuration or motor (2 or 3) for rem ote information transmission.

Note: As the [INPUTS / OUTPUTS CFG] (I_O-) menu is switched, these outputs mustbe assigned in all configurations in which information is required.


## AUTO TUNING BY LOGIC INPUT

| Code | Name / Description | Adjustment range | Factory setting |
| :---: | :---: | :---: | :---: |
| FUn- | [APPLICATION FUNCT.] (continued) |  |  |
| tn L- | [AUTO TUNING BY LI] |  |  |
| tUL $\begin{array}{r} \text { nO } \\ \text { LI1 } \end{array}$ | [Auto-tune assign.] <br> Auto-tuning is performed $w$ hen the assigned input or bit changes to 1 . <br> Note: Auto-tuning causes the motor to start up. <br> [ No ] ( nO ): Not assigned <br> [LI1] (LI1): Logical input LI1 <br> [...] (...): See the assignment conditions on page $\underline{153}$ |  |  |

## TRAVERSE CONTROL

Function for winding reels of yarn (in textile applications):


The speed of rotation of the cam mustfollow a precise profile to ensure that the reel is steady, compactand linear:


The function starts when the drive has reached its base reference and the traverse controlcommand has been enabled.
When the traverse control command is disabled, the drive returns to its base reference, following the ramp determined by the traverse control function. The function then stops, as soon as ithas returned to this
reference.
Bit 15 of word LRS1 is at 1 while the function is active.

## Function parameters

These define the cycle of frequency variations around the base reference, as shown in the diagram below:


| tr- | [Yarn control] (trC): Assignment of the traverse control command to a logic input or to a <br> communication bus control w ord bit |
| :--- | :--- |
| trl- | [Traverse freq. high] (trH): in Hertz |
| trl | [Traverse Freq. Low] $($ trl L): in Hertz |
| qSH | [Quick step High] (qSH): in Hertz |
| qSL | [Quick step Low] (qSL): in Hertz |
| t $\cup P$ | [Traverse ctrl. accel.] (tUP): time, in seconds |
| tdn | [Traverse ctrl. decel] (tdn): time, in seconds |

Reel parameters:

| tbo | [Reel time] (tllO): Time taken to make a reel, in minutes. <br> This parameter is intended to signal the end of $w$ inding. When the traverse control operating time since command [Yarn control] (trC) reaches the value of [Reeltime] (tbO), the logic output or one of the relays changes to state 1, if the corresponding function [End reel] (EO) has been assigned. <br> The traverse control operating time EbOt can be monitored online by a communication bus. |
| :---: | :---: |
| dtF' | [Decrease ref.speed] (dtF): Decrease in the base reference. <br> In certain cases, the base reference has to be reduced as the reel increases in size. The <br> [Decrease ref.speed] (dtF) valuecorresponds totime [Reel time] (tbO). Once this time has elapsed, the reference continues to fall, follow ing the same ramp. If low speed [Low speed] (LSP) is at0, the speed reaches 0 Hz , the drive stops and must be reset by a new run command. <br> If low speed [Low speed] (LSP) is not 0 , the traverse control function continues to operate above [Low speed](LSP). |



Counter wobble


Thread guide motor

The Counter wobble function is used in certain applications to obtain a constant yarn tension when the Traverse control function is producing considerable variations in speed on the yarn guide motor ([Traverse freq. high] $(\mathbf{t r H})$ and [Traverse Freq. low] (trL), see [Traverse freq. high] (trH) page 242).

Two motors mustbe used (one master and one slave).
The master controls the speed of the yarn guide, the slave controls the winding speed. The function assigns the slave a speed profile, which is in antiphase to that of the master. This means thatsynchronization is required, using one of the master's logic outputs and one of the slave's logic inputs.


## Connection of synchronization I/O

Master drive
Slave drive


The starting conditions for the function are:

- Base speeds reached on both drives
- [Yarn control] (trC) input activated
- Synchronization signal present

Note: The [Quick step High] (qSH) and [Quick step Low] (qSL) parameters should generally be kept at 0 .


| Code | Name / Description | Adjustment range | Factory setting |
| :---: | :---: | :---: | :---: |
|  | [Counter wobble] <br> Synchronization input. <br> To be configured on the winding drive (slave) only. <br> [ No l ( nO ): : Function inactive, thereby helping to prevent access to other parameters <br> [LI1] (LI1): Logical input L11 <br> [...] (...): See the assignment conditions on page 153 |  |  |
| tSY <br> * $\begin{array}{r} \text { nO } \\ \text { LO1 } \\ \text { r2 } \\ \text { dO1 } \end{array}$ | [Sync. wobble] <br> Synchronization output. <br> To be configured on the yarn guide drive (master) only. ```[ No d (nO): Function not assigned [LO1] (LO1) [R2] (r2) [dO1] (dO1): Analog output AO1 functioning as a logic output. Selection can be made if [AO1 assignment] (AO1) page \(\underline{144}\) is set to [ No ] ( nO ).``` |  |  |
| $\begin{gathered} \text { dtF } \\ * \\ \text { () } \end{gathered}$ | Decrease in the base reference during the traverse control cycle. |  |  |
|  | When the state of the assigned input or bit changes to 1 , the traverse control operating time is reset to 0 , along $w$ ith [Decrease ref. speed] (dtF). <br> [ No l ( nO ): Function not assigned <br> [LI1] (LI1): Logical input LI1 <br> [...] (...): See the assignment conditions on page 153 |  |  |

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

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.

## HIGH SPEED SWITCHING

| Code | Name/Description | Adjustment range | Factory setting |
| :---: | :---: | :---: | :---: |
| FUn- | [APPLICATION FUNCT.] (continued) |  |  |
| CHS- | [HSP SWITCHING] |  |  |
| SH2 $\begin{aligned} & \text { nO } \\ & \text { FtA } \\ & \text { F2A } \\ & \text { LI1 } \end{aligned}$ | [2 High speed] <br> High Speed Sw itching. <br> [ No ] ( nO ): Function not assigned <br> [Freq. Th. attain.] (FtA): Frequency threshold attained <br> [Freq. Th. 2 attained] (F2A): Frequency threshold 2 attained <br> [LI1] (LI1): Logical input LI1 <br> [...] (...): See the assignment conditions on page 153 |  |  |
| SH4 | [4 High speed] <br> High Speed Sw itching. <br> Note: In order to obtain 4 High speed, [2 High speed] (SH2) must also be configured. <br> Identical to [2 High speed] (SH2) page $\underline{244}$. |  |  |
| $\begin{gathered} \mathrm{HSP} \\ \mathbf{~} \end{gathered}$ | 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) is set to [ 60 Hz NEM A] ( 0 ). |  |  |
| $\begin{gathered} \hline \text { HSP2 } \\ * \\ \text { () } \end{gathered}$ | [High speed 2] <br> Visible if [2 High speed] (SH2) is not set to [ No ] ( nO ). Identical to [High speed] (HSP) page $\underline{244}$. | 0 to 599 Hz | 50 Hz |
| $\begin{gathered} \hline \text { HSP3 } \\ * \\ \text { () } \end{gathered}$ | [High speed 3] <br> Visible if [4 High speed] (SH4) is not set to [No] (nO). Identical to [High speed] (HSP) page 244. | 0 to 599 Hz | 50 Hz |
| HSP4 * () | [High speed 4] <br> Visible if [4 High speed] (SH4) is not set to [ No ] ( nO ). Identical to [High speed] (HSP) page $\underline{244}$. | 0 to 599 Hz | 50 Hz |

[^3]
## DC Bus

| Code | Name／Description ${ }^{\text {a }}$ Adjustment range ${ }^{\text {a }}$ Factory setting |
| :---: | :---: |
| FUn－ | ［APPLICATION FUNCT．］ |
| dCC－ | ［DC Bus］ |
| dCCM <br> no <br> MAIn bUS | ［DC－Bus chaining］ <br> A．DANGER <br> GROUND FAULT MONITORING DISABLED，NO ERROR DETECTION <br> Setting this parameter to［Bus \＆Main］（Main）deactivates ground fault monitoring． <br> －Only use this parameter after a thorough risk assessment in com pliance with all regulations and standards that apply to the device and to the application． <br> －Im plement alternative ground fault m onitoring functions that do not trigger automatic error responses of the drive，but allow for adequate，equivalent responses byother means in compliance with all applicable regulations and standards as well as the risk assessment． <br> －Commission and test the system with ground fault monitoring enabled． <br> －During commissioning，verify that the drive and the system operate as intended byperforming tests and simulations in a controlled environment under controlled conditions． <br> Failure to follow these instructions will result in death or serious injury． |
| dCCC <br> AtU <br> LHM <br> ＊ | ［DC－Bus compat．］ <br> DC Bus chaining compatibility <br> Visible if［DC－Bus chaining］（dCCM）above is not set to［ No ］（ nO ）． <br> ［Altivar］（AtU）：Only ER24 drives are on the DC Bus chain． <br> ［Lexium］（LHM）：At least one Lexium 32 drive is on the DC Bus chain． <br> －For $\mathbb{P} 24$ ．K／B notdepending on［DC－Bus com pat．］（dCCC）the parameters［Mains voltage］（UrES），［Undervoltage level］（USL），［Braking level］（Ub rr）are forced to their default value． <br> －For ER24－．．．／4K／B，if［DC－Bus com pat．］（dCCC）is set to［Altivar］（AtU）the parameters［Mains voltage］（UrES）， ［Undervoltage level］（USL），［Braking level］（Ubr）are forced to their default value． <br> For $⿴ 囗 十$ P24．．／4KB if［DC－Bus compat．］（dCCC）is setto［Lexium］（LHM）the parameters［Mains voltage］（UrES）， ［Undervoltage level］（USL）are forced to their default value，［Braking level］（Ubrr）is forced to 780 Vdc and the drive will trigger in［Overbraking］（ObF）at a DC Bus level of 820 Vdc instead of 880 Vdc to be compatible with Lexium 32 drives． |
| IPL | ［Input phase Ioss $]$ According to drive <br> Drive behaviour in case of input phase loss detected fault． |
| $\begin{aligned} & * \\ & \\ & \text { nO } \\ & \text { YES } \end{aligned}$ | Cannot be accessed if drive rating is ER24－．．．K／B <br> Visible if［3．1 ACCESS LEVEL］（LAC）is set to［Expert］（Epr）and［DC－Bus chaining］（dCCM）above is set to［ No ］（nO）． <br> ［Ignore］（nO）：Detected fault ignored <br> ［Freewheel］（YES）：Detected fault w ith freew heel stop <br> ［Input phase loss］（IPL）is forced to［lgnore］（nO）if［DC－Bus chaining］（dCCM）above is set to［Only Bus］（bUS）． <br> See［Input phase loss］（IPL）in the Programming Manual（DRI－＞CONF＞FULL＞FLT－＞IPL－）． |



| USL | [Undervoltage level] Undervoltage fault level setting in Volts. | 100 to 276 Vac | According to drive rating |
| :---: | :---: | :---: | :---: |
| * | Visible if [3.1 ACCESS LEVEL] (LAC) is set to [Expert] (Epr), [DC-Bus chaining] (dCCM) above is set to [No] (nO) anc [Mains voltage] (UrES) is not set to [Lexium] (LHM). <br> The factory setting is determined by the drive voltage rating : <br> - For ER24-...K/B : 141 Vac <br> - For ER24-.../4K/B : 276 Vac <br> The adjustment range is determined by the [Mains voltage] (UrES) value. <br> See [Undervoltage le vel] (USL) in the Programming Manual (DRI- >CONF > FULL > FLT- > USB-). |  |  |
| Ubr | [Braking level] <br> Braking transistor command level. | 335 to 820 Vdc | According to drive rating |
| * | The factory setting is determined by the drive voltage rating : <br> - For ER24-...K/B: 395 Vdc <br> - For ER24-.../\$K/B: 820 Vdc <br> The adjustment range is determined by the [Mains voltage] (UrES) value. <br> See [Braking level] (Ubr) in the Programming Manual (DRI- > CONF > FULL > DRC-). |  |  |

[^4]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 corres ponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

## Fault Management

## With integrated display terminal:

Summary of functions:

| Code | Name | Page |
| :---: | :---: | :---: |
| PtC | [PTC M ANAGEMENT] | $\underline{250}$ |
| rSt | [FAULT RESET] | $\underline{251}$ |
| Atr | [AUTOM ATIC RESTART] | $\underline{252}$ |
| AIS | [ALARMSSETTING] | $\underline{252}$ |
| FLr | [CATCHON THE FLY] | $\underline{253}$ |
| t 1 Ht | [MOTOR THERM AL PROT.] | $\underline{255}$ |
| OPL | [OUTPUT PHASE LOSS] | $\underline{256}$ |
| IPL | [INPUT PHASE LOSS] | $\underline{256}$ |
| OHL | [DRIVE OVERHEAT] | $\underline{257}$ |
| SAt | [THERMAL ALARM STOP] | $\underline{258}$ |
| EtF | [EXTERNAL FAULT] | $\underline{258}$ |
| USb | [UNDERVOLTAGE MGT] | $\underline{259}$ |
| せ\\|t | [IGBT TESTS] | $\underline{260}$ |
| LFL | [4-20m A LOSS] | $\underline{260}$ |
| InH | [FAULT INHIBITION] | $\underline{261}$ |
| CLL | [COM. FAULT M ANAGEM ENT] | $\underline{261}$ |
| Sdd | [ENCODER FAULT] | $\underline{263}$ |
| tlld | [TORQUE OR I LIM. DETECT] | $\underline{264}$ |
| FqF | [FREQUENCY METER] | $\underline{266}$ |
| dLl | [DYNAMIC LOAD DETECT.] | $\underline{267}$ |
| tnF | [AUTO TUNING FAULT] | $\underline{268}$ |
| PPI | [CARDS PAIRING] | $\underline{269}$ |
| ULd | [PROCESS UNDERLOAD] | $\underline{270}$ |
| OLd | [PROCESS OVERLOAD] | $\underline{272}$ |
| LFF | [FALLBACK SPEED] | $\underline{272}$ |
| FSt | [RAMP DIVIDER] | $\underline{272}$ |
| dCl | [DC INJECTION] | $\underline{273}$ |



The parameters in the [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 orstopped.

PTC probe
1 set of PTC probe can be managed by the drive in order to help to protect the motor:on logic input LI6 converted for this use by switch SW2 on the control block.
The PTC probe is monitored for the following detected faults:

- Motor overheating
- Sensorbreak
- Sensor short-circuit

Protection via PTC probe does not disable protection via $1^{2}$ t calculation performed by the drive (the two types of protection can be combined).

ER24B, ER24K ab 5,5 kW


ER24K

$D Q-D Q+P E$


| Code | Name / Description $\quad$ Adjustment range | Factory setting |
| :---: | :---: | :---: |
| FLt- | [FAULT MANAGEMENT] (continued) |  |
| rSt- | [FAULT RESET] |  |
| rSF | [Fault reset] <br> Detected faults are cleared manually $w$ hen the assigned input or bit changes to 1 , if the cause of the detected fault has disappeared. <br> The STOP/RESET key on the graphic display terminal performs the same function. <br> Follow ing detected faults can be cleared manually :ASF, brF, bLF, CnF, COF, dLF, EPF1, EPF2, FbES, FCF2, InF9, InFA, InFb, LCF, LFF3, ObF, OHF, OLC, OLF, OPF1, OPF2, OSF, OtFL, PHF, PtFL, SCF4, SCF5, SLF1, SLF2, SLF3, SOF, SPF, SSF, tJF, tnF and ULF. <br> Note: If [Reset restricted fault configuration] (HrFC) is setto [Yes] (YES), the additional follow ing detected fault can be cleared manually: OCF, SCF1, SCF3. See page 252 <br> [ No ] ( nO ): Function inactive <br> [Yes] (YES): Logical input LI1 <br> [...] (...): See the assignment conditions on page 153 |  |
| $r \mathrm{PA}$ | [Product reset assig.] <br> The Restart function performs a Fault Reset and then restarts the drive. During this Restart procedure, the drive goes through the same steps as if it had been sw itched off and on again. Depending on the wiring and the configuration of the drive, this may result in immediate and unanticipated operation. The Restart function can be assigned to a digital input. |  |

## A WARNING

## UNANTICIPATED EQUIPMENT OPERATION

The Restart function performs a Fault Reset and restarts the drive.

- Verify that activating this function does not result in unsafe conditions.

Failure to follow these instructions can result in death, serious injury, or equipment damage
This parameter can only be modified if [3.1 ACCESS LEVEL] (LAC) is set to [EXpert] (EPTr) mode.
Drive reinitialization via logic input. Can be used to reset all detected faults without having to disconnect the drive from the power supply. The drive is reinitialized on a rising edge (change from0 to 1) of the assigned input. The drive can only be reinitialized when locked.
To assign reinitialization, press and hold dow n the ENT key for 2 s .
[ No l ( nO ): Function inactive
[LI1] (LI1): Logical input LI1
...
LIG. [Ll6] (LIG): Logical input LI6
LAI1 [LAI1] (LAl1): Logical input Al1
LAI2 [LAI2] (LAI2): Logical input AI2
OLO1 [OL01] (OL01): Function blocks: Logical Output 01
OL10 [OL10] (OL10): Function blocks: Logical Output 10
[Product reset]
The Restart function performs a Fault Reset and then restarts the drive. During this Restart procedure, the drive goes through the same steps as if it had been sw itched off and on again. Depending on the $w$ iring and the configuration of the drive, this may result in immediate and unanticipated operation.

## A W ARNING <br> UNANTICIPATED EQUIPMENT OPERATION

The Restart function performs a Fault Reset and restarts the drive.

- Verify that activating this function does notresultin unsafe conditions.
.Failure to follow these instructions can result in death, serious injury, or equipment damage
This parameter can only be accessed if [3.1 ACCESS LEVEL] (LAC) is set to [Expert](EPT) mode.
Drive reinitialization. Can be used to reset all detected faults without having to disconnect the drive from the pow er supply.
[ No o ( nO ): Function inactive
[Yes] (YES): Reinitialization. Press and hold dow $n$ 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 $w$ hen locked.

| Code | Name / Description $\quad$ Adjustment range ${ }^{\text {a }}$ Factory setting |
| :---: | :---: |
| HrFC <br> * $\begin{array}{r} \text { nO } \\ \text { YES } \end{array}$ | [Reset restricted fault configuration] <br> This parameter can only be accessed if [3.1 ACCESS LEVEL] (LAC) is set to [Expert] (EPr) mode. <br> Can be used to select the access level of [Fault reset] (rSF) to reset detected faults w ithout having to disconnect the drive fromthe pow er supply. see page $\underline{251}$ <br> Note: If [Resetrestricted fault configuration] (HrFC) is set to [Yes](YES), the additional follow ing detected fault can be cleared manually: OCF, SCF1, SCF3. <br> [ No l ( nO ): Function inactive <br> [Yes] (YES): Function active |
| F-L- | [FAULT MANAGEMENT] (continued) |
| Atr- | [AUTOMATIC RESTART] |
| Atr 82s | $\begin{aligned} & \hline \text { [Automatic restart] } \\ & \text { This function can be used to automatically performindividual or multiple Fault Resets. } \\ & \text { If the cause of the errorthat has triggered the transition to the operating state Fault disappears within while this function is active, } \\ & \text { the drive resumes normal operation. While the Fault Reset attempts are performed automatically, the output signal "Operating } \\ & \text { state Fault" is not available. } \\ & \text { If the attempts to performthe Fault Reset are not successful, the drive remains in the operating state Fault and the output signal } \\ & \text { "Operating state Fault" becomes active. } \end{aligned}$ |


|  |
| :--- |
| UNANTICIPATED EQUIPMENT OPERATION |
| - Verify that activating this function does not result in uns afe conditions. |
| - Verify that the fact that the outputsignal "Operating state Fault" is not available while this function is active |
| does not result in unsafeconditions. |

Failure to follow these instructions can result in death, serious injury, or equipment damage
The error relay remains activated if this function is active. The speed referenceand the operating direction must be maintained. Use 2-wire control ([2/3 wire control] (tCC) is set to [2 wire] (2C) and [2 wire type] (tCt) is set to [Level] (LEL), see [2/3 wire control] (tCC) page 85).
If the restarthas 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 error codes, which permit this function, are listed on page 311.
[ No ] (nO): Function inactive
[Yes] (YES): Automatic restart, after locking in fault state, if the detected 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: $1 \mathrm{~s}, 5 \mathrm{~s}, 10 \mathrm{~s}$, then 1 minute for the follow ing attempts.
[Max. restart time]
This parameter appears if [Automatic restart] (Atr) is set to [Yes] (YES). It can be used to limit the number of consecutive
*
restarts on a recurrent detected fault.
[ $5 \mathbf{m i n}$ ] (5): 5 minutes
[10 m inutes] (10): 10 minutes
[30 m inutes] (30): 30 minutes
[1 hour] (1h): 1 hour
$2 h$ [2 hours] (2h):2 hours
3h [3 hours] (3h): 3 hours
Ct [Unlim ited] (Ct): Unlimited

| F L_t- | [FAULT MANAGEMENT] (continued) |  |  |
| :---: | :--- | :--- | :--- |
| ALS- | [ALARM SETTING] |  |  |
| Ctd | [Current threshold] | 0 to $1.5 \ln (1)$ |  |
| () | Motor current threshold. |  |  |
| $(1)$ |  |  |  |


(1) In corresponds to the rated drive current indicated in the Installation manual and 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.

Parameter that can be modified during operation or when stopped.

2 s
To change the assignment of this parameter, press the ENT key for 2 s .

## Motor thermal protection

## Function

Therm al protection by calculating the $I^{2}$ t.
Note: The motor thermal state is not saved when the drive is switched off.

- Self-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.

The following curves represent the triggering time in seconds:

Triggering time in seconds


## CAUTION

## RISK OF DAMAGE TO THE MOTOR

External protection against overloads is required under the following circumstances:

- When the product is being switched on again, as there is no memoryto record the motor thermal state
- When supplying more than onemotor
- When supplying motors with ratings less than 0.2 times the nominal drive current
- When using motor switching

Failure to follow these instructions can result in equipment damage.

| Code | Name / Description | Adjustment range | Factory setting |
| :---: | :---: | :---: | :---: |
| FLt- | [FAULT MANAGEMENT] (continued) |  |  |
| tHt- | [MOTOR THERMAL PROT.] |  |  |
| tHt <br> no <br> ACL <br> FCL | [Motor protect. type] <br> Note: An errorwill occur when the thermal state reaches 1 back below $100 \%$. <br> [ No ] (nO): No protection <br> [Self cooled] (ACL): For self-cooled motors <br> [Force-cool] (FCL): For force-cooled motors | state and reactivation | [Self cooled] (ACL) <br> occurw hen the state falls |
| ttd | [Motor therm. Ievel] | 0 to 118\% | 100\% |
| () <br> (1) | Threshold for motor thermal alarm (logic output or relay). |  |  |
|  | [Motor2 therm. level] | 0 to 118\% | 100\% |
| () | Threshold for motor 2 thermal alarm (logic output or relay). |  |  |
| ttd3 | [Motor3 therm. level] | 0 to 118\% | 100\% |
| () | Threshold for motor 3 thermal alarm (logic output or relay). |  |  |
| ○LL | [Overload fault mgt] |  | [Freew heel] (YES) |
|  | OVERHEATING AND DAMAGE TO THE MOTOR <br> Depending on the settings of this parameter, the error response to detected errors is disabled or the transition to the operating state Fault is suppressed if an error is detected. <br> - Verify that the settings of this parameter do not result in equipment damage. <br> - Im plement alternative monitoring functions for dis abledm onitoring functions. <br> Failure to follow these instructions can result in equipment damage. |  |  |

Type of stop in the event of a motor thermal error.
[lgnore] (nO): Detected fault ignored
[Freew heel] (YES): Freew heel stop
[Per STT] (Stt): Stop according to configuration of [Type of stop] (Stt) page 173, without tripping. In this case, the fault relay does not open and thedrive is ready to restartas soon as the detected faultdisappears, according tothe restart conditions of the active command channel (for example, according to [2/3 wire control] (tCC) and [2 wire type] (tCt) page 125 if controlis viathe terminals). Configuring analarm for this detectedfaultis recommended (assignedtoalogic output, for example) in order to indicate the cause of the stop.
[fallback spd] (LFF): Change to fallback speed, maintained as long as the detected fault persists and the run command has not been removed (2)
[Spd m aint.] (rLS): The drive maintains the speed being applied when the detected fault occurred, as long as the detected 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] (dCl): DC injection stop. This type of stop cannot be used with certain other functions. See table on page 165
[Mot THR memo]
[№] (nO)
Motor thermal state memorization.
[ No ] ( nO ): Motor thermal state is not stored at pow er off
[Yes] (YES): Motor thermal state is stored at pow er off


(1) The parameter can also be accessed in the [SETTINGS] (SEt-) menu.
(2) Because, in this case, the detected fault does not trigger a stop, it is recommended to assign a relay or logic output to its indication.

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

Parameter that can be modified during operation or when stopped.

2 s
To change the assignment of this parameter, press the ENT key for 2 s .

## Deferred stop on thermal alarm

This function helps to prevent the drive stopping between two steps of the process 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 $20 \%$. Example:A threshold set at $80 \%$ enables reactivation at $60 \%$.

One thermal state threshold mustbe defined for the drive, and one thermal state threshold for the motor(s), which will trigger the deferred stop.



(1) Because, in this case, the detected fault does not trigger a stop, it is recommended to assign a relay or logic output to its indication.

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.

Parameter that can be modified during operation or when stopped.

Parameter can be accessed in [Expert] mode


| Code | Name / Description $\quad$ Adjustment range ${ }^{\text {a }}$ Factory setting |
| :---: | :---: |
| nO YES <br> Stt <br> LFF <br> rLS <br> rMP <br> FSt <br> dCl | Behavior of the drive in the event of a communication interruption with a communication card. <br> [Ignore] (nO): Detected fault ignored <br> [Freew heel] (YES): Freew heel stop <br> [Per STT] (Stt): Stop according to configuration of [Type of stop] (Stt) page 173, without fault tripping. In this case, the fault relay does not open and the drive is ready to restart as soon as the detected fault disappears, according to the restart conditions of the active command channel (for example, according to [2/3 wire control] (tCC) and [2 wire type] (tCt) page 125 if control is via the terminals). Configuring an alarm for this detected fault is recommended (assigned to a logic output, for example) in order to indicate the cause of the stop <br> [Fallback spd] (LFF): Change to fallback speed, maintained as long as the detected fault persists and the run command has not been removed (1) <br> [Spd maint.] (rLS): The drive maintains the speed being applied when the detected fault occurred, as long as the detected fault is present and the run command has not been removed (1) <br> [Ramp stop] (rMP): Stop on ramp <br> [Fast stop] (FSt): Fast stop <br> [DC injection] (dCl): DC injection stop. This type of stop cannot be used $w$ ith certain other functions. See table on page 163 |
| COL | [CANopen fault mgt] [Freew heel] (YES) |
|  |  <br> LOSS OF CONTROL <br> If this parameter is set to [lgnore] ( $n O$ ), cANopen com m unication m onitoring is dis abled. <br> - Only use this setting after a thorough risk assessment in compliance with all regulations and standards <br> that apply to the device and to the application. <br> - Only use this setting for tests during commissioning. <br> - Verify that communication monitoring has been re-enabled before com pleting the commissioning <br> procedure and performing the final commissioning test. <br> Failure to follow these instructions can result in death, serious injury, or equipment damage. |

Behavior of the drive in the event of a communication interruption with integrated CANopen®.
[lgnore] (nO): Detected fault ignored
[Freew heel] (YES): Freew heel stop
[Per STT] (Stt): Stop according to configuration of [Type of stop] (Stt) page 173, without fault tripping. In this case, the fault relay does not open and the drive is ready to restart as soon as the detected fault disappears, according to the restart conditions of the active command channel (for example, according to [2/3 wire control] ( tCC ) and [2 wire type] ( tCt ) page 125 if control is via the terminals). Configuring an alarm for this detected faultis recommended (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 detected fault persists and the run command has not been removed (1)
rLS [Spd maint.] (rLS): The drive maintains the speed being applied $w$ hen the detected fault occurred, as long as the detected 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

| [Modbus fault mgt] | [Freew heel] (YES) |
| :--- | :--- |

## A WARNING

## LOSS OF CONTROL

If this parameter is setto [lgnore] ( nO ), Modbus communication monitoring is disabled.

- Only use this setting after a thorough risk assessment in com pliance with all regulations and standards that apply to the device and to the application.
- Only use this setting for tests during commissioning.
- Verify that communication monitoring has been re-enabled before completing the com missioning procedure and performing the final com missioning test.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

| Code | Name / Description | Adjustment range | Factory setting |
| :---: | :---: | :---: | :---: |
| $\begin{aligned} & \text { nO } \\ & \text { YES } \\ & \text { Stt } \\ & \\ & \text { LFF } \\ & \text { rLS } \\ & \text { rMP } \\ & \text { FSt } \\ & \text { dCI } \end{aligned}$ | Behavior of the drive in the event of a communication interruption with integrated Modbus. <br> [Ignore] (nO): Detected fault ignored <br> [Freew heel] (YES): Freew heel stop <br> [Per STT] (Stt): Stop according to configuration of [Type of stop] (Stt) page 173, without fault tripping. In this case, the fault relay does not open and the drive is ready to restart as soon as the detected fault disappears, according to the restart conditions of the active command channel (for example, according to [2/3 wire control] (tCC) and [2 wire type] (tCt) page 125 if control is via the terminals). Configuring an alarm for this detected faultis recommended (assigned to a logic output, for example) in order to indicate the cause of the stop. <br> [fallback spd] (LFF): Change to fallback speed, maintained as long as the detected fault persists and the run command has not been removed (1) <br> [Spd maint.] (rLS): The drive maintains the speed being applied when the detected fault occurred, as long as the detected fault is present and the run command has not been removed (1) <br> [Ramp stop] (rMP): Stop on ramp <br> [Fast stop] (FSt): Fast stop <br> [DC injection] (dCl): DC injection stop. This type of stop cannot be used with certain other functions. See table on page 165 . |  |  |
| FL_t- | [FAULT MANAGEMENT] (continued) |  |  |
| Sdd- | [ENCODER FAULT] |  |  |
| Sdd ${ }^{\text {Sol }}$ | [Load slip detection] <br> Load slip detection activation <br> [No] (nO): Detected fault ignored <br> [Yes] (YES): Freew heel stop <br> The event is triggered by comparison w iththe output frequency and the speed feedback according to the related parameters configuration $F A n F$, LAnF, dANF and tAnF. <br> The event is also triggered as soon as a RUN order is received, if the sign of the output frequency and the speed feedback are in opposite way during tAnF. <br> In case of a detected fault, the drive sw itch to a freewheel stop, and if the brake logic control function has been configured, the brake command will be set to 0 . |  |  |
| $\begin{gathered} \hline \text { FAnF } \\ * \end{gathered}$ | Visible if [Encoder usage] (EnU) is set to [Fdbk monit.] (SEC). See page 136 |  |  |
| $\begin{gathered} \text { LAnF } \\ * \end{gathered}$ | [ANF Detection Ievel] <br> Visible if [Encoder usage] (EnU) is set to [Fdbk monit.] (SEC). See page 136 |  |  |
| $\begin{gathered} \mathrm{dA} A F \\ * \end{gathered}$ | [ANF Direction check] <br> Visible if [Encoder usage] (EnU) is set to [Fdbk monit.] (SEC). See page 137 |  |  |
| $\begin{gathered} \mathrm{tAnF} \\ * \end{gathered}$ | [ANF Time Thd.] <br> Visible if [Encoder usage] (EnU) is set to [Fdbk monit.] (SEC). See page 137 |  |  |

\begin{tabular}{|c|c|c|c|}
\hline Code \& Name / Description \& Adjustment range \& Factory setting <br>
\hline tII - \& \multicolumn{3}{|l|}{[TORQUE OR I LIM. DETECT]} <br>
\hline SSb

nO
YES
Stt

LFF \& \multicolumn{3}{|l|}{| [Trq/I limit. stop] |
| :--- |
| Behavior in the event of sw itching to torque or current limitation. |
| [Ignore] (nO): Detected fault ignored |
| [Freew heel] (YES): Freew heel stop |
| [Per STT] (Stt): Stop according to configuration of [Type of stop] (Stt) page 173, without fault tripping. In this case, the fault relay does not open and the drive is ready to restart as soon as the detected fault disappears, according to the restart conditions of the active command channel (for example, according to [2/3 wire control] ( tCC ) and [2 wire type] ( $\mathrm{tC} \mathbf{t}$ ) page 125 if control is via the terminals). Configuring an alarm for this detected fault is recommended (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 detected fault persists and the run command has not been removed (1) |
| [Spd maint.] (rLS): The drive maintains the speed being applied when the detected fault occurred, as long as the detected 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] (dCl): DC injection stop. This type of stop cannot be used w ith certain other functions. See table on page 165 |} <br>

\hline StO \& [Trq/I limit. time out] \& 0 to $9,999 \mathrm{~ms}$ \& 1,000 ms <br>
\hline () \& \multicolumn{3}{|l|}{(If [ $\mathrm{Trq} / \mathrm{llim}$ it. stop] (SSb) has been configured) Time delay for taking SSF limitation into account.} <br>
\hline
\end{tabular}

(1) Because, in this case, the detected fault does not trigger a stop, it is recommended to assign a relay or logic output to its indication.
() Parameter that can be modified during operation or when stopped.

2 s
To change the assignment of this parameter, press the ENT key for 2 s .

## Use of the "Pulse input" input to measure the speed of rotation of the motor

This function uses the "Pulse input" input and can only be used if the "Pulse input" input is not being used for another function.

## Example of use

An indexed disk driven bythe 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.


T


When applied to the "Pulse input" 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 $\underline{50}$.
- Overspeed detection (ifthe measured speedexceeds a preset thres hold, the drive will trigger an error).
- Brake failure detection, if brake logic control has been configured: If the speed does not drop sufficiently quickly following a com mand to engage the brake, the drive will trigger an error. 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 102 and is assignable to a relay or logicoutput, seepage 138.



## Load variation detection

This detection is only possible with the High-speed hoisting function. It can be used to detect if an obstacle has been reached, triggering a sudden (upward) increase or (downward) decrease in the load.
Load variation detection triggers a [Dynamic load fault] (dLF). The [Dyn. load Mgt.] (dLb) parameter can be used to configure the response of the drive in the event of this detected fault.
Load variation detection can also be assigned to a relay or a logic output.
There are two possible detection modes, depending on the configuration of high-speed hoisting:

- Speed reference mode
[High speed hoisting] (HSO) page 205 is set to [Speed ref] (SSO).
Torque variation detection.
During high-speed operation, the load is compared to that measured during the speed step. The permissible load variation and its duration can be configured. If exceeded, the drive switches to fault mode.
- Currentlimitation mode
[High speed hoisting] (HSO) page 205 is setto [Current Limit] (CSO).
On ascend, during high-speed operation, an increase in load will result in a drop in speed. Even if highspeed operation has been activated, if the motor frequency drops below the [I Limit Frequency] (SCL) threshold page $\underline{205}$, the drive will switch to fault mode. The detection is realised only for a positive variation of the load and only in the high speed area (area upper to [I Limit Frequency] (SCL)). On descend, operation takes the form of Speed reference mode.


| Code | Name / Description | Adjustment range | Factory setting |
| :---: | :---: | :---: | :---: |
| F L t- | [FAULT MANAGEMENT] (continued) |  |  |
| tn F- | [AUTO TUNING FAULT] |  |  |
| tn L $\begin{array}{r} \text { nO } \\ \text { YES } \end{array}$ | [Autotune fault mgt] <br> [Ignore] : Detected fault ignored <br> [Freew heel] (YES): Freew heel stop |  |  |

(1) Because, in this case, the detected fault does not trigger a stop, it is recommended to assign a relay or logic output to its indication.

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

## Card pairing

Function can only be accessed in [Expert] (EPr) 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 param eters of the card 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 mustrevert 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 control block, the communication cards.
- The serial number for: the controlblock.

| Code | Name / Description | Adjustment range | Factory setting |
| :---: | :---: | :---: | :---: |
| F L t- | [FAULT MANAGEMENT] (continued) |  |  |
| PPI- | [CARDS PARING] |  |  |
| PPI | [Pairing password] | [OFF] (OFF) to 9,999 | [OFF] (OFF) |
| OFF | The [OFF] (OFF) value signifies that the card pairing function is inactive <br> 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 detected fault <br> As soon as the code has been entered, the drive is unlocked and the code changes to [ON] (On). <br> The PPI code is an unlock code know n only to BLEMO Product Support. |  |  |

* 

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.

## Process underload detected fault

A process underload is detected when the next event occurs and remains pending for a minimum time
[Unld T. Del. Detect] (ULt), which is configurable:

- The motor is in steadystate and the torque is below the set underload limit ([UnId. Thr. 0. Speed.] (LUL), [Unld. Thr. Nom. Speed.] (LUn), [Unld. Freq. Thr. Det.] (rMUd) parameters).
- The motor is in steadystate when the offs et between the frequency reference and motor frequency falls below the configurable threshold [Hysteresis Freq. Att.] (Srb).

Torque as a \% of the rated torque


Betw een zero frequency and the rated frequency, the curve reflects the follow ing equation:
torque $=L U L+\frac{(L U n-L U L) x(\text { frequency })^{2}}{(\text { rated frequency })^{2}}$

The underload function is not active for frequencies below
[Unld. Freq. Thr. Det.] (rMUd).

A relay or a logic outputcan be assigned to the signaling of this detected fault in the
[INPUTS / OUTPUTS CFG] (॥_○-) menu.



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.

Parameter that can be modified during operation or when stopped.

## Process overload detected fault

A process overload is detected when the next event occurs and remains pending for a minimum time [Ovid Time Detect.] (tOL), which is configurable:

- The drive is in current limitation mode.
- The motor is in steadystate and the current is above the setoverload threshold [Ovid Detection Thr.] (LOC).
The motor is in steady state when the offset between the frequency reference and motor frequency falls below the configurable threshold [Hysteresis Freq. Att.] (Srb).
A relay or a logic outputcan be assigned to the signaling of this detected fault in the
[INPUTS / OUTPUTS CFG] (I__O-) menu.



Injection current activated by logic input or selected as stop mode, once period of time [DC injection time 1] (tol II) has elapsed.

| Code | Name / Description | Adjustment range | Factory setting |
| :---: | :---: | :---: | :---: |
| tdC | [DC injection time 2] | 0.1 to 30 s | 0.5 s |
|  | NOTICE |  |  |
| * <br> (2) <br> (1) (3) | OVERHEATING AND DAMAGE TO THE MOTOR <br> Verify that the connected motor is properly rated for the DC injection current to be applied in terms of amount and time in order to avoid overheating and damage to the motor. <br> Failure to follow these instructions can result in equipment damage. |  |  |

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) is set to [DC injection] (dCI).
(1) The parameter can also be accessed in the[SETTINGS] (SEt-) and [APPLICATION FUNCT.] (FUn-) menus.
(2) In corresponds to the rated drive current indicated in the Installation manual and on the drive nameplate.
(3) These settings are independent of the [AUTO DC INJECTION] (AdC-) function.

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

Parameter that can be modified during operation or when stopped.

## Communication

## With integrated display terminal:



| Code | Name / Description $\quad$ Adjustment range | Factory setting |
| :---: | :---: | :---: |
| FULL | [FULL] (continued) |  |
| COM- | [COMMUNICATION] |  |
| ICS- | [COM. SCANNER INPUT] <br> [Scan. IN1 address] (nMA1) to [Scan. IN4 address] (nMA4) could be used for Fast Task of the communication scanner (see Modbus \& CANopen® communication manual). |  |
| nMA1 | [Scan. IN1 address] <br> Address of the 1 st input word. |  |
| nMA2 | Address of the 2nd input w ord. |  |
| nMA3 | [Scan. IN3 address] <br> Address of the 3rd input w ord | $0$ |
| nMA4 | [Scan. IN4 address] <br> Address of the 4th input word. | $0$ |
| nMA5 | [Scan. IN5 address] <br> Address of the 5th input w ord. | $0$ |
| nMA | [Scan. IN6 address] <br> Address of the 6th input w ord. | $0$ |
| nMA7 | [Scan. IN7 address] <br> Address of the 7th input w ord. | $0$ |
| nMA8 | [Scan. IN8 address] <br> Address of the 8th input w ord. | $0$ |


| Code | Name / Description | Adjustment range | Factory setting |
| :---: | :---: | :---: | :---: |
| COM- | [COMMUNICATION] (continued) |  |  |
| OCS- | [Scan. Out1 address ] (nCA1) to [Scan. Out4 address] (nCA4) could be used for Fast Task of the communication scanner (see Modbus \& CANopen® communication manual). |  |  |
| nCA1 | [Scan.Out1 address] <br> Address of the 1st output w ord. |  |  |
| nCA2 | [Scan.Out2 address] <br> Address of the 2nd output w ord. |  |  |
| nCA3 | [Scan.Out3 address] <br> Address of the 3rd output w ord. |  |  |
| nCA4 | [Scan.Out4 address] <br> Address of the 4th output w ord. |  |  |
| nCA5 | [Scan.Out5 address] <br> Address of the 5th output w ord. |  |  |
| nCA6 | [Scan.Out6 address] <br> Address of the 6th output w ord. |  |  |
| nCA7 | [Scan.Out7 address] <br> Address of the 7th output w ord. |  |  |
| nCA8 | [Scan.Out8 address] <br> Address of the 8th output w ord. |  |  |
| COM- | [COMMUNICATION] (continued) |  |  |
| Md1 - | [MODBUS NETWORK] |  |  |
| Add | [Modbus Address] | [OFF] (OFF) to 247 | [OFF] (OFF) |
| OFF | $\begin{aligned} & \text { [OFF] (OFF) } \\ & 1 \text { to } 247 \end{aligned}$ |  |  |
| AMOC | [Modbus add Com. C.] | [OFF] (OFF) to 247 | [OFF] (OFF) |
| OFF | $\begin{aligned} & \text { [OFF] (OFF) } \\ & 1 \text { to } 247 \end{aligned}$ |  |  |
| tlor | [Modbus baud rate] <br> 48-96-192-384 kbps on the integrated display terminal. <br> $4800,9600,19200$ or 38400 bauds on the graphic display terminal. |  |  |
|  |  |  |  |
| tFO | $[$ [Modbus format $]$ $[8-\mathrm{E}-1](8 \mathrm{E} 1)$ <br> $8 \mathrm{O} 1-8 \mathrm{E} 1-8 \mathrm{n} 1,8 \mathrm{n} 2$  |  |  |
|  |  |  |  |
| ttO | [Modbus time out] | 0.1 to 30 s | 10.0 s |
|  | 0.1 to 30 s |  |  |
| COM1 | ```[Mdb com stat] [roto] (rOtO): Modbus no reception, no transmission = communication idle [rot1] (rOt1): Modbus no reception, transmission [r1t0] (r-1 tO): Modbus reception, no transmission [rit1] \((\mathrm{r} 1 \mathrm{t} 1)\) ): Modbus reception and transmission``` |  |  |
| $\begin{aligned} & \text { roto } \\ & \text { rot1 } \\ & \text { r1to } \\ & \text { r1t1 } \end{aligned}$ |  |  |  |

[^5] also be accessed and adjusted from w ithin the configuration menu for the corresponding function, their description is detailed
in these menus, on the pages indicated, to aid programming.

## Access Level

See [Access Level] (LAC) page 280.

## Interface (ItF)

## What's in this Chapter?

This chapter contains the following topics:

| Topic | Page |
| :--- | :---: |
| Access Level(LAC) | $\underline{280}$ |
| Language (LnG) | $\underline{282}$ |
| Monitoring Configuration (MCF) | $\underline{283}$ |
| Display configuration (dCF) | $\underline{287}$ |

## Access Level (LAC)

## With integrated display terminal:

From ItF-menu



[^6]
## Comparison of the menus that can be accessed on the graphic display terminal/integrated display terminal


(1) Can be accessed only w ith graphic display terminal.

## Language (LnG)

| RDY | Term | +0.0 Hz | 0.0 A |
| :--- | :--- | :--- | :--- |
|  | 3.2 LANGUAGE |  |  |
|  |  |  |  |
| English |  |  |  |
| Françals |  |  | $\checkmark$ |
| Deutsch |  |  |  |
| Español |  |  |  |
| Italiano |  |  |  |
|  |  | $\ll$ | $\gg$ |

When only one selection is possible, the selection made is indicated by $\checkmark$ Example: Only one language can be chosen.

| Code | Name / Description | Factory setting |
| :---: | :--- | :--- |
| LnG | [3.2 LANGUAGE] |  |
| (2 | Current language index. |  |
| LnGO | [Language 0] (LnG0) |  |
| LnG9 | $\ldots$ | [Language 9] (LnG9) |

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

## Monitoring Configuration (MCF)

This menu can only be accessed with the graphic displayterminal.


This can be used to configure the information displayed on the graphic displayscreen during operation.

[PARAM. BAR SELECT]: Selection of 1 to 2 param eters displayed on the top line (the first 2 cannot be modified).
[MONITOR SCREEN TYPE]: Selection of param eters displayed in the centre of the screen and the displaymode (digital values or bar graph format).
[COM. MAP CONFG.]: Selection of the words displayed and their form at.

| Code | Name / Description |
| :--- | :--- |
| MCF- $_{-}$ | $[3.3$ MONITORING CONFIG] |


| Code | Name / Description |
| :---: | :---: |
| PloS- | [PARAM. BAR SELECT] |
|  |  |
|  | Select the parameter using ENT (a $\square$ then appears next to the parameter). Parameter(s) can also be deselected using ENT. <br> 1 or 2 parameters can be selected. <br> Example: |

## Monitor screen type



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

## Communication map configuration



## Display configuration (dCF)

This menu can onlybe accessedwith the graphic displayterminal. It can be used to custom ize param eters or a menu and to access parameters.


- USER PARAMETERS: Customization of 1 to 15 param eters.
- MY MENU: Creation of a customizedmenu.
- PARAMETER ACCESS: Customization of the visibility and protection mechanisms of menus and parameters.
- KEYPAD PARAMETERS: Adjustment of the contrastand stand-bymode of the graphic dis playterminal (parameters stored in the terminal rather than in the drive).

| Code | Name / Description |
| :--- | :--- |
| dCF $_{-}$ | [3.4 DISPLAY CONFIG] |

## User parameters

If [Return std name] is setto [Yes], the displayreverts to standard but the custom settings remain stored.
Standard:use of the factory set unit.
Customized:customization of the unit.
$\%, \mathrm{~mA}$, etc.: select from drop-down list.
4

Offsets and coefficients are Use F1 to change to ABC, abc, 123, *[-. numerical values. Do not use Use the jog dial to increment the character (alphabetical order), a too high multiplier
(99,999-max display). and << and >> (F2 and F3) to switch to the next or previous character res pectively.
in order to display the name.
ABC $\ll \quad \gg$ Press ESC to return to Unit.



Names (USER MENU NAME, DRIVE NAME, configuration, serialno., lines of messages, names of units, etc.) are customized as in the example of the parameter name shown opposite.
If no custom settings have been made, the standard values appear (names, units, etc.).
Displayon 1 or 2 lines of characters.
Use F1 to change to ABC, abc, 123, *[-.
Use the jog dial to increment the character (alphabetical order), and
<< and >> (F2 and F3) to switch to the next or previous character respectively.

| Code | Name / Description | Factory setting |
| :---: | :---: | :---: |
| CUP- | [USER PARAMETERS] |  |
| $\begin{aligned} & \text { GSP } \\ & \mathbf{( 2} \\ & \text { YO } \\ & \text { YES } \end{aligned}$ | [Return std name] <br> Display standard parameters instead of customised ones. $\begin{aligned} & {[\mathrm{No}](\mathrm{nO})} \\ & {[\mathrm{Yes]} \text { (YES) }} \end{aligned}$ | [No] (nO) |
| MYMN | [MY MENU] |  |
| PAn | [DEVICE NAME] |  |
| SEr- | [SERVICE MESSAGE] |  |
| SML01 | [LINE 1] |  |
| SMLO2 | [LINE 2] |  |
| SML03 | [LINE 3] |  |
| SMLO4 | [LINE 4] |  |
| SML05 | [LINE 5] |  |
| CFN01 | [CONFIGURATION 0] |  |
| CFN02 | [CONFIGURATION 1] |  |
| CFN03 | [CONFIGURATION 2] |  |
| PSn | [SERIAL NUMBER] |  |

()

Parameter that can be modified during operation or when stopped.

My Menu config.


Use the F2 and F3 keys to arrange the parameters in the list (example below using F3).

| RDY | Term | +0.0 Hz |
| :--- | :---: | ---: |
| SELECTED LIST | 0.0 A |  |
| Acceleration |  |  |
| Ramp increment |  |  |
| Speed prop. gain |  |  |
|  |  |  |
| Del |  |  |



| Code | Name / Description |
| :--- | :--- |
| MYC- | [MY MENU CONFIG.] |

## Parameter access




Note: The protected parameters are no longer accessible and are not, therefore, displayed for the selected channels.

| Code | Name / Description | Factory setting |
| :---: | :---: | :---: |
| pAC- | [PARAMETER ACCESS] |  |
| Pro- | [PROTECTION] |  |
| pCd- | [PROTECTED CHANNELS] |  |
| COn <br> P <br> Mdb <br> CAn <br> nEt | [HMI] (COn): Graphic display terminal or remote display terminal [PC Tool] (P S): PC Softw are <br> [Modbus] (Mdb): Integrated Modbus <br> [CANopen] (CAn): Integrated CANopen® <br> [Com.card] (nEt): Communication card (if inserted) |  |
| UlS- | [VISIBILITY] |  |
| PUIS () <br> ACt ALL | [PARAMETERS] <br> Parameter visibility: only active ones, or all parameters. <br> [Active] (ACt) <br> [AII] (ALL) | [Active] (ACt) |

## Keypad parameters

| RDY | Term | 0.0 Hz | 0.0 A |
| :---: | :---: | :---: | :---: |
| KEYPAD PARAMETERS |  |  |  |
| Key pad contrast |  |  | 50\% |
| Key pad | nd-by |  | 5 min |
| Code | << | >> | Quick |


| Code | Name / Description | Adjustment range | Factory setting |
| :---: | :---: | :---: | :---: |
| CnL- | [KEYPAD PARAMETERS] |  |  |
| Crst | [Keypad contrast] | 0 to 100\% | 50\% |
| () | Contrast of the keypad. |  |  |
| CSbY | [Keypad stand-by] | [ No l ( nO ) to 10 min | 5 min |
| () | Graphic keypad standby delay. |  |  |
| nO | [ No ] ( nO ) : No |  |  |

[^7]
## Open / Save as (trA)

This menu can only be accessed with the graphic displayterminal.

[4.1 OPEN]: To download one of the 4 files from the graphic displayterminal to the drive.
[4.2 SAVE AS]: To download the currentdrive configuration to the graphic dis playterminal.

| RDY Term $0.0 \mathrm{~Hz} \quad 0.0 \mathrm{~A}$ <br> 4. OPEN $/$ SAVE AS   |  |  |  | ENT | RDY | Term | 0.0 H | 0.0 A | ENT |  | Term |  | 0.0A | See details on the next page. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4.1 OPEN |  |  |  |  | 4.1 OPEN |  |  |  |  | RDY |  | 0.0 Hz |  |  |
| 4.2 SAVE AS |  |  |  |  | File 1 Used |  |  |  |  | DOWNLOADGROUP |  |  |  |  |
|  |  |  |  |  | File 2 |  |  | mpty |  | None |  |  |  |  |
|  |  |  |  |  | File 3 |  |  | mpty |  | All |  |  |  |  |
|  |  |  |  |  | File 4 |  |  | pty |  | Drive | iguratio |  |  | ENT |
| Code | << | >> | Quick |  |  |  |  |  |  | Motor parameters Communication |  |  |  |  |
|  |  |  |  |  | Code | << | >> | Quick |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  | Code |  |  | Quick |  |

Note: Opening an em pty file has no effect.


Various messages may appear when the download is requested:

- [TRANSFER IN PROGRESS]
- [DONE]
- Error messages if download notpossible
- [Motor parameters are NOT COMPATIBLE. Do you want to continue?]: In this case, the download is possible, but the parameterswill be restricted.


## DOWNLOAD GROUP

| [None]: |  | No parameters |
| :---: | :---: | :---: |
| [AIII]: |  | All parameters in all menus |
| [Drive configuration] |  | The entire [1 DRIVE MENU] without [COMMUNICATION] |
| [Motor parameters]: | [Rated motor volt.] (UnS) | In the [MOTOR CONTROL] (drC-) menu |
|  | [Rated motor freq.] (FrS) |  |
|  | [PSI align curr. max] (NCr) |  |
|  | [Rated motor speed] (nSP) |  |
|  | [Motor 1 Cosinus phi] (COS) |  |
|  | [Rated motor power] (nPrr) |  |
|  | [Motor param choice] (MPC) |  |
|  | [Tune selection] (StUn) |  |
|  | [Mot. therm. current] (\\|tH) |  |
|  | [IR compensation] (UFr) |  |
|  | [Slip compensation] (SLP) |  |
|  | [Cust stator resist.] (rSA) |  |
|  | [Lfw] (LFA) |  |
|  | [Cust. rotor t const.] (tr A) |  |
|  | [Nominal I sync.] (nCrS) |  |
|  | [Nom m otor spdsync] (nSPS) |  |
|  | [Pole pairs] (PPnS) |  |
|  | [Syn. EMF constant] (PHS) |  |
|  | [Autotune L d-axis] (LdS) |  |
|  | [Autotune L q-axis] (LqS) |  |
|  | [Nominal freq sync.] (FrSS) |  |
|  | [Cust. stator R syn] (rSAS) |  |
|  | [Motor torque] (tqS) |  |
|  | [U1] (U1) |  |
|  | [F1] (F1) |  |
|  | [U2] (U2) |  |
|  | [F2] (F2) |  |
|  | [U3] (U3) |  |
|  | [F3] (F3) |  |
|  | [U4] (U4) |  |
|  | [F4] (F4) |  |
|  | [U5] (U5) |  |
|  | [F5] (F5) |  |
|  | The motor parameters that can be accessed in [Expert] (EPr) mode, page 261 . |  |
|  | [Mot. therm. current] ( \\|tH) | In the [SETTINGS] (SEt-) menu |
| [Communication] : |  | All the parameters in the [COMMUNICATION] menu |

## 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 displayterminal:


- The drive is unlocked when the PIN codes are setto [Unlocked] (OFF) (no password) or when the correct code has been entered. All menus are visible.
- 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 place where you will be able to find it.
- The drive has 2 access codes, enabling 2 access levels to be setup:
- PIN code 1 is a public unlock code:6969.
- PIN code 2 is an unlock code known only to BLEMO Product Support. It can only be accessed in [Expert] (EPr) mode.
- Only one PIN1 or PIN2 code can be used, the other mustremain setto [OFT] (OFF).

Note: When the unlock code is entered, the user access code appears.

The following items are access-protected:

- Return to factory settings ([FACTORY SETTINGS] (FCS-) menu.
- The channels and parameters protected bythe [MY MENU] (MYMn -) as well as the menu its elf.
- The custom displaysettings ([3.4 DISPLAY CONFG.] (dCF-) menu).

| Code | Name / Description ${ }^{\text {a }}$ Adjustment range | Factory setting |
| :---: | :---: | :---: |
| COd- | [5 PASSWORD] |  |
| CSt | [State] <br> Information parameter, cannot be modified. <br> [Locked](LC): The drive is locked by a password [Unlocked](ULC): The drive is not locked by a passw ord |  |
| COd | 1st access code. The value [OFF] (OFF) indicates that no password has been set [Unlocked] (ULC). The value [ON] (On) indicates that the drive is protected and an access code must be entered in order to unlockit. Once the correct code has been entered, it remains on the display and the drive is unlocked until the next time the pow er supply is disconnected. PIN code 1 is a public unlock code: 6969. |  |
| COd2 | This parameter can only be accessed in [Expert] (EPrr) mode. <br> 2nd access code. The value [OFF] (OFF) indicates that no passw ord has been set [Unlocked] (ULC). The value [ON] (On) indicates that the drive is protected and an access code must be entered in order to unlockit. Once the correct code has been entered, it remains on the display and the drive is unlocked until the next time the pow er supply is disconnected. <br> PIN code 2 is an unlock code know n only to BLEMO Product Support. <br> When [PIN code 2] (COd2) is not set to [OFF] (OFF), the [1.2 MONITORING] (MOn-) menu is the only one visible. Then if [PIN code 2] (COd2) is set to [OFF] (OFF) (drive unlocked), all menus are visible. <br> If the display settings are modified in [3.4 DISPLAY CONFIG.] (dCF-) menu, and if [PIN code 2] (COd2) is not set to [OFF] (OFF), the visibility configured is kept. Then if [PIN code 2] (COd2) is set to OFF (drive unlocked), the visibility configured in [3.4 DISPLAY CONFIG.] (dCF-) menu is kept. |  |
| Uடr <br> ULro | Reads or copies the current configuration to the drive. <br> [Permitted] (ULrO): The current drive configuration can be uploaded to the graphic display terminal or PC Softw are. [Not allow ed] (ULr1): The current drive configuration can only be uploaded to the graphic display terminal or PC Sofw are if the drive is not protected by an access code or if the correct code has been entered. |  |
| dllr dLrO dLr1 dLr2 dLr3 | [Download rights] <br> Writes the current configuration to the drive or dow nloads a configuration to the drive. <br> [Locked drv] (dLrO) : A configuration file can only be dow nloaded to the drive if the drive is protecte which is the same as the access code for the configuration to be dow nloaded. <br> [Unlock. drv] (dLr1): A configuration file can be dow nloaded to the drive or a configuration in the drive drive is unlocked (access code entered) or is not protected by an access code. <br> [Not allow ed] (dLr2): Dow nload not authorized. <br> [Lock/unlock] (dLr3): Combination of [Locked drv.] (dLrO) and [Unlock. drv] (dLr1). | Unlock. drv] (dLr1) <br> by an access code, <br> can be modified if the |

## Multipoint Screen

## Multipoint Screen

Communication is possible between a graphic displayterminal and a number of drives connected on the same bus. The addresses ofthe drives mustbe configured in advance in the [COMMUNICATION] (COM-) menu using the [Modbus Address] (Add) parameter, page 276.

When a number of drives are connected to the same graphic displayterminal, it automatically dis plays the following screens:


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 displayterminal is not authorized, apart from the Stop key, which locks all the drives.

If there is an error on a drive, this drive is displayed.

## Maintenance and Diagnostics

## What's in this Part?

This part contains the following chapters:

| Chapter | Chapter Name | Page |
| :---: | :--- | :---: |
| 11 | Maintenance | $\underline{305}$ |
| 12 | Diagnostics and Troubleshooting | $\underline{307}$ |

## Maintenance

## 10

## Limitation of Warranty

The warranty does not apply if the product has been opened, except by BLEMO services

## Servicing

| CAUTION |
| :--- |
| RISK OF DAMAGE TO THE DRIVE |
| Adapt the following recommendations according to the environment conditions: temperature, chemical, dust. |
| Failure to follow these instructions can result in equipment damage. |

It is recommended to do the following in order to optimize continuity of operation.

| Environm ent | Part concerned | Action | Periodicity |
| :--- | :--- | :--- | :--- |
| Knock on the product | Housing - control block <br> (led - display) | Check the drive visual aspect | At least each year |
| Corrosion | Terminals - connector - screws- <br> EMC plate | Inspect and clean if required |  |
| Dust | Terminals - fans - blow holes |  |  |
| Temperature | Around the product | Check and correct if required |  |
| Cooling | Fan | Check the fan operation |  |
|  | Replace the fan | After 3 to 5 years, depending <br> on the operating conditions |  |
| Vibration | Terminal connections | Check tightening at recom- <br> mended torque | At least each year |

Note: The fan operation depends on the drive thermal state. The drive may be running and the fan not.

## Spares and repairs

Serviceable product. Please refer to your Customer Care Centre.

## Long time storage

If the drive was not connected to mains for an extended period of time, the capacitors mustbe restored to their full perform ance before the motor is started. See page 39 .

## Fan replacement

It is possible to order a new fan for the ER24 maintenance, see the commercial references on www.blemo.com.

Fans may continue to run for a certain period of time even after power to the producthas been disconnected.

| CAUTION |
| :--- |
| RUNNING FANS |
| Verify that fans have come to a complete standstill before handling them. |
| Failure to follow these instructions can result in equipment damage. |

## Diagnostics and Troubleshooting

## What's in this Chapter?

This chapter contains the following topics:

| Topic | Page |
| :--- | :---: |
| Error code | $\underline{308}$ |
| Clearing the detected fault | $\underline{308}$ |
| Fault detection codes w hich require a power reset after the detected fault is cleared | $\underline{309}$ |
| Fault detection codes that can be cleared w th the automatic restart function after the cause has <br> disappeared | $\underline{311}$ |
| Fault detection codes that are cleared as soon as their cause dis appears | $\underline{314}$ |
| Option card changed or removed | $\underline{314}$ |
| Control block changed | $\underline{314}$ |
| Fault detection codes displayed on the remote display terminal | $\underline{315}$ |

## A A DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH
Read and understand the instructions in "Safety Information" chapter before performing any procedure in this chapter.
Failure to follow these instructions will result in death or serious injury.

## Error code

- If the displaydoes notlightup, check the power supply to the drive.
- The assignment of the Fast stop or Freewheel functions will help to prevent the drive starting if the corresponding logic inputs are not powered up. The ER24 then displays [Freewheel] ( nSt ) in freewheel stop and [Fast stop] (FSt) in faststop. This is normal since these functions are active atzero so that the drive will be stopped if there is a wire break.
- Check that the run commandinputis activated in accordance with the selected control mode ([2/3 wire control] (tCC) and [2 wire type] (tCt) parameters, page 85).
- If an inputis assigned to the limitswitch function and this input is atzero, the drive can only be started up by sending a command for the opposite direction (see page 224).
- If the reference channel or comm and 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 com munication bus sends a command.

| Code | Name / De scription |
| :--- | :--- |
| d Gt- | [DIAGNOSTICS] |
| This menu can only be accessedwith the graphic display terminal. It displays detected faults and their cause in plain text and can |  |
| be used to carry out tests, see page $\underline{64 .}$ |  |

## Clearing the detected fault

In the event of a non resettable detected fault:

- Disconnectall power, including external control power that maybe present.
- Lock all power dis connects in the open position.
- Wait 15 minutes to allow the DC bus capacitors to discharge (the drive LEDs are not indicators of the absence of $D C$ bus voltage).
- Meas ure the voltage of the $D C$ bus between the $P A /+$ and $P C /-$ terminals to ensure that the voltage is less than 42 Vdc .
- If the DC bus capacitors do not discharge completely, contact your local BLEMO representative. Do not repair or operate the drive.
- Find and correct the detected fault.
- Restore power to the drive to confirm the detected fault has been rectified.

In the event of a resettable detected fault, the drive can be reset after the cause is cleared:

- By switching off the drive until the display dis appears com pletely, then switching on again.
- Automatically in the scenarios described for the [AUTOMATIC RESTART] (Atr-) function, page 252.
- By means of a logic input or control bit as signed to the [FAULT RESET] (rSt-) function, page 251.
- By pressing the STOP/RESET key on the graphic displaykeypad if the active channel commandis the HMI (see [Cmd channel 1] (Cd1) page 155).


## Fault detection codes which require a power reset after the detected fault is cleared

The cause of the detected fault mustbe rem oved before resetting by turning off and then back on.
ASF, brF, SOF, SPF and $t n F$ detected faults can also becleared remotely by means of a logic input or control bit ([Fault reset] (rSF) parameter, page 251).

| Detected Fault | Name | Probable cause | Remedy |
| :---: | :---: | :---: | :---: |
| AnF | [Load slipping] | - The difference betw een the output frequency and the speed feedback is not correct. | - Check the motor, gain and stabillity parameters. <br> - Add a braking resistor. <br> - Check the size of the motor/drive/load. <br> - Check the encoder's mechanical coupling and its wiring. <br> - Check the setting of parameters |
| ASF | [Angle Error] | - This occurs during the phase-shift angle measurement, if the motor phase is disconnected or if the motor inductance is too high. | - Check the motor phases and the maximum current allow ed by the drive. |
| brF | [Brake feedback] | - The brake feedback contact does not match the brake logic control. <br> - The brake does not stop the motor quickly enough (detected by measuring the speed on the "Pulse input" input). | - Check the feedback circuit and the brake logic control circuit. <br> - Check the mechanical state of the brake. <br> - Check the brake linings. |
| CrF1 | [Precharge] | - Charging relay control detected fault or charging resistor damaged. | - Turn the drive off and then turn on again. <br> - Check the internal connections. <br> - Contact BLEMO Product Support. |
| EEF1 | [ControlEeprom] | - Internal memory detected fault, control block. | - Check the environment (electromagnetic compatibiility). <br> - Turn off, reset, return to factory settings. <br> - Contact BLEMO Product Support. |
| EEF2 | [Pow er Eeprom] | - Internal memory detected fault, power card. |  |
| FCF1 | [Out. contact. stuck] | - The output contactor remains closed although the opening conditions have been met. | - Check the contactor and its w iring. <br> - 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. |
| \\| L F | [internal com. link] | - Communication interruption betw een option card and drive. | - Check the environment (electromagnetic compatibility). <br> - Check the connections. <br> - Replace the option card. <br> - Contact BLEMO Product Support. |
| l n F 1 | [Rating error] | - The pow er card is different fromthecard stored. | - Check the reference of the power card. |
| InF2 | [Incom patible PB] | - The pow er card is incompatible w iththe control block. | - Check the reference of the power card and its compatibility. |
| InF3 | [Internal serial link] | - Communication interruption betw een the internal cards. | - Check the internal connections. <br> - Contact BLEMO Product Support. |
| InF4 | [Internal-mftg zone] | - Internal data inconsistent. | - Recalibrate the drive (performed by BLEMO Product Support). |
| InF6 | [Internal - fault option] | - The option installed in the drive is not recognized. | - Check the reference and compatibility of the option. <br> - Check that the option is w ell inserted into the ER24. |
| InF9 | [Internal- I measure] | - The current measurements are incorrect. | - Replace the current sensors or the pow er card. <br> - Contact BLEMO Product Support. |
| $\operatorname{lnF}$ A | [Internal-mains circuit] | - The input stage is not operating correctly. | - Contact BLEMO Product Support. |
| InFb | [Internal- th. sensor] | - The drive temperature sensor is not operating correctly. | - Replace the drive temperature sensor. <br> - Contact BLEMO Product Support. |
| InFE | [internal- CPU] | - Internal microprocessor detected fault. | - Turn off and reset. <br> - Contact BLEMO Product Support. |
| SAFF | [Safety fault] | - Debounce time exceeded. <br> - SS1 threshold exceeded. <br> - Wrong configuration. <br> - SLS type overspeed detected. | - Check the safety functions configuration. <br> - Check the ER24 Integrated safety Functions manual <br> - Contact BLEMO Product Support. |


| Detected Fault | Name | Probable cause | Remedy |
| :---: | :---: | :---: | :---: |
| SOF | [Overspeed] | - Instability or driving load too high. | - Check the motor, gain and stability parameters. <br> - Add a braking resistor. <br> - Check the size of the motor/drive/load. <br> - Check the parameters settings for the [FREQUENCY METER] (FqF-) functionpage 266, if it is configured. |
| SPF | [Speed fdback loss] | - Signal on "Pulse input" missing, if the input is used for speed measurement. <br> - Encoder feedback signal missing | - Check the w iring of the input cable and the detector used. <br> - Check the configuration parameters of the encoder. <br> - Check the w iring between the encoder and thedrive. <br> - Check the encoder. |

## Fault detection codes that can be cleared with the automatic restart function after the cause has disappeared

These detected faults can also be cleared by turning on and off or by means of a logic input or control bit ([Fault reset] (rSF) parameter page 251).

| Detected Fault | Name | Probable cause | Remedy |
| :---: | :---: | :---: | :---: |
| bLF | [Brake control] | - Brake release current not reached. <br> - Brake engage frequency threshold [Brake engage freq] (bEn) only regulated $w$ hen brake logic control is assigned. | - Check the drive/motor connection. <br> - Check the motor windings. <br> - Check the [Brake release IFW] (llor) and [Brake release I Rev] (llrd) settings page 194. <br> - Apply the recommended settings for [Brake engage freq] (bEn). |
| CnF | [Com. network] | - Communication interruption on communication card. | - Check the environment (electromagnetic compatibility). <br> - Check the w iring. <br> - Check the time-out. <br> - Replace the option card. <br> - Contact BLEMO Product Support. |
| COF | [CANopen com.] | - Communication interruption on the CANopen® bus. | - Check the communication bus. <br> - Check the time-out. <br> - Refer to the CANopen® User's manual. |
| EPF1 | [External flt-LI/Bit] | - Event triggered by an external device, depending on user. | - Check the device w hich causedthe triggering and reset. |
| EPF2 | [External fault com.] | - Event triggered by a communication netw ork. | - Check for the cause of the triggering and reset. |
| FbES | [FB stop flt.] | - Function blocks have been stopped w hile motor w as running. | - Check [Stop FB Stop m otor](FbSM) configuration. |
| FCF2 | [Out. contact. open.] | - The output contactor remains open although the closing conditions have been met. | - Check the contactor and its wiring. <br> - 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. <br> - Check the time-out. <br> - Check the supply mains/contactor/drive connection. |
| LFF3 | [Al3 4-20m A loss] | - Loss of the 4-20 mA reference on analog input Al3. | - Check the connection on the analog inputs. |
| ObF | [Overbraking] | - Braking too sudden or driving load. <br> - Supply voltage too high. | - Increase the deceleration time. <br> - Install a braking resistor if necessary. <br> - Activate the [Dec ram p adapt.] (brA) function page 172, if it is compatible w ith the application. <br> - Check the supply voltage. |
| OCF | [Overcurrent] | - Parameters in the [SETTINGS] (SEt-) and [MOTOR CONTROL] (drC-) menus are not correct. <br> - Inertia or load too high. <br> - Mechanical locking. | - Check the parameters. <br> - Check the size of the motor/drive/load. <br> - Check the state of the mechanism. <br> - Decrease [Currentlimitation] (CLI). <br> - Increase the sw itching frequency. |
| OHF | [Drive overheat] | - Drive temperature too high. | - Check the motor load, the drive ventilation and the ambient temperature. Wait for the drive to cool dow $n$ before restarting. |
| OLC | [Proc. overload flt] | - Process overload. | - Check and remove the cause of the overload. <br> - Check the parameters of the [PROCESS OVERLOAD] (OLd-) function, page 272. |
| OLF | [Motor ove rload] | - Triggered by excessive motor current. | - Check the setting of the motor thermal protection, check the motor load. Wait for the motor to cool dow $n$ before restarting. |
| OPF1 | [1 output phase loss] | - Loss of one phase at drive output. | - Check the connections fromthe drive to themotor. |


| Detected Fault | Name | Probable cause | Remedy |
| :---: | :---: | :---: | :---: |
| OPF2 | [3motor phaseloss] | - Motor not connected or motor power too low. <br> - Output contactor open. <br> - Instantaneous instability in the motor current. | - Check the connections from the drive to the motor. <br> - If an output contactor is being used, set [Output Phase Loss] (OPL) to [Output cut] (OAC), page 256. <br> - Test on a low pow er motor or w ithout a motor: In factory settings mode, motor 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 w ith the same rating as the drive (in particular for high pow er drives), deactivate motor phase loss detection [Output Phase Loss] (OPL) $=[\mathrm{No}$ ( nO ), see instructions given page 256 . <br> - Check and optimize the follow ing parameters: [IR com pensation] (UFr) page 90, [Rated motor volt.] (UnS) and [Rated mot. current] ( nCr ) page 86 and perform [Auto tuning] (tUn) page 87. |
| OSF | [Mains overvoltage] | - Supply voltage too high. <br> - Disturbed mains supply. | - Check the supply voltage. |
| OtFL | [LI6=PTC overheat] | - Overheating of PTC probes detected on input Ll6. | - Check the motor load and motor size. <br> - Check the motor ventilation. <br> - Wait for the motor to cool before restarting. <br> - Check the type and state of the PTC probes. |
| PtFL | [LI6=PTC probe] | - PTC probe on input LI6 open or short-circuited. | - Check the PTC probe and the w iring betw een it andthe motor/drive. |
| SCF1 | [Motor short circuit] | - Short-circuit or grounding at thedrive output. | - Check the cables connecting the drive to the motor, and the motor insulation. <br> - Reduce the sw itching frequency. <br> - Connect chokes in series w ith the motor. <br> - Check the adjustment of speed loop and brake. <br> - Increase the [Time to restart] (ttr), page 101. <br> - Increase the sw itching frequency. |
| SCF3 | [Ground short circuit] | - 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. <br> - Reduce the sw itching frequency. <br> - Connect chokes in series w ith the motor. <br> - Check the adjustment of speed loop and brake. <br> - Increase the [Time to restart] (ttr), page 101. <br> - Reduce the sw itching frequency. |
| SCF4 | [IGBT short circuit] | - Pow er component detected fault. | - Contact BLEMO Product Support. |
| SCF5 | [Motor short circuit] | - Short-circuit at drive output. | - Check the cables connecting the drive to the motor, and the motor's insulation. <br> - Contact BLEMO Product Support. |
| SLF1 | [Modbus com.] | - Communication interruption on the Modbus bus. | - Check the communication bus. <br> - Check the time-out. <br> - Refer to the Modbus User's manual. |
| SLF2 | [PC com.] | - Communication interruption w ith PC Softw are. | - Check the PC Software connecting cable. <br> - Check the time-out. |
| SLF3 | [HMI com.] | - Communication interruption w ith the graphic display terminal or remote display terminal. | - Check the terminal connection <br> - Check the time-out. |
| SSF | [Torque/current lim] | - Sw itch to torque or currentlimitation. | - Check if there are any mechanical problems. <br> - Check the parameters of [TORQUE LIMITATION] (tOL-) page 216 and the parameters of the [TORQUE OR ILIM. DETECT.] (tlll-), page 264. |
| tJF | [IGBT overheat] | - Drive overheated. | - Check the size of the load/motor/drive. <br> - Reduce the sw itching frequency. <br> - Wait for the motor to cool before restarting. |


| Detected Fault | Name | Probable cause | Remedy |
| :---: | :---: | :---: | :---: |
| tn F | [Auto-tuning] | - Special motor or motor w hose power is not suitable for the drive. <br> - Motor not connected to thedrive. <br> - Motor not stopped | - Check that the motor/drive are compatible. <br> - Check that the motor is present during auto-tuning. <br> - If an output contactor is being used, close it during auto-tuning. <br> - Check that the motor is stopped during tuneoperation. |
| ULF | [Proc. underload FIt] | - Process underload. | - Check and remove the cause of the underload. <br> - Check the parameters of the [PROCESS UNDERLOAD] (Uld-) function, page 270 |

Fault detection codes that are cleared as soon as their cause disappears

| Detected Fault | Name | Probable cause | Remedy |
| :---: | :---: | :---: | :---: |
| CFF | [Incorrect config.] | - Option card changed or removed. <br> - Control block replaced by a control block configured on a drive with a different rating. <br> - The current configuration is inconsistent. | - Check that there are no card errors. <br> - In the event of the option card being changed/removed deliberately, see the remarks below . <br> - Check that there are no card errors. <br> - In the event of the control block being changed deliberately, see the remarks below. <br> - Return to factory settings or retrieve the backup configuration, if it is valid (see page 81). |
| $\frac{\text { CFI }}{\text { CFI2 }}$ | [Invalid config.] | - Invalid configuration. <br> The configuration loaded in the drive via the bus or communication netw ork is inconsistent. | - Check the configuration loaded previously. <br> - Load a compatible configuration. |
| CSF | [Ch. Sw.fault] | - Sw itch to not valid channels. | - Check the function parameters. |
| dLFF | [Dynam ic load fault] | - Abnormal load variation. | - Check that the load is not blocked by an obstacle. <br> - Removal of a run command causes a reset. |
| FbE | [FB fault] | - Function blocks error. | - See [FB Fault] (FbFt) for more details. |
| HCF | [Cards pairing] | - The [CARDS PAIRING] (PPI-) function page 269 has been configured and a drive card has been changed. | - In the event of a card error, reinsert the original card. <br> - Confirm the configuration by enteringthe [Pairing password] (PPI) if the card was changed deliberately. |
| PHF | [Input phase loss] | - Drive incorrectly supplied or a fuse blown. <br> - One phase missing. <br> - 3-phase ER24 used on a single-phase supply mains. <br> - Unbalanced load. <br> This protection only operates w ith the drive on load. | - Check the pow er connection and thefuses. <br> - Use a 3-phase supply mains. <br> - Disable the detected fault by [Input phase loss] (IPL) = [ No ] ( nO ) page 86. |
| USF | [Undervoltage] | - Supply mains too low . <br> - Transient voltage dip. | - Check the voltage and the parameters of [UNDERV OLTAGE MGT] (USb-), page 259. |

## 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 detected fault can be cleared by pressing the ENT key twice, which causes the factory settings to be restored (see page 81) for the parameter groups affected by the card. These are as follows:
Card replaced by a card of the same type

- Communication cards : only the parameters that are specific to com munication cards


## Control block changed

When a control block is replaced by a control block configured on a drive with a different rating, the drive locks in [Incorrect config.] (CFF) fault mode on power-up. If the control block has been deliberately changed, the detected fault can be cleared by pressing the ENT key twice, which causes all the factory settings to be restored.

Fault detection codes displayed on the remote display terminal

| Code | Name | Description |
| :---: | :---: | :---: |
| Inlt | [Initialization in progress] | The microcontroller is initializing. Search underw ay for communication configuration. |
| COM. E <br> (1) | [Communicationerror] | Time out detected fault ( 50 ms ). <br> This message is displayed after 20 attempts at communication. |
| A-17 <br> (1) | [Alarm button] | A key has been held dow $n$ for more than 10 seconds. The keypad is disconnected. <br> The keypad w akes up when a key is pressed. |
| CLr <br> (1) | [Confirmation of detected fault reset] | This is displayed $w$ hen the STOP key is pressed once if the active command channel is the remote display terminal. |
| dEU.E <br> (1) | [Drive disparity] | The drive brand does not match that of the remote display terminal. |
| rOM.E <br> (1) | [ROM anom aly] | The remote display terminal detects a ROM anomaly on the basis of checksumcalculation. |
| rAM.E <br> (1) | [RAM anom aly] | The remote display terminal detects a RAM anomaly. |
| CPU.E <br> (1) | [Other detected faults] | Other detected faults. |

(1) Flashing

## Annex

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Index of Parameter Codes
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The following table represents the param eter codes:

| Code |  |  |  |  |  |  |  |  |  |  |  |  |  |  | CUSTOMER SETTING |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
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| Code |  |  |  |  |  |  |  |  |  |  |  |  |  |  | CUSTOMER SETTING |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
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| CCS |  |  |  |  |  |  |  |  | 155 |  |  |  |  |  |  |
| Cd1 |  |  |  |  |  |  |  |  | $\underline{155}$ |  |  |  |  |  |  |
| Cd 2 |  |  |  |  |  |  |  |  | $\underline{155}$ |  |  |  |  |  |  |
| CFG |  |  |  | 82 | 85 |  |  |  |  |  |  |  |  |  |  |
| CFPS |  | 62 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CHA1 |  |  |  |  |  |  |  |  |  |  | 230 |  |  |  |  |
| CHA2 |  |  |  |  |  |  |  |  |  |  | 230 |  |  |  |  |


| Code |  |  |  |  |  |  |  |  |  |  |  |  |  |  | CUSTOMER SETTING |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CHCF |  |  |  |  |  |  |  |  | 154 |  |  |  |  |  |  |
| CHM |  |  |  |  |  |  |  |  |  |  | $\underline{235}$ |  |  |  |  |
| CL2 |  |  |  |  |  | 95 |  |  |  |  | $\underline{218}$ |  |  |  |  |
| CLI |  |  |  |  |  | $\underline{94}$ | 119 |  |  |  | $\underline{218}$ |  |  |  |  |
| CLL |  |  |  |  |  |  |  |  |  |  |  | 261 |  |  |  |
| CLO |  |  |  |  |  |  |  |  |  |  | 205 |  |  |  |  |
| CLS |  |  |  |  |  |  |  |  |  |  | $\underline{228}$ |  |  |  |  |
| CMdC |  | 56 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| CnF1 |  |  |  |  |  |  |  |  |  |  | $\underline{235}$ |  |  |  |  |
| CnF2 |  |  |  |  |  |  |  |  |  |  | $\underline{235}$ |  |  |  |  |
| CnFS |  | 62 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| COd |  | 75 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| COd2 |  | 75 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| COF |  |  |  |  |  |  |  |  |  |  | 205 |  |  |  |  |
| COL |  |  |  |  |  |  |  |  |  |  |  | 262 |  |  |  |
| COP |  |  |  |  |  |  |  |  | 156 |  |  |  |  |  |  |
| COr |  |  |  |  |  |  |  |  |  |  | 205 |  |  |  |  |
| COS |  |  |  |  |  |  | 107 |  |  |  |  |  |  |  |  |
| CP1 |  |  |  |  |  |  |  |  |  |  | 200 |  |  |  |  |
| CP2 |  |  |  |  |  |  |  |  |  |  | 200 |  |  |  |  |
| CrH3 |  | 53 |  |  |  |  |  | 134 |  |  |  |  |  |  |  |
| CrL3 |  | 53 |  |  |  |  |  | 134 |  |  |  |  |  |  |  |
| CrSt |  |  |  |  |  |  |  |  |  |  |  |  |  | $\underline{293}$ |  |
| CrtF |  |  |  |  |  |  | 118 |  |  |  |  |  |  |  |  |
| CSbY |  |  |  |  |  |  |  |  |  |  |  |  |  | 293 |  |
| CSt |  | 75 |  |  |  |  |  |  |  |  |  |  |  | 300 |  |
| Ctd |  |  |  |  |  | 102 |  |  |  |  |  | $\underline{252}$ |  |  |  |
| Ctt |  |  |  |  |  |  | 105 |  |  |  |  |  |  |  |  |
| CtU |  | 56 |  |  |  |  |  |  |  | 158 |  |  |  |  |  |
| dA2 |  |  |  |  |  |  |  |  |  |  | 168 |  |  |  |  |
| dA3 |  |  |  |  |  |  |  |  |  |  | 169 |  |  |  |  |
| dAF |  |  |  |  |  |  |  |  |  |  | $\underline{227}$ |  |  |  |  |
| dAL |  |  |  |  |  |  |  |  |  |  | 227 |  |  |  |  |
| dAnF |  |  |  |  |  |  |  | 137 |  |  |  | 263 |  |  |  |
| dAr |  |  |  |  |  |  |  |  |  |  | 227 |  |  |  |  |
| dAS |  |  |  |  |  |  |  |  |  |  | $\underline{223}$ |  |  |  |  |
| dbS |  |  |  |  |  |  |  |  |  |  | $\underline{223}$ |  |  |  |  |
| dCCC |  |  |  |  |  |  |  |  |  |  | 245 |  |  |  |  |
| dCCM |  |  |  |  |  |  |  |  |  |  | $\underline{245}$ |  |  |  |  |
| dCC1 |  | 66 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| dCC2 |  | 67 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| dCC3 |  | 67 |  |  |  |  |  |  |  |  |  |  |  |  |  |


| Code |  |  |  |  |  |  |  |  |  |  |  |  |  |  | CUSTOM ER SETTING |
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|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| dCC4 |  | 67 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| dCC5 |  | 67 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| dCC6 |  | 67 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| dCC7 |  | 67 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| dCC8 |  | 67 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| dCF |  |  |  |  |  | 93 |  |  |  |  | 173 | $\underline{272}$ |  |  |  |
| dCI |  |  |  |  |  |  |  |  |  |  | 174 |  |  |  |  |
| dE2 |  |  |  |  |  | 89 |  |  |  |  | $\begin{aligned} & \frac{171}{187} \\ & \hline \end{aligned}$ |  |  |  |  |
| dEC |  |  |  |  | 87 | 89 |  |  |  |  | 170 |  |  |  |  |
| dLb |  |  |  |  |  |  |  |  |  |  |  | $\underline{267}$ |  |  |  |
| d L ${ }^{\text {d }}$ |  |  |  |  |  |  |  |  |  |  |  | $\underline{267}$ |  |  |  |
| d Llr |  | 75 |  |  |  |  |  |  |  |  |  |  |  | 300 |  |
| dO1 |  |  |  |  |  |  |  | 141 |  |  |  |  |  |  |  |
| dO1d |  |  |  |  |  |  |  | 141 |  |  |  |  |  |  |  |
| dO1H |  |  |  |  |  |  |  | 141 |  |  |  |  |  |  |  |
| dO1S |  |  |  |  |  |  |  | 141 |  |  |  |  |  |  |  |
| dP1 |  | 64 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| dP2 |  | 67 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| dP3 |  | 67 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| dP4 |  | $\underline{67}$ |  |  |  |  |  |  |  |  |  |  |  |  |  |
| dP5 |  | 67 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| $\mathrm{dP}_{\text {a }}$ |  | 67 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| dP7 |  | 67 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| dP8 |  | 67 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| drC1 |  | 66 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| drC2 |  | 66 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| drC3 |  | 66 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| drC4 |  | 66 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| drC5 |  | 66 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| drCa |  | 66 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| drC7 |  | 66 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| drC8 |  | 66 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| dSF |  |  |  |  |  |  |  |  |  |  | $\underline{228}$ |  |  |  |  |
| dSII |  |  |  |  |  |  |  |  |  |  | 187 |  |  |  |  |
| dSP |  |  |  |  |  |  |  |  |  |  | 187 |  |  |  |  |
| dtF |  |  |  |  |  |  |  |  |  |  | $\underline{243}$ |  |  |  |  |
| EbO |  |  |  |  |  |  |  |  |  |  | $\underline{242}$ |  |  |  |  |
| EPL |  |  |  |  |  |  |  |  |  |  |  | $\underline{259}$ |  |  |  |
| EnU |  |  |  |  |  |  |  | $\underline{135}$ |  |  |  |  |  |  |  |
| EnS |  |  |  |  |  |  |  | $\underline{135}$ |  |  |  |  |  |  |  |
| ErCO |  |  |  |  |  |  |  |  |  |  |  |  | $\underline{277}$ |  |  |
| EtF |  |  |  |  |  |  |  |  |  |  |  | $\underline{258}$ |  |  |  |


| Code |  |  |  |  |  |  |  |  |  |  |  |  |  |  | CUSTOMER SETTING |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| F1 |  |  |  |  |  |  | 118 |  |  |  |  |  |  |  |  |
| F2 |  |  |  |  |  |  | 118 |  |  |  |  |  |  |  |  |
| F2d |  |  |  |  |  |  | 102 |  |  |  |  |  |  |  |  |
| F3 |  |  |  |  |  |  | 119 |  |  |  |  |  |  |  |  |
| F4 |  |  |  |  |  |  | 119 |  |  |  |  |  |  |  |  |
| F5 |  |  |  |  |  |  | 119 |  |  |  |  |  |  |  |  |
| FAb |  |  |  |  |  |  | $\underline{120}$ |  |  |  |  |  |  |  |  |
| FAd1 |  |  |  |  |  |  |  |  |  |  |  |  |  | $\underline{286}$ |  |
| FAd2 |  |  |  |  |  |  |  |  |  |  |  |  |  | 286 |  |
| FAd3 |  |  |  |  |  |  |  |  |  |  |  |  |  | $\underline{286}$ |  |
| FAd4 |  |  |  |  |  |  |  |  |  |  |  |  |  | $\underline{286}$ |  |
| FAnF |  |  |  |  |  |  |  | $\underline{136}$ |  |  |  | 263 |  |  |  |
| FbCd |  |  |  |  |  |  |  |  |  | 158 |  |  |  |  |  |
| FbdF |  |  |  |  |  |  |  |  |  | 159 |  |  |  |  |  |
| FbFt |  | 55 |  |  |  |  |  |  |  | 158 |  |  |  |  |  |
| FbrM |  |  |  |  |  |  |  |  |  | 159 |  |  |  |  |  |
| FbSN |  |  |  |  |  |  |  |  |  | 159 |  |  |  |  |  |
| FbSt |  | 55 |  |  |  |  |  |  |  | $\underline{158}$ |  |  |  |  |  |
| FCS1 |  |  | 81 |  |  |  |  |  |  |  |  |  |  |  |  |
| Fdt |  |  |  |  |  |  |  |  |  |  |  | 266 |  |  |  |
| FFH |  |  |  |  |  |  | 118 |  |  |  |  |  |  |  |  |
| FFM |  |  |  |  |  | 104 |  |  |  |  |  |  |  |  |  |
| FFt |  |  |  |  |  | 102 |  |  |  |  | 173 |  |  |  |  |
| FLI |  |  |  |  |  |  |  |  |  |  | $\underline{189}$ |  |  |  |  |
| FLO |  |  |  |  |  |  |  |  |  |  |  |  | 277 |  |  |
| FLOC |  |  |  |  |  |  |  |  |  |  |  |  | 277 |  |  |
| FLOt |  |  |  |  |  |  |  |  |  |  |  |  | $\underline{277}$ |  |  |
| FLr |  |  |  |  |  |  |  |  |  |  |  | 253 |  |  |  |
| FLU |  |  |  |  |  | 95 | 109 |  |  |  | 189 |  |  |  |  |
| Fn1 |  |  |  |  |  |  |  |  | 157 |  |  |  |  |  |  |
| Fn2 |  |  |  |  |  |  |  |  | 157 |  |  |  |  |  |  |
| Fn3 |  |  |  |  |  |  |  |  | 157 |  |  |  |  |  |  |
| Fn4 |  |  |  |  |  |  |  |  | 157 |  |  |  |  |  |  |
| FPI |  |  |  |  |  |  |  |  |  |  | $\underline{212}$ |  |  |  |  |
| FqA |  |  |  |  |  |  |  |  |  |  |  | 266 |  |  |  |
| FqC |  |  |  |  |  |  |  |  |  |  |  | $\underline{266}$ |  |  |  |
| FqF |  |  |  |  |  |  |  |  |  |  |  | $\underline{266}$ |  |  |  |
| FqL |  |  |  |  |  | 102 |  |  |  |  |  | $\underline{253}$ |  |  |  |
| FqS |  | 50 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Fqt |  |  |  |  |  |  |  |  |  |  |  | $\underline{266}$ |  |  |  |
| Fr1 |  |  |  |  |  |  |  |  | 154 |  |  |  |  |  |  |
| Fr1b |  |  |  |  |  |  |  |  |  |  | 167 |  |  |  |  |


| Code |  |  |  |  |  |  |  |  |  |  |  |  |  |  | CUSTOM ER SETTING |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Fr2 |  |  |  |  |  |  |  |  | 155 |  |  |  |  |  |  |
| FrH | 50 | $\begin{aligned} & \frac{50}{56} \\ & \hline \end{aligned}$ |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Frl |  |  |  |  |  |  | 116 |  |  |  |  |  |  |  |  |
| FrS |  |  |  |  | 86 |  | 107 |  |  |  |  |  |  |  |  |
| FrSS |  |  |  |  |  |  | 116 |  |  |  |  |  |  |  |  |
| Frt |  |  |  |  |  |  |  |  |  |  | 171 |  |  |  |  |
| FSt |  |  |  |  |  |  |  |  |  |  | 173 |  |  |  |  |
| Ftd |  |  |  |  |  | 102 |  |  |  |  |  | $\underline{253}$ |  |  |  |
| FtO |  |  |  |  |  | 103 |  |  |  |  |  | 272 |  |  |  |
| FtU |  |  |  |  |  | 103 |  |  |  |  |  | $\underline{271}$ |  |  |  |
| FtY |  |  | 81 |  |  |  |  |  |  |  |  |  |  |  |  |
| GFS |  |  | 81 |  |  |  |  |  |  |  |  |  |  |  |  |
| GSP |  |  |  |  |  |  |  |  |  |  |  |  |  | $\underline{289}$ |  |
| HF1 |  |  |  |  |  |  | 116 |  |  |  |  |  |  |  |  |
| H1r |  |  |  |  |  |  | 116 |  |  |  |  |  |  |  |  |
| HrFC |  |  |  |  |  |  |  |  |  |  |  | $\underline{252}$ |  |  |  |
| HSO |  |  |  |  |  |  |  |  |  |  | 205 |  |  |  |  |
| HSP |  |  |  |  | 87 | 89 |  |  |  |  | $\underline{244}$ |  |  |  |  |
| HSP2 |  |  |  |  |  | $\underline{90}$ |  |  |  |  | $\underline{244}$ |  |  |  |  |
| HSP3 |  |  |  |  |  | $\underline{90}$ |  |  |  |  | $\underline{244}$ |  |  |  |  |
| HSP4 |  |  |  |  |  | $\underline{90}$ |  |  |  |  | $\underline{244}$ |  |  |  |  |
| 12 tA |  |  |  |  |  |  |  |  |  |  | $\underline{219}$ |  |  |  |  |
| 12tM |  | 51 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 12t1 |  |  |  |  |  |  |  |  |  |  | 219 |  |  |  |  |
| 12tt |  |  |  |  |  |  |  |  |  |  | $\underline{219}$ |  |  |  |  |
| $1 \mathrm{AO1}$ |  |  |  |  |  |  |  |  |  | 160 |  |  |  |  |  |
| 1 A02 |  |  |  |  |  |  |  |  |  | 160 |  |  |  |  |  |
| $1 \mathrm{AO3}$ |  |  |  |  |  |  |  |  |  | $\underline{160}$ |  |  |  |  |  |
| IAO4 |  |  |  |  |  |  |  |  |  | 160 |  |  |  |  |  |
| $1 \mathrm{AO5}$ |  |  |  |  |  |  |  |  |  | 160 |  |  |  |  |  |
| 1 AO |  |  |  |  |  |  |  |  |  | 160 |  |  |  |  |  |
| 1 1407 |  |  |  |  |  |  |  |  |  | 160 |  |  |  |  |  |
| 1408 |  |  |  |  |  |  |  |  |  | 160 |  |  |  |  |  |
| 1 IA09 |  |  |  |  |  |  |  |  |  | 160 |  |  |  |  |  |
| IA1O |  |  |  |  |  |  |  |  |  | 160 |  |  |  |  |  |
| IAd1 |  |  |  |  |  |  |  |  |  |  |  |  |  | $\underline{286}$ |  |
| lAd2 |  |  |  |  |  |  |  |  |  |  |  |  |  | $\underline{286}$ |  |
| IAd3 |  |  |  |  |  |  |  |  |  |  |  |  |  | $\underline{286}$ |  |
| IAd4 |  |  |  |  |  |  |  |  |  |  |  |  |  | $\underline{286}$ |  |
| 1 ll r |  |  |  |  |  | 101 |  |  |  |  | $\underline{194}$ |  |  |  |  |
| llbrA |  |  |  |  |  |  |  |  |  |  | $\underline{200}$ |  |  |  |  |
| IdA |  |  |  |  |  |  | 111 |  |  |  |  |  |  |  |  |


| Code |  |  |  |  |  |  |  |  |  |  |  |  |  |  | CUSTOMER SETTING |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| IdC |  |  |  |  |  | $\underline{93}$ |  |  |  |  | 174 | $\underline{273}$ |  |  |  |
| IdC2 |  |  |  |  |  | 93 |  |  |  |  | 175 | $\underline{273}$ |  |  |  |
| I L O1 |  |  |  |  |  |  |  |  |  | 159 |  |  |  |  |  |
| $1 \mathrm{LO2}$ |  |  |  |  |  |  |  |  |  | 159 |  |  |  |  |  |
| I L03 |  |  |  |  |  |  |  |  |  | 159 |  |  |  |  |  |
| I LO4 |  |  |  |  |  |  |  |  |  | 159 |  |  |  |  |  |
| 1L05 |  |  |  |  |  |  |  |  |  | 159 |  |  |  |  |  |
| ILOC |  |  |  |  |  |  |  |  |  | 159 |  |  |  |  |  |
| 1 L07 |  |  |  |  |  |  |  |  |  | 159 |  |  |  |  |  |
| $1 \mathrm{LO8}$ |  |  |  |  |  |  |  |  |  | 159 |  |  |  |  |  |
| 1 L 09 |  |  |  |  |  |  |  |  |  | 159 |  |  |  |  |  |
| 1 ا 10 |  |  |  |  |  |  |  |  |  | 159 |  |  |  |  |  |
| 1 L r |  |  |  |  |  |  | 116 |  |  |  |  |  |  |  |  |
| $\mathrm{lnl\mid}$ |  |  |  |  |  |  |  |  |  |  |  | 261 |  |  |  |
| 1 nr |  |  |  |  |  | 89 |  |  |  |  | 170 |  |  |  |  |
| IntP |  |  |  |  |  |  |  |  |  |  | $\underline{216}$ |  |  |  |  |
| IPL |  |  |  |  | 86 |  |  |  |  |  | 245 | 256 |  |  |  |
| 1 ral |  |  |  |  |  | 101 |  |  |  |  | 194 |  |  |  |  |
| Itt |  |  |  |  | 87 | $\underline{90}$ |  |  |  |  |  |  |  |  |  |
| JdC |  |  |  |  |  | 101 |  |  |  |  | 195 |  |  |  |  |
| JF2 |  |  |  |  |  | 102 |  |  |  |  | 183 |  |  |  |  |
| JF3 |  |  |  |  |  | 103 |  |  |  |  | 183 |  |  |  |  |
| JFH |  |  |  |  |  | 103 |  |  |  |  | 183 |  |  |  |  |
| JGF |  |  |  |  |  | $\underline{95}$ |  |  |  |  | 178 |  |  |  |  |
| JGt |  |  |  |  |  | $\underline{96}$ |  |  |  |  | 179 |  |  |  |  |
| JOG |  |  |  |  |  |  |  |  |  |  | 178 |  |  |  |  |
| JPF |  |  |  |  |  | 102 |  |  |  |  | 183 |  |  |  |  |
| L1A |  | 51 |  |  |  |  |  | 127 |  |  |  |  |  |  |  |
| L1d |  |  |  |  |  |  |  | $\underline{128}$ |  |  |  |  |  |  |  |
| L2A |  | 51 |  |  |  |  |  | 128 |  |  |  |  |  |  |  |
| L2d |  |  |  |  |  |  |  | $\underline{128}$ |  |  |  |  |  |  |  |
| L3A |  | 51 |  |  |  |  |  | 127 |  |  |  |  |  |  |  |
| L3d |  |  |  |  |  |  |  | 128 |  |  |  |  |  |  |  |
| L4A |  | 51 |  |  |  |  |  | 128 |  |  |  |  |  |  |  |
| L4d |  |  |  |  |  |  |  | 128 |  |  |  |  |  |  |  |
| L5A |  | 51 |  |  |  |  |  | 127 |  |  |  |  |  |  |  |
| L5d |  |  |  |  |  |  |  | $\underline{128}$ |  |  |  |  |  |  |  |
| L A |  | 51 |  |  |  |  |  | 128 |  |  |  |  |  |  |  |
| L囫d |  |  |  |  |  |  |  | $\underline{128}$ |  |  |  |  |  |  |  |
| LA01 |  |  |  |  |  |  |  |  |  | 160 |  |  |  |  |  |
| LA02 |  |  |  |  |  |  |  |  |  | 160 |  |  |  |  |  |
| LA03 |  |  |  |  |  |  |  |  |  | 160 |  |  |  |  |  |


| Code |  |  |  |  |  |  |  |  |  |  |  |  |  |  | CUSTOMER SETTING |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| LA04 |  |  |  |  |  |  |  |  |  | 160 |  |  |  |  |  |
| LA05 |  |  |  |  |  |  |  |  |  | 160 |  |  |  |  |  |
| LAO圆 |  |  |  |  |  |  |  |  |  | 160 |  |  |  |  |  |
| LA07 |  |  |  |  |  |  |  |  |  | 160 |  |  |  |  |  |
| LA08 |  |  |  |  |  |  |  |  |  | 160 |  |  |  |  |  |
| LA1A |  | 51 |  |  |  |  |  | 128 |  |  |  |  |  |  |  |
| LA1d |  |  |  |  |  |  |  | 128 |  |  |  |  |  |  |  |
| LA2A |  | 51 |  |  |  |  |  | 128 |  |  |  |  |  |  |  |
| LA2d |  |  |  |  |  |  |  | 128 |  |  |  |  |  |  |  |
| LAnF |  |  |  |  |  |  |  | 136 |  |  |  | 263 |  |  |  |
| LAC |  |  |  |  |  |  |  |  |  |  |  |  |  | $\underline{280}$ |  |
| LbA |  |  |  |  |  |  | 122 |  |  |  |  |  |  |  |  |
| LbC |  |  |  |  |  | 103 | 122 |  |  |  |  |  |  |  |  |
| LbC1 |  |  |  |  |  |  | 124 |  |  |  |  |  |  |  |  |
| LbC2 |  |  |  |  |  |  | 124 |  |  |  |  |  |  |  |  |
| LbC3 |  |  |  |  |  |  | 124 |  |  |  |  |  |  |  |  |
| LbF |  |  |  |  |  |  | 124 |  |  |  |  |  |  |  |  |
| LC2 |  |  |  |  |  |  |  |  |  |  | $\underline{218}$ |  |  |  |  |
| LCr |  | 50 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| LCt |  |  |  |  |  |  |  |  |  |  | 221 |  |  |  |  |
| LdS |  |  |  |  |  |  | 116 |  |  |  |  |  |  |  |  |
| LES |  |  |  |  |  |  |  |  |  |  | 221 |  |  |  |  |
| LEt |  |  |  |  |  |  |  |  |  |  |  | $\underline{258}$ |  |  |  |
| LFA |  |  |  |  |  |  | 111 |  |  |  |  |  |  |  |  |
| LFF |  |  |  |  |  |  |  |  |  |  |  | $\underline{272}$ |  |  |  |
| LFL3 |  |  |  |  |  |  |  |  |  |  |  | $\underline{260}$ |  |  |  |
| LFr | 46 | 50 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| LFr1 |  | 59 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| LFr2 |  | 59 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| LFr3 |  | 59 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| LIS1 |  | 51 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| LIS2 |  | 51 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| LLC |  |  |  |  |  |  |  |  |  |  | $\underline{21}$ |  |  |  |  |
| LnG |  |  |  |  |  |  |  |  |  |  |  |  |  | $\underline{282}$ |  |
| LO1 |  |  |  |  |  |  |  |  | 139 |  |  |  |  |  |  |
| LO1d |  |  |  |  |  |  |  |  | $\underline{139}$ |  |  |  |  |  |  |
| LO1H |  |  |  |  |  |  |  |  | 140 |  |  |  |  |  |  |
| LO1S |  |  |  |  |  |  |  |  | 140 |  |  |  |  |  |  |
| LOC |  |  |  |  |  | 103 |  |  |  |  |  | $\underline{272}$ |  |  |  |
| LP1 |  |  |  |  |  |  |  |  |  |  | 200 |  |  |  |  |
| LP2 |  |  |  |  |  |  |  |  |  |  | $\underline{200}$ |  |  |  |  |
| LqS |  |  |  |  |  |  | 116 |  |  |  |  |  |  |  |  |


| Code |  |  |  |  |  |  |  |  |  |  |  |  |  |  | CUSTOMER SETTING |
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|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| LSP |  |  |  |  | 87 | 89 |  |  |  |  |  |  |  |  |  |
| LUL |  |  |  |  |  | 103 |  |  |  |  |  | $\underline{270}$ |  |  |  |
| LUn |  |  |  |  |  | 103 |  |  |  |  |  | $\underline{270}$ |  |  |  |
| M001 |  |  |  |  |  |  |  |  |  | 161 |  |  |  |  |  |
| M002 |  |  |  |  |  |  |  |  |  | 161 |  |  |  |  |  |
| M003 |  |  |  |  |  |  |  |  |  | 161 |  |  |  |  |  |
| M004 |  |  |  |  |  |  |  |  |  | 161 |  |  |  |  |  |
| M005 |  |  |  |  |  |  |  |  |  | 161 |  |  |  |  |  |
| MOO |  |  |  |  |  |  |  |  |  | 161 |  |  |  |  |  |
| M007 |  |  |  |  |  |  |  |  |  | 161 |  |  |  |  |  |
| M008 |  |  |  |  |  |  |  |  |  | 161 |  |  |  |  |  |
| M1 Ct |  | 58 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| M1EC |  | 58 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| MStP |  |  |  |  |  |  |  |  |  |  | $\underline{228}$ |  |  |  |  |
| MA2 |  |  |  |  |  |  |  |  |  |  |  | 169 |  |  |  |
| MA3 |  |  |  |  |  |  |  |  |  |  |  | 169 |  |  |  |
| MCr |  |  |  |  |  |  | 116 |  |  |  |  |  |  |  |  |
| Mdit |  |  |  |  |  |  |  |  |  |  |  |  |  | $\underline{285}$ |  |
| MFr | 46 | 50 |  |  |  | $\underline{98}$ |  |  |  |  |  |  |  |  |  |
| MMF |  | 50 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| MPC |  |  |  |  |  |  | 110 |  |  |  |  |  |  |  |  |
| MtM |  |  |  |  |  |  |  |  |  |  |  | $\underline{255}$ |  |  |  |
| nbrP |  | 61 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| nbtP |  | 61 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| nC1 |  | 58 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| nC2 |  | 58 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| nC3 |  | 58 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| nC4 |  | 58 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| nC5 |  | 58 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| nC F |  | 59 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| $\mathrm{nC7}$ |  | 59 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| nC8 |  | 59 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| nCA1 |  |  |  |  |  |  |  |  |  |  |  |  | 276 |  |  |
| nCA2 |  |  |  |  |  |  |  |  |  |  |  |  | $\underline{276}$ |  |  |
| nCA3 |  |  |  |  |  |  |  |  |  |  |  |  | 276 |  |  |
| nCA4 |  |  |  |  |  |  |  |  |  |  |  |  | $\underline{276}$ |  |  |
| nCA5 |  |  |  |  |  |  |  |  |  |  |  |  | $\underline{276}$ |  |  |
| nCAE |  |  |  |  |  |  |  |  |  |  |  |  | $\underline{276}$ |  |  |
| nCA7 |  |  |  |  |  |  |  |  |  |  |  |  | $\underline{276}$ |  |  |
| nCA8 |  |  |  |  |  |  |  |  |  |  |  |  | $\underline{276}$ |  |  |
| nCr |  |  |  |  | 86 |  | 107 |  |  |  |  |  |  |  |  |
| nCrS |  |  |  |  |  |  | 113 |  |  |  |  |  |  |  |  |


| Code |  |  |  |  |  |  |  |  |  |  |  |  |  |  | CUSTOMER SETTING |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| nLS |  |  |  |  |  |  |  |  |  |  | $\underline{228}$ |  |  |  |  |
| nM1 |  | $\underline{58}$ |  |  |  |  |  |  |  |  |  |  |  |  |  |
| nM2 |  | 58 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| nM3 |  | 58 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| nM4 |  | 58 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| nM5 |  | 58 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| $\mathrm{nM} \mathrm{m}^{2}$ |  | 58 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| nM7 |  | 58 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| nM8 |  | $\underline{58}$ |  |  |  |  |  |  |  |  |  |  |  |  |  |
| nMA1 |  |  |  |  |  |  |  |  |  |  |  |  | $\underline{275}$ |  |  |
| nMA2 |  |  |  |  |  |  |  |  |  |  |  |  | $\underline{275}$ |  |  |
| nMA3 |  |  |  |  |  |  |  |  |  |  |  |  | $\underline{275}$ |  |  |
| nMA4 |  |  |  |  |  |  |  |  |  |  |  |  | $\underline{275}$ |  |  |
| nMA5 |  |  |  |  |  |  |  |  |  |  |  |  | $\underline{275}$ |  |  |
| nMA 园 |  |  |  |  |  |  |  |  |  |  |  |  | $\underline{275}$ |  |  |
| nMA7 |  |  |  |  |  |  |  |  |  |  |  |  | 275 |  |  |
| nMA8 |  |  |  |  |  |  |  |  |  |  |  |  | $\underline{275}$ |  |  |
| nMtS |  | 61 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| nPr |  |  |  |  | 86 |  | 107 |  |  |  |  |  |  |  |  |
| nrd |  |  |  |  |  |  | 120 |  |  |  |  |  |  |  |  |
| nSP |  |  |  |  | 86 |  | 107 |  |  |  |  |  |  |  |  |
| nSPS |  |  |  |  |  |  | 113 |  |  |  |  |  |  |  |  |
| nSt |  |  |  |  |  |  |  |  |  |  | 173 |  |  |  |  |
| ntJ |  | 74 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| OCC |  |  |  |  |  |  |  |  |  |  | $\underline{223}$ |  |  |  |  |
| OdL |  |  |  |  |  |  |  |  |  |  |  | $\underline{272}$ |  |  |  |
| Odt |  |  |  |  |  |  |  |  |  |  |  | $\underline{256}$ |  |  |  |
| OHL |  |  |  |  |  |  |  |  |  |  |  | $\underline{257}$ |  |  |  |
| OLL |  |  |  |  |  |  |  |  |  |  |  | $\underline{255}$ |  |  |  |
| OPL |  |  |  |  |  |  |  |  |  |  |  | 256 |  |  |  |
| OPr |  | 50 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| OSP |  |  |  |  |  |  |  |  |  |  | 205 |  |  |  |  |
| Otr |  | 50 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| PAH |  |  |  |  |  | $\underline{99}$ |  |  |  |  | $\underline{212}$ |  |  |  |  |
| PAL |  |  |  |  |  | 99 |  |  |  |  | 211 |  |  |  |  |
| PAS |  |  |  |  |  |  |  |  |  |  | $\underline{228}$ |  |  |  |  |
| PAU |  |  |  |  |  |  |  |  |  |  | $\underline{212}$ |  |  |  |  |
| PCd |  |  |  |  |  |  |  |  |  |  |  |  |  | $\underline{292}$ |  |
| PEr |  |  |  |  |  | $\underline{99}$ |  |  |  |  | $\underline{212}$ |  |  |  |  |
| PES |  |  |  |  |  |  |  |  |  |  | 200 |  |  |  |  |
| PFI |  | 54 |  |  |  |  |  | 128 |  |  |  |  |  |  |  |
| PFr |  | 54 |  |  |  |  |  | 128 |  |  |  |  |  |  |  |


| Code |  |  |  |  |  |  |  |  |  |  |  |  |  |  | CUSTOMER SETTING |
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|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| PG1 |  |  |  |  |  |  |  | 135 |  |  |  |  |  |  |  |
| PHS |  |  |  |  |  |  | 116 |  |  |  |  |  |  |  |  |
| PIA |  | 54 |  |  |  |  |  | 128 |  |  |  |  |  |  |  |
| PIC |  |  |  |  |  |  |  |  |  |  | 211 |  |  |  |  |
| PIF |  |  |  |  |  |  |  |  |  |  | 210 |  |  |  |  |
| PIF1 |  |  |  |  |  |  |  |  |  |  | $\underline{210}$ |  |  |  |  |
| PIF2 |  |  |  |  |  |  |  |  |  |  | 210 |  |  |  |  |
| P\\|I |  |  |  |  |  |  |  |  |  |  | 210 |  |  |  |  |
| PIL |  | 54 |  |  |  |  |  | $\underline{128}$ |  |  |  |  |  |  |  |
| PIM |  |  |  |  |  |  |  |  |  |  | 213 |  |  |  |  |
| PIP1 |  |  |  |  |  |  |  |  |  |  | $\underline{210}$ |  |  |  |  |
| PIP2 |  |  |  |  |  |  |  |  |  |  | 210 |  |  |  |  |
| PIS |  |  |  |  |  |  |  |  |  |  | $\underline{212}$ |  |  |  |  |
| POH |  |  |  |  |  | $\underline{99}$ |  |  |  |  | $\underline{211}$ |  |  |  |  |
| POL |  |  |  |  |  | $\underline{99}$ |  |  |  |  | $\underline{211}$ |  |  |  |  |
| PPI |  |  |  |  |  |  |  |  |  |  |  | $\underline{269}$ |  |  |  |
| PPnS |  |  |  |  |  |  | 113 |  |  |  |  |  |  |  |  |
| Pr2 |  |  |  |  |  |  |  |  |  |  | 214 |  |  |  |  |
| Pr4 |  |  |  |  |  |  |  |  |  |  | 214 |  |  |  |  |
| prst |  |  |  |  |  |  |  |  |  |  | $\underline{228}$ |  |  |  |  |
| PrP |  |  |  |  |  | $\underline{99}$ |  |  |  |  | $\underline{211}$ |  |  |  |  |
| PS1迷 |  |  |  |  |  |  |  |  |  |  | 181 |  |  |  |  |
| PS2 |  |  |  |  |  |  |  |  |  |  | 181 |  |  |  |  |
| PS4 |  |  |  |  |  |  |  |  |  |  | 181 |  |  |  |  |
| PS8 |  |  |  |  |  |  |  |  |  |  | 181 |  |  |  |  |
| PSir |  |  |  |  |  | $\underline{99}$ |  |  |  |  | $\underline{212}$ |  |  |  |  |
| PSt |  |  |  |  |  |  |  |  | 154 |  |  |  |  |  |  |
| PtCL |  |  |  |  |  |  |  |  |  |  |  | $\underline{250}$ |  |  |  |
| PtH |  | 62 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| PUIS |  |  |  |  |  |  |  |  |  |  |  |  |  | 292 |  |
| qSH |  |  |  |  |  | 102 |  |  |  |  | $\underline{242}$ |  |  |  |  |
| qSL |  |  |  |  |  | 102 |  |  |  |  | $\underline{242}$ |  |  |  |  |
| r1 |  |  |  |  |  |  |  | 138 |  |  |  |  |  |  |  |
| r1d |  |  |  |  |  |  |  | 138 |  |  |  |  |  |  |  |
| r1F |  |  |  |  |  |  |  | 139 |  |  |  |  |  |  |  |
| r2F |  |  |  |  |  |  |  | 139 |  |  |  |  |  |  |  |
| r1H |  |  |  |  |  |  |  | $\underline{139}$ |  |  |  |  |  |  |  |
| r1s |  |  |  |  |  |  |  | 138 |  |  |  |  |  |  |  |
| r2 |  |  |  |  |  |  |  | 139 |  |  |  |  |  |  |  |
| r2d |  |  |  |  |  |  |  | 139 |  |  |  |  |  |  |  |
| r2H |  |  |  |  |  |  |  | 139 |  |  |  |  |  |  |  |
| r2S |  |  |  |  |  |  |  | 139 |  |  |  |  |  |  |  |


| Code |  |  |  |  |  |  |  |  |  |  |  |  |  |  | CUSTOMER SETTING |
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|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| rCA |  |  |  |  |  |  |  |  |  |  | $\underline{223}$ |  |  |  |  |
| rCb |  |  |  |  |  |  |  |  |  |  | 167 |  |  |  |  |
| rodAE |  |  |  |  |  |  | 117 |  |  |  |  |  |  |  |  |
| rdG |  |  |  |  |  | $\underline{99}$ |  |  |  |  | 211 |  |  |  |  |
| rEC1 |  | 61 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| rFC |  |  |  |  |  |  |  |  | 155 |  |  |  |  |  |  |
| rFCC |  | 56 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| rFLt |  | 74 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| rFr |  | 50 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| rIG |  |  |  |  |  | $\underline{99}$ |  |  |  |  | 211 |  |  |  |  |
| rln |  |  |  |  |  |  |  |  | 154 |  |  |  |  |  |  |
| rMUd |  |  |  |  |  | 103 |  |  |  |  |  | $\underline{270}$ |  |  |  |
| rP |  |  |  |  |  |  |  |  |  |  |  | $\underline{251}$ |  |  |  |
| rP11 |  | 59 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| rP12 |  | 59 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| rP13 |  | 59 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| rP14 |  | 59 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| rP2 |  |  |  |  |  | 99 |  |  |  |  | 214 |  |  |  |  |
| rP21 |  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| rP22 |  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| rP23 |  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| rP24 |  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| rP3 |  |  |  |  |  | 100 |  |  |  |  | 214 |  |  |  |  |
| rP31 |  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| rP32 |  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| rP33 |  | $\underline{60}$ |  |  |  |  |  |  |  |  |  |  |  |  |  |
| rP34 |  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| rP4 |  |  |  |  |  | 100 |  |  |  |  | 214 |  |  |  |  |
| rPA |  |  |  |  |  |  |  |  |  |  |  | 251 |  |  |  |
| rPC | 46 | 62 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| rPE |  | 62 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| rPF |  | 62 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| rPG |  |  |  |  |  | 99 |  |  |  |  | 211 |  |  |  |  |
|  | 46 | $\underline{62}$ |  |  |  |  |  |  |  |  | 211 |  |  |  |  |
| rPO |  | 62 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| rPr |  | 62 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| rPS |  |  |  |  |  |  |  |  |  |  | 171 |  |  |  |  |
| $r P t$ |  |  |  |  |  |  |  |  |  |  | 170 |  |  |  |  |
| rrs |  |  |  |  |  |  |  | 126 |  |  |  |  |  |  |  |
| rSA |  |  |  |  |  |  | 111 |  |  |  |  |  |  |  |  |
| rSAS |  |  |  |  |  |  | 116 |  |  |  |  |  |  |  |  |
| rSd |  |  |  |  |  |  |  |  |  |  | $\underline{205}$ |  |  |  |  |


| Code |  |  |  |  |  |  |  |  |  |  |  |  |  |  | CUSTOMER SETTING |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  |  |  |  | $\begin{array}{\|l}  \\ \hline \end{array}$ |  |  | ［FAULT MANAGEMENT］ |  |  |  |
| rSF |  |  |  |  |  |  |  |  |  |  |  | $\underline{251}$ |  |  |  |
| rSL |  |  |  |  |  |  |  |  |  |  | 213 |  |  |  |  |
| rStL |  |  |  |  |  |  |  |  |  |  | 205 |  |  |  |  |
| reth |  | 62 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| retr |  |  |  |  |  |  |  |  |  |  | $\underline{243}$ |  |  |  |  |
| rUn |  |  |  |  |  |  |  | $\underline{126}$ |  |  |  |  |  |  |  |
| S101 |  |  |  |  |  |  |  |  |  |  | $\underline{230}$ |  |  |  |  |
| S102 |  |  |  |  |  |  |  |  |  |  | $\underline{230}$ |  |  |  |  |
| S103 |  |  |  |  |  |  |  |  |  |  | $\underline{230}$ |  |  |  |  |
| S104 |  |  |  |  |  |  |  |  |  |  | $\underline{230}$ |  |  |  |  |
| S105 |  |  |  |  |  |  |  |  |  |  | $\underline{230}$ |  |  |  |  |
| S10同 |  |  |  |  |  |  |  |  |  |  | $\underline{230}$ |  |  |  |  |
| S107 |  |  |  |  |  |  |  |  |  |  | $\underline{230}$ |  |  |  |  |
| S108 |  |  |  |  |  |  |  |  |  |  | $\underline{230}$ |  |  |  |  |
| S109 |  |  |  |  |  |  |  |  |  |  | $\underline{230}$ |  |  |  |  |
| S110 |  |  |  |  |  |  |  |  |  |  | $\underline{230}$ |  |  |  |  |
| S111 |  |  |  |  |  |  |  |  |  |  | $\underline{230}$ |  |  |  |  |
| S112 |  |  |  |  |  |  |  |  |  |  | $\underline{230}$ |  |  |  |  |
| S113 |  |  |  |  |  |  |  |  |  |  | $\underline{230}$ |  |  |  |  |
| S114 |  |  |  |  |  |  |  |  |  |  | $\underline{230}$ |  |  |  |  |
| S115 |  |  |  |  |  |  |  |  |  |  | $\underline{230}$ |  |  |  |  |
| S201 |  |  |  |  |  |  |  |  |  |  | $\underline{230}$ |  |  |  |  |
| S202 |  |  |  |  |  |  |  |  |  |  | $\underline{230}$ |  |  |  |  |
| 5203 |  |  |  |  |  |  |  |  |  |  | $\underline{230}$ |  |  |  |  |
| S204 |  |  |  |  |  |  |  |  |  |  | $\underline{230}$ |  |  |  |  |
| 5205 |  |  |  |  |  |  |  |  |  |  | $\underline{230}$ |  |  |  |  |
| S20同 |  |  |  |  |  |  |  |  |  |  | 230 |  |  |  |  |
| 5207 |  |  |  |  |  |  |  |  |  |  | $\underline{230}$ |  |  |  |  |
| S208 |  |  |  |  |  |  |  |  |  |  | $\underline{230}$ |  |  |  |  |
| S209 |  |  |  |  |  |  |  |  |  |  | $\underline{230}$ |  |  |  |  |
| S210 |  |  |  |  |  |  |  |  |  |  | $\underline{230}$ |  |  |  |  |
| S211 |  |  |  |  |  |  |  |  |  |  | $\underline{230}$ |  |  |  |  |
| 5212 |  |  |  |  |  |  |  |  |  |  | $\underline{230}$ |  |  |  |  |
| 5213 |  |  |  |  |  |  |  |  |  |  | $\underline{230}$ |  |  |  |  |
| S214 |  |  |  |  |  |  |  |  |  |  | $\underline{230}$ |  |  |  |  |
| S215 |  |  |  |  |  |  |  |  |  |  | $\underline{230}$ |  |  |  |  |
| S301 |  |  |  |  |  |  |  |  |  |  | 231 |  |  |  |  |
| S302 |  |  |  |  |  |  |  |  |  |  | 231 |  |  |  |  |
| 5303 |  |  |  |  |  |  |  |  |  |  | $\underline{231}$ |  |  |  |  |
| 5304 |  |  |  |  |  |  |  |  |  |  | $\underline{231}$ |  |  |  |  |
| S305 |  |  |  |  |  |  |  |  |  |  | 231 |  |  |  |  |
| S30同 |  |  |  |  |  |  |  |  |  |  | 231 |  |  |  |  |


| Code |  |  |  |  |  |  |  |  |  |  |  |  |  |  | CUSTOMER SETTING |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 5307 |  |  |  |  |  |  |  |  |  |  | $\underline{231}$ |  |  |  |  |
| 5308 |  |  |  |  |  |  |  |  |  |  | 231 |  |  |  |  |
| 5309 |  |  |  |  |  |  |  |  |  |  | $\underline{231}$ |  |  |  |  |
| 5310 |  |  |  |  |  |  |  |  |  |  | 231 |  |  |  |  |
| S311 |  |  |  |  |  |  |  |  |  |  | 231 |  |  |  |  |
| S312 |  |  |  |  |  |  |  |  |  |  | 231 |  |  |  |  |
| 5313 |  |  |  |  |  |  |  |  |  |  | 231 |  |  |  |  |
| 5314 |  |  |  |  |  |  |  |  |  |  | 231 |  |  |  |  |
| S315 |  |  |  |  |  |  |  |  |  |  | 231 |  |  |  |  |
| SA2 |  |  |  |  |  |  |  |  |  |  | 168 |  |  |  |  |
| SA3 |  |  |  |  |  |  |  |  |  |  | 168 |  |  |  |  |
| SAF1 |  | 69 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SAF2 |  | $\underline{70}$ |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SAL |  |  |  |  |  |  |  |  |  |  | 227 |  |  |  |  |
| SAr |  |  |  |  |  |  |  |  |  |  | $\underline{227}$ |  |  |  |  |
| SAt |  |  |  |  |  |  |  |  |  |  |  | 258 |  |  |  |
| SCL |  |  |  |  |  |  |  |  |  |  | 205 |  |  |  |  |
| SCL3 |  |  |  |  |  |  |  |  |  |  | 246 |  |  |  |  |
| SCSI |  |  | 81 |  |  |  |  |  |  |  |  |  |  |  |  |
| SdC1 |  |  |  |  |  | $\underline{93}$ |  |  |  |  | $\begin{aligned} & \frac{176}{195} \\ & \hline \end{aligned}$ |  |  |  |  |
| SdC2 |  |  |  |  |  | 94 |  |  |  |  | 177 |  |  |  |  |
| Sdd |  |  |  |  |  |  |  |  |  |  |  | 263 |  |  |  |
| SdS |  |  |  |  |  | 104 |  |  |  |  |  |  |  |  |  |
| SFOO |  | 70 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SFO1 |  | 70 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SF02 |  | 71 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SF03 |  | 71 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SFO4 |  | 71 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SFO5 |  | $\underline{72}$ |  |  |  |  |  |  |  |  |  |  |  |  |  |
| $\mathrm{SFO} \mathrm{H}^{\text {a }}$ |  | $\underline{72}$ |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SF07 |  | 72 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SF08 |  | $\underline{73}$ |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SF09 |  | 73 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SF10 |  | 73 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SF11 |  | 74 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SFC |  |  |  |  |  | 90 | 118 |  |  |  |  |  |  |  |  |
| SFd |  |  |  |  |  |  |  |  |  |  | $\underline{228}$ |  |  |  |  |
| SFFE |  | $\underline{55}$ |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SFr |  |  |  |  |  | 94 | 119 |  |  |  |  |  |  |  |  |
| SFt |  |  |  |  |  |  | 119 |  |  |  |  |  |  |  |  |
| SH2 |  |  |  |  |  |  |  |  |  |  | 244 |  |  |  |  |


| Code |  |  |  |  |  |  |  |  |  |  |  |  |  |  | CUSTOMER SETTING |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SH4 |  |  |  |  |  |  |  |  |  |  | 244 |  |  |  |  |
| SIr |  |  |  |  |  |  | 117 |  |  |  |  |  |  |  |  |
| SIt |  |  |  |  |  | 90 | 118 |  |  |  |  |  |  |  |  |
| SLL |  |  |  |  |  |  |  |  |  |  |  | 262 |  |  |  |
| SLP |  |  |  |  |  | 90 | 118 |  |  |  |  |  |  |  |  |
| SLSS |  | 54 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SMOt |  |  |  |  |  |  | 114 |  |  |  |  |  |  |  |  |
| SnC |  |  |  |  |  |  |  |  |  |  | $\underline{243}$ |  |  |  |  |
| SOP |  |  |  |  |  |  | $\underline{120}$ |  |  |  |  |  |  |  |  |
| SP10 |  |  |  |  |  | 97 |  |  |  |  | 182 |  |  |  |  |
| SP11 |  |  |  |  |  | 97 |  |  |  |  | 182 |  |  |  |  |
| SP12 |  |  |  |  |  | 97 |  |  |  |  | 182 |  |  |  |  |
| SP13 |  |  |  |  |  | 98 |  |  |  |  | 182 |  |  |  |  |
| SP14 |  |  |  |  |  | 98 |  |  |  |  | 182 |  |  |  |  |
| SP15 |  |  |  |  |  | 98 |  |  |  |  | 182 |  |  |  |  |
| SP1道 |  |  |  |  |  | 98 |  |  |  |  | 182 |  |  |  |  |
| SP2 |  |  |  |  |  | $\underline{97}$ |  |  |  |  | 181 |  |  |  |  |
| SP3 |  |  |  |  |  | 97 |  |  |  |  | 181 |  |  |  |  |
| SP4 |  |  |  |  |  | $\underline{97}$ |  |  |  |  | 181 |  |  |  |  |
| SP5 |  |  |  |  |  | 97 |  |  |  |  | 181 |  |  |  |  |
| SP司 |  |  |  |  |  | 97 |  |  |  |  | 181 |  |  |  |  |
| SP7 |  |  |  |  |  | 97 |  |  |  |  | 181 |  |  |  |  |
| SP8 |  |  |  |  |  | 97 |  |  |  |  | 182 |  |  |  |  |
| SP9 |  |  |  |  |  | 97 |  |  |  |  | 182 |  |  |  |  |
| SPb |  |  |  |  |  |  | 116 |  |  |  |  |  |  |  |  |
| SPd1 |  | 63 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SPd2 |  | 63 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SPd3 |  | 63 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SPF |  |  |  |  |  |  | 116 |  |  |  |  |  |  |  |  |
| SPG |  |  |  |  |  | 90 | 118 |  |  |  |  |  |  |  |  |
| SPGU |  |  |  |  |  | $\underline{90}$ | 118 |  |  |  |  |  |  |  |  |
| SPM |  |  |  |  |  |  |  |  |  |  | 188 |  |  |  |  |
| Sr11 |  | 64 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| $\begin{array}{r} \text { Sr12 } \\ \text { to } \\ \text { Sr18 } \end{array}$ |  | 67 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Sr21 |  | 64 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| $\begin{array}{r} \text { Sr22 } \\ \text { to } \\ \text { Sr28 } \end{array}$ |  | 67 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SrA1 |  | 64 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| $\begin{array}{r} \text { SrA2 } \\ \text { to } \\ \text { SrA8 } \end{array}$ |  | $\underline{67}$ |  |  |  |  |  |  |  |  |  |  |  |  |  |


| Code |  |  |  |  |  |  |  |  |  |  |  |  |  |  | CUSTOMER SETTING |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Std |  |  |  |  |  |  |  |  |  |  | 228 |  |  |  |  |
| StFr |  | 50 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| StM |  |  |  |  |  |  |  |  |  |  |  | $\underline{260}$ |  |  |  |
| StO |  |  |  |  |  |  |  |  |  |  |  | $\underline{264}$ |  |  |  |
| StOS |  | 54 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| StP |  |  |  |  |  |  |  |  |  |  |  | $\underline{259}$ |  |  |  |
| Str |  |  |  |  |  |  |  |  |  |  | 185 |  |  |  |  |
| Strt |  |  |  |  |  |  |  |  |  |  |  | $\underline{260}$ |  |  |  |
| Stt |  |  |  |  |  |  |  |  |  |  | $\underline{173}$ |  |  |  |  |
| StUn |  |  |  |  | 87 |  | $\frac{108}{114}$ |  |  |  |  |  |  |  |  |
| SUL |  |  |  |  |  |  | 120 |  |  |  |  |  |  |  |  |
| tA1 |  |  |  |  |  | 89 |  |  |  |  | 170 |  |  |  |  |
| tA2 |  |  |  |  |  | 89 |  |  |  |  | 171 |  |  |  |  |
| tA3 |  |  |  |  |  | 89 |  |  |  |  | 171 |  |  |  |  |
| tA4 |  |  |  |  |  | 89 |  |  |  |  | 171 |  |  |  |  |
| tAA |  |  |  |  |  |  |  |  |  |  | $\underline{216}$ |  |  |  |  |
| tAC |  | 74 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| tAC2 |  | 74 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| tAnF |  |  |  |  |  |  |  | $\underline{136}$ |  |  |  | $\underline{263}$ |  |  |  |
| tAr |  |  |  |  |  |  |  |  |  |  |  | $\underline{252}$ |  |  |  |
| tbE |  |  |  |  |  | 101 |  |  |  |  | 195 |  |  |  |  |
| tbo |  |  |  |  |  |  |  |  |  |  | $\underline{242}$ |  |  |  |  |
| tlor |  |  |  |  |  |  |  |  |  |  |  |  | $\underline{276}$ |  |  |
| tbs |  |  |  |  |  |  |  |  |  |  |  | $\underline{260}$ |  |  |  |
| tCC |  |  |  |  | 85 |  |  | 125 |  |  |  |  |  |  |  |
| tCt |  |  |  |  |  |  |  | 125 |  |  |  |  |  |  |  |
| tdC |  |  |  |  |  | $\underline{93}$ |  |  |  |  | 175 | $\underline{274}$ |  |  |  |
| tol 1 |  |  |  |  |  | $\underline{93}$ |  |  |  |  | 176 |  |  |  |  |
| tdC2 |  |  |  |  |  | $\underline{94}$ |  |  |  |  | 177 |  |  |  |  |
| tall |  |  |  |  |  | $\underline{93}$ |  |  |  |  | 174 | $\underline{273}$ |  |  |  |
| toln |  |  |  |  |  |  |  |  |  |  | $\underline{242}$ |  |  |  |  |
| tdS |  |  |  |  |  |  |  |  |  |  |  | $\underline{266}$ |  |  |  |
| tEC1 |  | 61 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| tFO |  |  |  |  |  |  |  |  |  |  |  |  | $\underline{276}$ |  |  |
| tFr |  |  |  |  | 87 |  |  | 105 |  |  |  |  |  |  |  |
| tHA |  |  |  |  |  |  |  |  |  |  |  | $\underline{\underline{257}}$ |  |  |  |
| tHd |  | 50 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| t1r |  | 50 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| tl\|t |  |  |  |  |  |  |  |  |  |  |  | $\underline{255}$ |  |  |  |
| tLA |  |  |  |  |  |  |  |  |  |  | $\underline{216}$ |  |  |  |  |
| tLC |  |  |  |  |  |  |  |  |  |  | $\underline{217}$ |  |  |  |  |


| Code |  |  |  |  |  |  |  |  |  |  |  |  |  |  | CUSTOMER SETTING |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  |  |  |  | $\overline{2}$ $\sum_{0}^{1}$ $\sum_{0}^{1} \quad$ 0. |  |  |  |  |  |  |
| tLd |  |  |  |  |  |  |  |  |  |  |  | $\underline{267}$ |  |  |  |
| tLIG |  |  |  |  |  | 101 |  |  |  |  | $\underline{216}$ |  |  |  |  |
| tLIM |  |  |  |  |  | 101 |  |  |  |  | 216 |  |  |  |  |
| tLS |  |  |  |  |  | $\underline{95}$ |  |  |  |  | $\underline{213}$ |  |  |  |  |
| tnL |  |  |  |  |  |  |  |  |  |  |  | $\underline{268}$ |  |  |  |
| tOL |  |  |  |  |  |  |  |  |  |  |  | $\underline{272}$ |  |  |  |
| tOS |  |  |  |  |  |  |  |  |  |  | 205 |  |  |  |  |
| tP11 |  | 59 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| tP12 |  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| tP13 |  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| tP14 |  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| tP21 |  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| tP22 |  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| tP23 |  | $\underline{60}$ |  |  |  |  |  |  |  |  |  |  |  |  |  |
| tP24 |  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| tP31 |  | 61 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| tP32 |  | 61 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| tP33 |  | 61 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| tP34 |  | 61 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| tqb |  |  |  |  |  |  |  |  |  |  |  | $\underline{266}$ |  |  |  |
| tqS |  |  |  |  |  |  | 113 |  |  |  |  |  |  |  |  |
| trA |  |  |  |  |  |  | 111 |  |  |  |  |  |  |  |  |
| trC |  |  |  |  |  |  |  |  |  |  | $\underline{242}$ |  |  |  |  |
| trH |  |  |  |  |  | 102 |  |  |  |  | $\underline{242}$ |  |  |  |  |
| trL |  |  |  |  |  | 102 |  |  |  |  | $\underline{242}$ |  |  |  |  |
| tSM |  |  |  |  |  |  |  |  |  |  |  | $\underline{259}$ |  |  |  |
| tSY |  |  |  |  |  |  |  |  |  |  | $\underline{243}$ |  |  |  |  |
| ttd |  |  |  |  |  | $\underline{102}$ |  |  |  |  |  | $\underline{255}$ |  |  |  |
| ttd2 |  |  |  |  |  |  |  |  |  |  |  | $\frac{255}{\underline{258}}$ |  |  |  |
| ttd3 |  |  |  |  |  |  |  |  |  |  |  | $\begin{aligned} & \underline{255} \\ & \underline{258} \end{aligned}$ |  |  |  |
| ttH |  |  |  |  |  | 102 |  |  |  |  |  | $\underline{253}$ |  |  |  |
| ttL |  |  |  |  |  | 102 |  |  |  |  |  | $\underline{253}$ |  |  |  |
| t-tO |  |  |  |  |  |  |  |  |  |  |  | $\underline{276}$ |  |  |  |
| ttr |  |  |  |  |  | 101 |  |  |  | 196 |  |  |  |  |  |
| tUL |  |  |  |  |  |  |  |  |  | $\underline{236}$ |  |  |  |  |  |
| tUn |  |  |  |  | 87 |  | $\underline{108}$ |  |  |  |  |  |  |  |  |
| tUnU |  |  |  |  |  |  | $\frac{108}{114}$ |  |  |  |  |  |  |  |  |
| tUP |  |  |  |  |  |  |  |  |  | $\underline{242}$ |  |  |  |  |  |



## Glossary

## D

## Display terminal

The displayterminal menus are shown in square brackets.
For example: [Communication]
The codes are shown in round brackets.
For example: COM-
Parameter names are dis played on the displayterminal in square brackets.
For example:[Fallback Speed]
Parameter codes are dis played in round brackets.
For example:LFF

## E

## Error

Discrepancybetween a detected (computed, measured, or signaled) value or condition and the specified or theoretically correct value or condition.

## F

## Factory setting

Factory settings when the product is shipped

## Fault

Fault is an operating state. If the monitoring functions detectan error, a transition to this operating state is triggered, depending on the error class. A "Fault reset" is required to exit this operating state after the cause of the detected error has been removed. Further information can be found in the pertinentstandards such as IEC 61800-7, ODVA Common Industrial Protocol (CIP).

## Fault Reset

A function used to restore the drive to an operational state after a detected error is cleared by removing the cause of the error so that the error is no longer active.

M

## Monitoring function

Monitoring functions acquire a value continuously or cyclically (for example, by measuring) in order to check whether it is within perm is sible limits. Monitoring functions are used for error detection. Glossary

## P

## Parameter

Device data and values that can be read and set (to a certain extent) by the user.

## PELV

Protective Extra Low Voltage, low voltage with isolation. For more inform ation: IEC 60364-4-41

PLC
Program mable logic controller

## Power stage

The powerstage controls the motor. The power stage generates current for controlling the motor

W

Warning
If the term is used outside the context of safety instructions, a warning alerts to a potential problem that was detected by a monitoring function. A warning does not cause a transition of the operating state.

## BLEMO ${ }^{\circledR}$ Frequenzumrichter

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[^0]:    Used to limit the motor current. See page 218.
    Note: If the setting is less than 0.25 in , the drive may lock in [Output Phase Loss] (OPL) fault mode if this has been enabled (see page $\underline{256}$ ). If it is less than the no-load motor current, the motor cannot run.

[^1]:    ()

    Parameter that can be modified during operation or when stopped.

[^2]:    () Parameter that can be modified during operation or $w$ hen stopped.

[^3]:    * 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.

[^4]:    $(2)$
    Parameter that can be modified during operation or when stopped.

[^5]:    * 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.

[^6]:    () Parameter that can be modified during operation or when stopped.

[^7]:    ()

    Parameter that can be modified during operation or when stopped.

