ER330

Variable Speed Drives for Asynchronous and Synchronous Motors for HVAC Applications

Programming Manual

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Safety Information

Important Information

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain it. The following special messages 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.

Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by blemo 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 by using the product, by changing the settings and by the mechanical, electrical and electronic equipment of the entire system in which the product is used. All persons working on and with the product must be fully familiar with all applicable standards, directives, and accident prevention regulations when performing such work.

Intended Use

This product is intended for industrial use according to this manual.

The product may only be used in compliance with all applicable safety standard and local regulations and directives, the specified requirements and the technical data. The product must be installed outside the hazardous Ex zone. 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 must be implemented. Since the product is used as a component in an entire system, you must ensure the safety of persons by means 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.

About the document

Document Scope

The purpose of this document is:

- 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

Original instructions and information given in the present document have been written in English (before optional translation).

This documentation is valid for the Blemo HVAC ER330 drives.

Product Related Information

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

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Only appropriately trained persons who are familiar with and fully understand the contents of the present manual and all other pertinent product documentation and who have received all necessary training to recognize and avoid hazards involved are authorized to work on and with this device system.
- Installation, adjustment, repair and maintenance must be performed by qualified personnel.
- Verify compliance with all local and national electrical code requirements as well as all other applicable regulations with respect to grounding of all equipment.
- Only use properly rated, electrically insulated tools and measuring equipment.
- Do not touch unshielded components or terminals with voltage present.
- Prior to performing any type of work on the device system, block the motor shaft to prevent rotation.
- 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.

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

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Before performing work on the device system:

- Disconnect all power, including external control power that may be present. Take into account that the circuit breaker or main switch does not de-energize all circuits.
- Place a “Do Not Turn On” label on all power switches related to the device system.
- Lock all power switches in the open position.
- Wait 15 minutes to allow the DC bus capacitors to discharge.
- Verify the absence of hazardous voltage. (1)

Before applying voltage to the device system:

- Verify that the work has been completed and that the entire installation cannot cause hazards.
- If the mains input terminals and the motor output terminals have been grounded and short-circuited, remove the ground and the short circuits on the mains input terminals and the motor output terminals.
- Verify proper grounding of all equipment.
- Verify that all protective equipment such as covers, doors, grids is installed and/or closed.

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

(1) Refer to the Verify the Absence of Hazardous Voltage section in the installation manual of the product.

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

⚠⚠DANGER

ELECTRIC SHOCK OR UNANTICIPATED EQUIPMENT OPERATION

Do not use damaged products or accessories.

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

Contact your local Blemo sales office if you detect any damage whatsoever.

This equipment has been designed to operate outside of any hazardous location. Only install this equipment in zones known to be free of a hazardous atmosphere.

⚠DANGER

POTENTIAL FOR EXPLOSION

Install and use this equipment in non-hazardous locations only.

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

Your application consists of a whole range of different interrelated mechanical, electrical, and electronic components, the device being just one part of the application. The device by itself is neither intended to nor capable of providing the entire functionality to meet all safety-related requirements that apply to your application. Depending on the application and the corresponding risk assessment to be conducted by you, a whole variety of additional equipment is required such as, but not limited to, external encoders, external brakes, external monitoring devices, guards, etc.
As a designer/manufacturer of machines, you must be familiar with and observe all standards that apply to your machine. You must conduct a risk assessment and determine the appropriate Performance Level (PL) and/or Safety Integrity Level (SIL) and design and build your machine in compliance with all applicable standards. In doing so, you must consider the interrelation of all components of the machine. In addition, you must provide instructions for use that enable the user of your machine to perform any type of work on and with the machine such as operation and maintenance in a safe manner.
The present document assumes that you are fully aware of all normative standards and requirements that apply to your application. Since the device cannot provide all safety-related functionality for your entire application, you must ensure that the required Performance Level and/or Safety Integrity Level is reached by installing all necessary additional equipment.

⚠WARNING

INSUFFICIENT PERFORMANCE LEVEL/SAFETY INTEGRITY LEVEL AND/ OR UNINTENDED EQUIPMENT OPERATION

- Conduct a risk assessment according to EN ISO 12100 and all other standards that apply to your application.
- Use redundant components and/or control paths for all critical control functions identified in your risk assessment.
- Implement all monitoring functions required to avoid any type of hazard identified in your risk assessment, for example, slipping or falling loads.
- Verify that the service life of all individual components used in your application is sufficient for the intended service life of your overall application.
- Perform extensive commissioning tests for all potential error situations to verify the effectiveness of the safety-related functions and monitoring functions implemented, for example, but not limited to, speed monitoring by means of encoders, short circuit monitoring for all connected equipment, correct operation of brakes and guards.
- Perform extensive commissioning tests for all potential error situations to verify that the load can be brought to a safe stop under all conditions.

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

Product may perform unexpected movements because of incorrect wiring, incorrect settings, incorrect data or other errors.

⚠WARNING

UNANTICIPATED 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 commissioning test.

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

⚠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 emergency stop, overtravel stop, power outage and restart.
- Separate or redundant control paths must be provided for critical control functions.
- System control paths may include communication links. Consideration must be given to the implications of unanticipated transmission delays or failures of the link.
- Observe all accident prevention regulations and local safety guidelines (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 information, refer to NEMA ICS 1.1 (latest edition), Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control and to NEMA ICS 7.1 (latest edition), Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable-Speed Drive Systems.

The temperature of the products described in this manual may exceed 80°C (176°F) during operation.

⚠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 handling it.
- Verify that the heat dissipation is sufficient by performing a test run under maximum load conditions.

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

Machines, controllers, and related equipment are usually integrated into networks. Unauthorized persons and malware may gain access to the machine as well as to other devices on the network/fieldbus of the machine and connected networks via insufficiently secure access to software and networks.

⚠WARNING

UNAUTHORIZED ACCESS TO THE MACHINE VIA SOFTWARE AND NETWORKS

- In your hazard and risk analysis, consider all hazards that result from access to and operation on the network/fieldbus and develop an appropriate cybersecurity concept.
- Verify that the hardware infrastructure and the software infrastructure into which the machine is integrated as well as all organizational measures and rules covering access to this infrastructure consider the results of the hazard and risk analysis and are implemented according to best practices and standards covering ITsecurity and cybersecurity (such as: ISO/IEC 27000 series, Common Criteria for Information Technology Security Evaluation, ISO/ IEC 15408, IEC 62351, ISA/IEC 62443, NIST Cybersecurity Framework, Information Security
- Verify the effectiveness of your ITsecurity and cybersecurity systems using appropriate, proven methods.

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

⚠WARNING

LOSS OF CONTROL

Perform a comprehensive commissioning test to verify that communication monitoring properly detects communication interruptions.

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

NOTICE

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.

General Cybersecurity Information

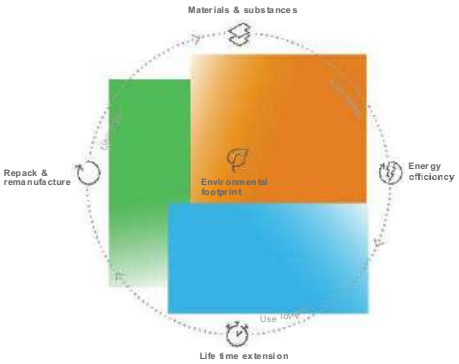
In recent years, the growing number of networked machines and production plants has seen a corresponding increase in the potential for cyber threats, such as unauthorized access, data breaches, and operational disruptions. You must, therefore, consider all possible cybersecurity measures to help protect assets and systems against such threats.

Environmental Data

The Environmental Data Program is a framework for how we measure, categorize, and compare the environmental attributes and footprint of our products.

Using a rigorous, fact-based methodology, the program provides environmental data from across the product lifecycle.

Five data categories across the product lifecycle



Use Better: How sustainable a product is, including environmental footprint, materials and substances, packaging, and energy efficiency.

Use Longer: How a product's life time can be effectively extended in terms of repairability and updatability.

Use Again: How a product can be reused, from dismantling and remanufacturing to recyclability and manufacturer take back.

With this transparent, verified data, customers and partners are empowered to make conscious environmental choices and accurately evaluate and report on sustainability performance.

All our hardware offers have an associated environmental data available on se.com product pages.

Related Documents

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:

- The whole catalog for detailed characteristics and selection guides,
- The CAD files to help design your installation, available in over 20 different file formats,
- All software and firmware to maintain your installation up to date,
- A large quantity of White Papers, Environment documents, Application solutions, Specifications... to gain a better understanding of our electrical systems and equipment or automation,

ER321 to ER330 Substitution Manual

The ER321 to ER330

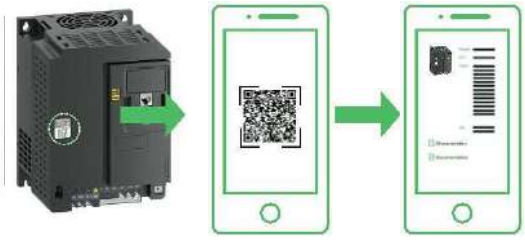
This information includes product selection based on existing installations, technical differences between product ranges, product frame size, wiring information, and available options.

Information on Non-Inclusive or Insensitive Terminology

As a responsible, inclusive company, blemo is constantly updating its communications and products that contain non-inclusive or insensitive terminology. However, despite these efforts, our content may still contain terms that are deemed inappropriate by some customers.

Electronic product data sheet

Scan the QR code in front of the drive to get the product data sheet.



Terminology used in this document

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

Among others, these standards include:

- ISO 13849: The Foundation of Functional Safety in the Machinery
- IEC/UL 60204-1: Safety of machinery - Electrical equipment of machines – Part 1: General requirements.
- IEC/UL 61010: Safety requirements for electrical equipment for measurement, control, and laboratory use.
- IEC 61158 series: Industrial communication networks - Fieldbus specifications
- IEC/UL 61508 Ed.2 series: Functional safety of electrical/electronic/ programmable electronic safety-related.
- IEC 61784 series: Industrial communication networks - Profiles.
- IEC 61784-5-3: Industrial communication networks - Profiles - Part 5-3: Installation of fieldbuses - Installation profiles for CPF 3
- IEC/UL 61800 series: Adjustable speed electrical power drive systems.
- IEC 61918: Industrial communication networks - Installation of communication networks in industrial premises.
- IEC 62443 /UL 2900: Security for industrial automation and control systems.

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.

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 Glossary at the end of this manual.

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Introduction

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Setup

What's in This Chapter

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Initial Steps

Before Powering up the Drive

⚠WARNING

UNANTICIPATED EQUIPMENT OPERATION

Before switching on the device, verify that no unintended signals can be applied to the digital inputs that could cause unintended movements.

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

If the drive was not connected to mains for an extended period of time, the capacitors must be 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 specified periods of time.(1)
- 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 first time 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.

(1) Period of time:

- 12 months at a maximum storage temperature of +50°C (+122°F)
- 24 months at a maximum storage temperature of +45°C (+113°F)
- 36 months at a maximum storage temperature of +40°C (+104°F)

If the specified procedure cannot be performed without a Run command 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.

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

In factory settings, the motor output phase loss detection is active: **[OutPhLoss Assign]** OPL is set to **[OPF Error]** YES. For details, refer to the parameter description, page 405. For commissioning tests or maintenance phase, the drive could be connected to a small motor power size and thus trigger an error **[Output Ph Loss]** OPF2 or **[Single out ph loss]** OPF1 when a Run command is applied.

For that purpose, the function can be disabled by setting **[OutPhLoss Assign]** OPL to **[Function Inactive]** NO.

Set also **[Motor control type]** CTT to **[U/F VC Standard]** STD in **[Motor parameters]** MPA–.

NOTICE

MOTOR OVERHEATING

Install external thermal monitoring equipment if a motor with a rated current of less than 20% of the drive's norminal current is connected.

Failure to follow these instructions can result in equipment damage.

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

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

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

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

First Power Up

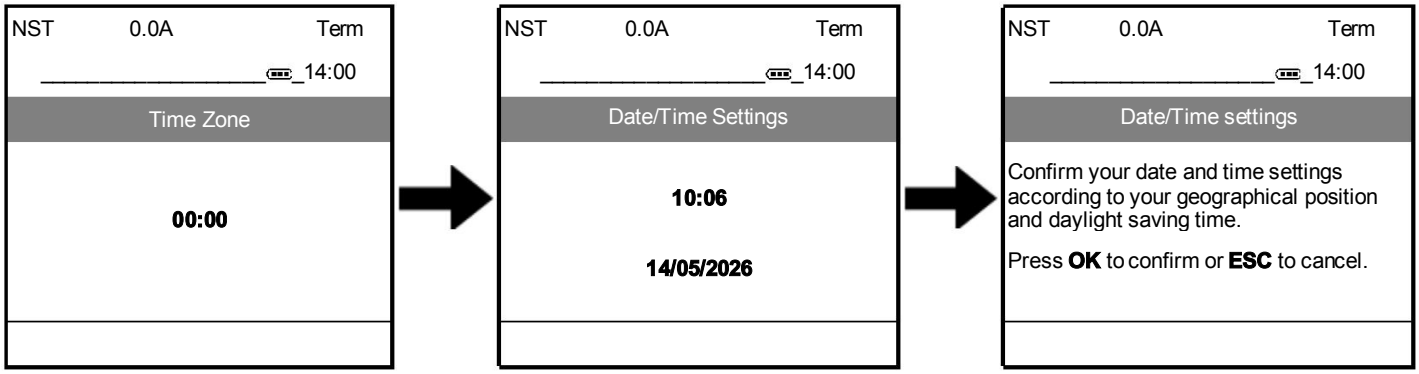
When powering-Up the ER330 for the first time, before operating it is mandatory to:

Set the language

Select the language. It can be changed after this setup, for more details see **[LANGUAGE]** LNG– .

Set the Time Zone and Set the Date and Time.

Check the set time zone, date and time.

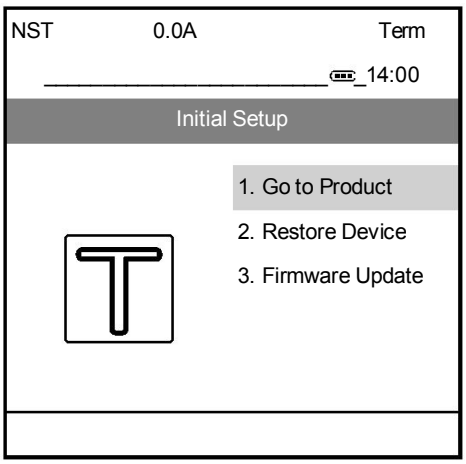


Press **OK** to confirm or **ESC** to cancel and return to the **[Time Zone]** screen.

Time Zone and Date and Time can be changed after this setup, for more details see Date and Time settings, page 506.

Go to product by setting cybersecurity policy (advanced, minimum)

To go into operational mode you need to configure the cybersecurity



At the first power up, the ER330 proposes minimum step-by-step settings in order to select the cybersecurity policy.

Step	Action
1	1. In the **[Initial Setup]** menu, scroll to **[Go to product]** and press **OK**. 2. Choose a cybersecurity policy: • To set **no credentials** to access this device, refer to step 2 – a. • To set **credentials**, refer to step 2 – b. • To **load an existing cybersecurity policy** already set and exported from a compatible device, refer to step 2 – c. For more information about the cybersecurity policies, refer to ER330 Security Policy, page 56.
2 – a	1. Scroll to **[Minimum Cybersec]** and press **OK**. 2. Read the message explaining the functionalities of this profile and press **OK** to validate and access the **[Access Level]** parameter or **ESC** to cancel the selection. 3. Refer to **[Access Level]** LAC– to set your access level and access the main menu of the device. **Result:** The device is ready to be commissioned. Disabling this feature, no credentials will be required to access your process or machine. This setting is saved with the configuration and will be active if a configuration is loaded or copied. **⚠WARNING** **UNAUTHENTICATED ACCESS AND MACHINE OPERATION** Do not disable the feature if your machine or process is accessible to unauthorized personnel either directly or via a network. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

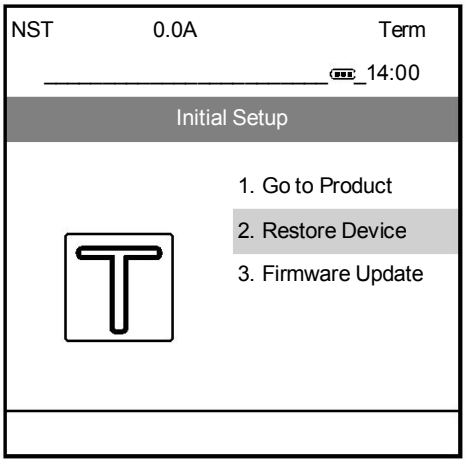
Step	Action
2 – b	1. Scroll to **[Advanced Cybersec]** and press **OK**. 2. Set a password and press **OK** to confirm it or **ESC** to cancel the selection. 3. Verify the set credentials and press **OK** to confirm them or **ESC** to cancel the selection. 4. Scroll down to display the confirmation message, press **OK** to validate this cybersecurity policy and access the **[Access Level]** parameter or press **ESC** to cancel the selection. 5. Refer to **[Access Level]** LAC– to set your access level and access the main menu of the device. **Result:** The device is ready to be commissioned. For more information about the cybersecurity policies, refer to ER330 Security Policy, page 56.
2 – c	1. Scroll to **[Load security policy]** and press **OK**. 2. Scroll to the cybersecurity policy file (.secp) to upload on the device and press **OK** to transfer the file and access the **[Access Level]** parameter or **ESC** to cancel your selection. 3. Refer to **[Access Level]** LAC– the main menu of the device. For more information about the import / export of cybersecurity policies, refer to **Import / Export Security Policy** **Result:** The cybersecurity policy is set and the device is ready to be commissioned.

NOTE: Once the steps are done (the cybersecurity policy is selected), the pre-operating procedure will not be required at the next power up and the device is ready for operation.

NOTE: The complete configuration of cybersecurity is accessible through.

Restore a device configuration (Situational)

In case of a product replacement or a similar situation, it is possible to restore a configuration.

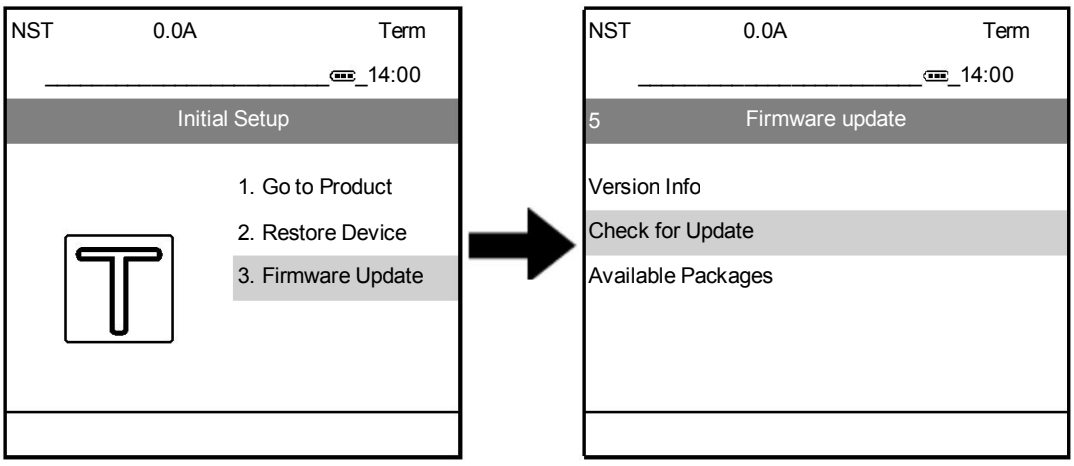


Step	Action
1	In the **[Initial Setup]** menu, scroll to **[Restore device]** and press **OK**.
2	Select **[Load backup image]**, press **OK** and select a .bki file. Refer to Device Configuration files, page 501 for more information on the drive's configuration files.
3	Read carefully the message on the display terminal and press **OK** to validate. **Result:** The device is ready to be commissioned. The previous device cybersecurity policy will be erased by this new configuration.

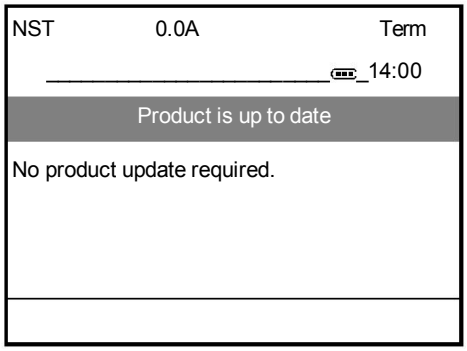
Check if the device is up to date (Situational)

It is possible to have a firmware package to be applied on the device.

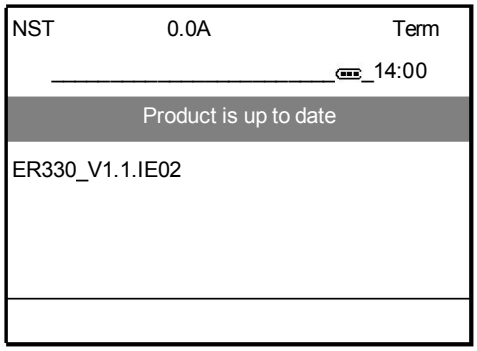
Verify if there is a firmware update to apply by selecting **[Firmware update]** then Check for Update:



If the Product is up to date, two possibilities can appear:



OR



If firmware package is available, please follow this process:

Step	Action
1	Select the firmware package.
2	Apply the new firmware.
3	Pass through the **Release Info** step by pressing the **OK** button.
4	Pass through the **FW UPDATE** step by pressing the **OK** button.
5	These messages appear: 1. You are about to apply a new firmware. 2. Please wait for completion. 3. Product update is in progress. 4. Product restart in progress.
6	The final message “Firmware update has been correctly applied” appears. Press **OK** to continue the first power up procedure.

NOTE: To do a Firmware Update after your first power procedure, refer to **[Firmware Update]** FWUP—

Steps for Setting-Up the Drive

① **Installation:**
the installation manual, page 15.

② **Switch ON:**
the drive without active run command.

At first power ON (refer to First Power Up, page 22 for complete steps):

1. Select the desired language.
2. Set the Time Zone.
3. Set the local Date & Time.
4. In the **[Initial Setup]** ROOT menu, scroll to **[Go to product]** PRDM and press **OK**.
5. Select **[Minimum Cybersec]** CSE to set no credentials and access the main menu.
   Or select **[Advanced Cybersec]** CSS to set credentials, then access the main menu.
6. In the menu **[Access Level]** LAC, select the level of menus and parameters access.

③ **Configure:**

- Motor standard in **[Motor Standard]** BFR if this is not 50 Hz (for IEC Standard).
- The motor parameters including **[Motor Th Current]** ITH in the **[Motor parameters]** MPA- menu, only if the factory configuration of the drive is not suitable.
- The application functions in the **[Complete settings]** CST- menu, only if the factory configuration of the drive is not suitable.

④ **Adjust:**
In the **[Simply start]** SIM- menu, adjust the following parameters:

- **[Low Speed]** LSP and **[High Speed]** HSP.

⑤ **Start:**
The drive is ready for operation on simple applications.

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

⚠WARNING

UNANTICIPATED 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 commissioning test.

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

Tips

Use the **[Config. Source]** FCSI parameter.

NOTE: The following operations must be performed for optimum drive performance in terms of accuracy and response time:

- Enter the values indicated on the motor nameplate in the **[Motor parameters]** MPA– menu.
- Perform autotuning with the motor cold and connected using the **[Autotuning]** TUN parameter.

Software Enhancements

Overview

NOTE: Make sure that the latest version of the software and of the programming manual is used.

The blemo ER330 will benefit from future software enhancements. Those enhancements will be listed below.

This documentation relates to the version V1.1

Refer to **[Firmware update]** FWUP–

V1.1 Release Note

Initial release.

Overview

What's in This Chapter

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Multipoint Screen 43
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Factory Configuration

Factory Settings

The ER330 are factory-set for common operating conditions:

- Display: drive ready **[Pre-Ramp Ref Freq]** FRH when motor is ready to run and motor frequency when motor is running.
- The DI2, DI3, DI5 and DI6 digital inputs, AI2 and AI3 analog inputs, R2 and R3 relays are unassigned.
- Stop mode when error detected: freewheel.

This table presents the basic parameters of the drive and their factory setting values:

Code	Name	Factory setting values
BFR	**[Motor Standard]**	**[50 Hz] IEC** 50Hz
RIN	**[Reverse Disable]**	**[Yes]** YES
TCC	**[2/3-Wire Control]**	**[2-Wire Control]** 2C: 2-wire control
L1H	**[DI1 High Assign]**	**[Forward]** LIFRD
L4H	**[DI4 High Assign]**	**[Fault Reset]** LIRSF
CTT	**[Motor control type]**	**[U/F VC Quad.]** UFQ: U/F for quadratics loads
ACC	**[Acceleration]**	**[AUTO]** AUTO
DEC	**[Deceleration]**	**[AUTO]** AUTO
LSP	**[Low Speed]**	0.0 Hz
HSP	**[High Speed]**	50.0 Hz
ITH	**[Motor Th Current]**	Nominal motor current (value depending on drive rating)
FRD	**[Forward]**	**[DI1]** LI1: Digital input DI1
FR1	**[Ref Freq 1 Config]**	**[AI1]** AI1: Analog input AI1
R1	**[R1 Assignment]**	**[Operating State Fault]** FLT: the contact opens when the drive has detected error or when the drive has been switched off
ATR	**[Auto Fault Reset]**	**[No]** NO: function inactive
STT	**[Type of stop]**	**[On Ramp]** RMP: on ramp
AO1	**[AQ1 assignment]**	**[Motor Frequency]** OFR: Motor frequency
AO2	**[AQ2 assignment]**	**[Motor Current]** OCR: Motor current

NOTE: If you want to restore the drive presettings to their factory values, set **[Config. Source]** FCSI to **[Macro Config]** INI.

Verify whether the above values are compatible with the application and modify them if required.

Application Functions

Introduction

The following tables show the combinations of functions and applications in order to guide your selection.

The applications in these tables relate to the following applications:

- **HVAC:** Air cooled chiller, water cooled chiller, roof top, air handling unit, cooling tower, heat pump, boiler, condenser.

Each application has its own special features, and the combinations listed here are not mandatory or exhaustive.

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

⚠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 result in unsafe conditions.

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

Combinations of Applications and Control Functions

Function	Application								
	Air cooled chiller	Water cooled chiller	Roof top	Cooling tower	Air handling unit	Heat pump	Boiler	Condens-er	Pump applica-tions
Fire Mode , page 442			✓		✓				
Run Permissive , page 436	✓	✓	✓	✓	✓	✓	✓	✓	✓
Damper Control , page 451			✓		✓				
PID Controller , page 430	✓	✓	✓	✓	✓	✓	✓	✓	✓
Additional PID , page 485			✓		✓				
Broken Belt Detection , page 455			✓	✓	✓				
Sleep/wake up , page 263									✓
Feedback monitoring , page 274	✓	✓	✓	✓	✓	✓	✓	✓	
Pump start stop, page 276									✓
Automatic restart , page 394	✓	✓	✓	✓	✓	✓	✓	✓	✓
Catch on fly , page 398				✓	✓			✓	

Reverse disable, page 339	✓	✓	✓	✓	✓	✓	✓	✓	✓
Torque limitation, page 340	✓	✓				✓			
Parameter set switching , page 341									✓
Acceleration deceleration ramps	✓	✓	✓	✓	✓	✓	✓	✓	✓
Motor control type	✓	✓	✓	✓	✓	✓	✓	✓	✓
Motor tune	✓	✓					✓		
Output phase rotation, page 181	✓	✓	✓	✓	✓	✓	✓	✓	✓

Combinations of Applications and Monitoring Functions

Function	**Application**							
	Air cooled chiller	**Water cooled chiller**	**Roof top**	**Cooling tower**	**Air handling unit**	**Heat pump**	**Boiler**	**Condenser**
Pumpcycle monitoring , page 281	✓	✓		✓		✓	✓	✓
Dry run monitoring , page 284	✓	✓		✓		✓	✓	✓
Pump low flow monitoring , page 288	✓	✓		✓		✓	✓	✓
Thermal pump monitoring , page 169	✓	✓		✓		✓	✓	✓
Outlet pressure monitoring , page 294	✓	✓		✓		✓	✓	✓
Process underload monitoring , page 351	✓	✓	✓	✓	✓	✓	✓	✓
Process overload monitoring , page 354	✓	✓	✓	✓	✓	✓	✓	✓
Stall monitoring , page 356	✓	✓	✓	✓	✓	✓	✓	✓
Thermal sensor monitoring , page 169	✓	✓	✓	✓	✓	✓	✓	✓
Surge voltage limitation , page 188	✓	✓	✓	✓	✓	✓	✓	✓
4-20 mA loss	✓	✓	✓	✓	✓	✓	✓	✓
Safe Torque Off	✓	✓	✓	✓	✓	✓	✓	✓

Combinations of Applications and Display Functions

Function	Application							
	Air cooled chiller	Water cooled chiller	Roof top	Cooling tower	Air handling unit	Heat pump	Boiler	Condenser
Energy parameters , page 87	✓	✓	✓	✓	✓	✓	✓	✓
Data logging , page 124	✓	✓	✓	✓	✓	✓	✓	✓

Basic Functions

Drive Ventilation

If **[Fan mode]** FFM is set to:

- **[Standard]** STD, the operation of the fan is enabled when the motor is running. According to drive rating, this could be the only available setting.
- **[Always]** RUN, the fan is always activated.
- **[Economy]** ECO, the fan is activated only if necessary, according to the internal thermal state of the drive.

Fan speed and **[Fan Operation Time]** FPBT are monitored values:

- An abnormal low speed of the fan triggers a warning **[Fan Fdbk Warn]**FFDA.
- As soon as **[Fan Operation Time]** FPBT reach the predefined value of 45,000 hours, a warning **[Fan Counter Warn]** FCTA is triggered.

[Fan Operation Time] FPBT counter can be set to 0 by using the **[Counter Reset]** RPR parameter.

Display Terminals

Description of the Graphic Display Terminal HVAC — VW3A1121

This Graphic Display Terminal is a local control unit which can be either plugged on the drive or mounted on the door of the wall-mounted. It has a cable with connectors, which is connected to the drive front Modbus serial link.

NOTE: While both display terminals are compatible, it is recommended to use the VW3A1121 instead of the VW3A1111

1 OFF / RESET: Stop command / apply a Fault Reset.

2 AUTO: used to switch from local (Graphic display terminal) to remote control of the drive.

3 ESC: used to quit a menu/parameter or remove the currently displayed value in order to revert to the previous value retained in the memory

4 F1 to F4: function keys used to access drive id, QR code, quick view, and submenus. Simultaneous press of F1 and F4 keys generates a screenshot file in the Graphic Display Terminal internal memory.

5 Graphic display.

6 Home: used to access directly at the home page.

7 Information: used to have more information about parameters. The selected parameter code is displayed on the first line of the information page.

8 HAND: Hold (2s) to switch to control by Graphic display terminal (Press Ok to confirm after the popup message). A second press will start the motor.

9 Touch wheel / OK: used to save the current value or access the selected menu/parameter. The touch wheel is used to scroll fast into the menus. Up/down arrows are used for precise selections, right/left arrows are used to select digits when setting a numerical value of a parameter.

10 RJ45 Modbus serial port: used to connect the Graphic Display Terminal to the drive.

11 Mini USB port: used to connect the Graphic Display Terminal to a computer.

12 Battery (10 years service life. Type: CR2032). The battery positive pole points to the front face of the Graphic Display Terminal.

13 RJ45 male connector: used to plug the Graphic Display Terminal on the inverter or the door mounting kit.

NOTE: Keys 1, 8 and 9 can be used to control the drive if control via the Graphic Display Terminal is activated. To activate the keys on the Graphic Display Terminal, you first need to set **[Ref Freq 1 Config]** FR1 to **[HMI]** LCC.

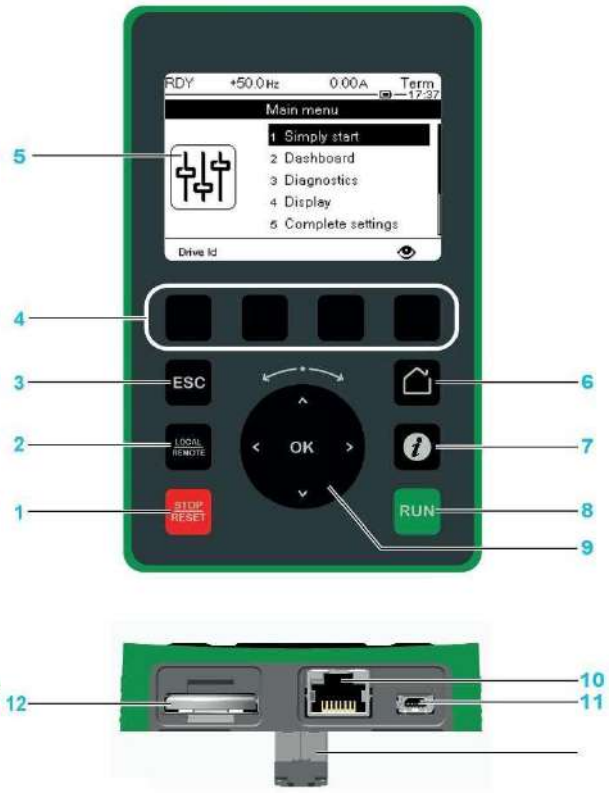
NOTE: The maximum length for extending a Graphic Display Terminal is 3 m (9,84 ft).

NOTE: In case of no connection with the Graphic Display Terminal, an issue on RJ45 power supply or on Graphic Display Terminal is probable.

Description of the Graphic Display Terminal — VW3A1111

This Graphic Display Terminal is a local control unit which can be either plugged on the drive or mounted on the door of the wall-mounted or floor-standing enclosure. It has a cable with connectors, which is connected to the drive front Modbus serial link.

NOTE: While both display terminals are compatible, it is recommended to use the VW3A1121 instead of the VW3A1111



1 STOP / RESET: Stop command / apply a Fault Reset.

2 LOCAL / REMOTE: used to switch between local and remote control of the drive.

3 ESC: used to quit a menu/parameter or remove the currently displayed value in order to revert to the previous value retained in the memory

4 F1 to F4: function keys used to access drive id, QR code, quick view, and submenus. Simultaneous press of F1 and F4 keys generates a screenshot file in the Graphic Display Terminal internal memory.

5 Graphic display.

6 Home: used to access directly at the home page.

7 Information: used to have more information about parameters. The selected parameter code is displayed on the first line of the information page.

8 RUN: executes the function assuming it has been configured.

9 Touch wheel / OK: used to save the current value or access the selected menu/parameter. The touch wheel is used to scroll fast into the menus. Up/down arrows are used for precise selections, right/left arrows are used to select digits when setting a numerical value of a parameter.

10 RJ45 Modbus serial port: used to connect the Graphic Display Terminal to the drive.

11 Mini USB port: used to connect the Graphic Display Terminal to a computer.

12 Battery (10 years service life. Type: CR2032). The battery positive pole points to the front face of the Graphic Display Terminal.

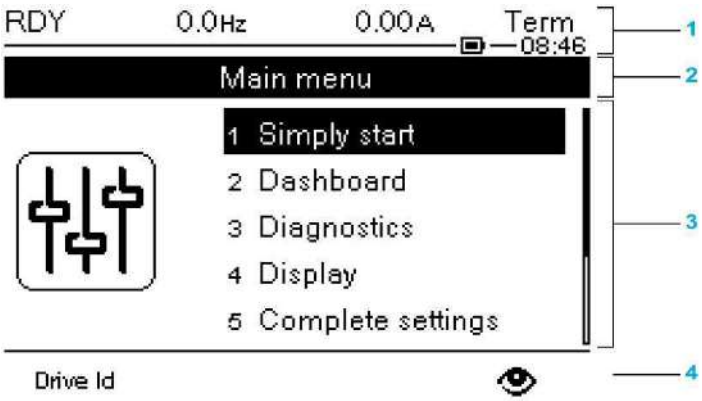
13 RJ45 male connector: used to plug the Graphic Display Terminal on the inverter or the door mounting kit.

NOTE: Keys 1, 8 and 9 can be used to control the drive if control via the Graphic Display Terminal is activated. To activate the keys on the Graphic Display Terminal, you first need to set **[Ref Freq 1 Config]** `FR1` to **[HMI]** `LCC`.

NOTE: The maximum length for extending a Graphic Display Terminal is 3 m (9,84 ft).

NOTE: In case of no connection with the Graphic Display Terminal, an issue on RJ45 power supply or on Graphic Display Terminal is probable. For additional support, contact our Customer Care Center on: www.blemo.com

Description of the Graphic Display



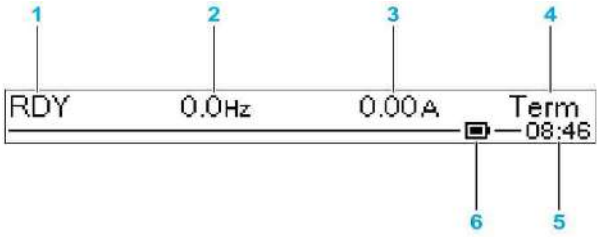
1 Display line: its content can be configured

2 Menu line: indicates the name of the current menu or submenu

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

4 Section displaying tabs (1 to 4 by menu), these tabs can be accessed using F1 to F4 keys

Display line details:

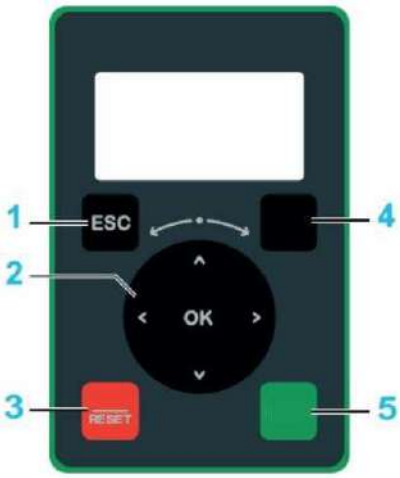


Key	
1	Drive state
2	Customer defined
3	Customer defined
4	Active control channel • TERM: terminals • HMI / HND: Graphic Display Terminal • MDB: integrated Modbus serial • NET: fieldbus module • EBM: Embedded BACnet MS/TP
5	Present time
6	Battery level

Plain Text Display Terminal HVAC — VW3A1123

This Plain Text Display Terminal is a local control unit plugged on drive. The Display Terminal can be removed to be mounted on the door of the wallmounted or floor-standing enclosure, using a dedicated door-mounting kit. The Display Terminal communicates with the soft starter using Modbus serial link. Both embedded Modbus connections (Modbus HMI & Modbus Fieldbus) can be used but only one Display Terminal is active (not possible to connect 2 Display Terminals).

NOTE: While both display terminals are compatible, it is recommended to use the VW3A1123 instead of the VW3A1113



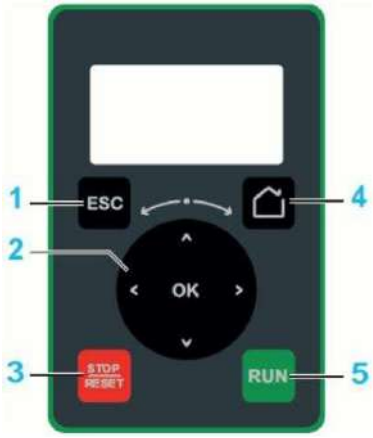
1. **ESC:** used to quit a menu/parameter, to clear the display of the triggered error or remove the currently displayed value in order to revert to the previous value retained in the memory
2. **Touch wheel / OK:** used to save the current value or access the selected menu/parameter. The touch wheel is used to scroll fast into the menus. Up/down arrows are used for precise selections, right/left arrows are used to select digits when setting a numerical value of a parameter.
3. **OFF / RESET** stop command / apply a Fault Reset (a).
4. **AUTO**: used to switch from local (display terminal) to remote control of the drive.
5. **HAND:** executes the function (a).

(a) The second press on **HAND** to run the motor and **RESET** functions are active only if the active command channel is HMI (**[Cmd channel 1]** CD1 or **[Cmd channel 2]** CD2 is set to **[HMI]** LCC)

Plain Text Display Terminal — VW3A1113

This Plain Text Display Terminal is a local control unit plugged on drive. The Display Terminal can be removed to be mounted on the door of the wallmounted or floor-standing enclosure, using a dedicated door-mounting kit. The Display Terminal communicates with the soft starter using Modbus serial link. Both embedded Modbus connections (Modbus HMI & Modbus Fieldbus) can be used but only one Display Terminal is active (not possible to connect 2 Display Terminals).

NOTE: While both display terminals are compatible, it is recommended to use the VW3A1123 instead of the VW3A1113



1. **ESC:** used to quit a menu/parameter, to clear the display of the triggered error or remove the currently displayed value in order to revert to the previous value retained in the memory
2. **Touch wheel / OK:** used to save the current value or access the selected menu/parameter. The touch wheel is used to scroll fast into the menus. Up/down arrows are used for precise selections, right/left arrows are used to select digits when setting a numerical value of a parameter.
3. **STOP / RESET:** stop command / apply a Fault Reset (a).
4. **Home:** used to access the home page.
5. **RUN:** executes the function (a).

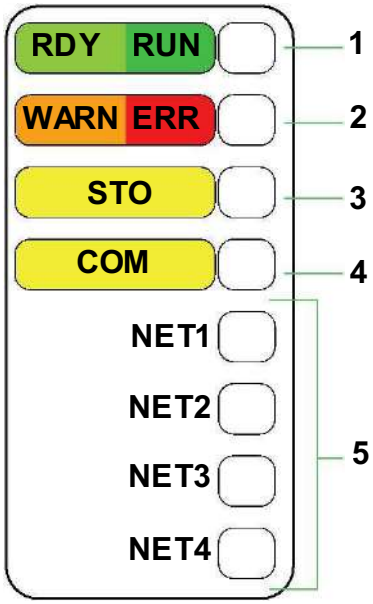
(a) The **RUN** and **RESET** functions are active only if the active command channel is HMI (**[Cmd channel 1]** CD1 or **[Cmd channel 2]** CD2 is set to **[HMI]**)

Description of the Plain Text Display

Key	
1	**Display line**
2	Drive State
3	Monitored parameter user defined. Can be configured in **[My preferences]**.
4	Active control channel • TERM: terminals • HMI / HND: Graphic Display Terminal • MDB: integrated Modbus serial • NET: fieldbus module • EBM: Embedded BACnet MS/TP
5	**Menu line: indicates the name of the current menu or submenu.**
6	Menus, submenus, parameters, values, bar charts, and so on, are displayed in drop-down window format on a maximum of 2 lines. The line or value selected by the navigation button is displayed in reverse video.

Description of the Product Front LEDs

NOTE: The leds figure will be updated with the new Led setup.



Following table provides the details of the drive status LEDs:

Item	LED	Color & status	Description
1	**STATUS**	OFF	Indicates that the drive is powered off
		Green flashing	Indicates that the drive is not running, ready to start
		Green blinking	Indicates that the drive is in transitory status (acceleration, deceleration, and so on)
		Green on	Indicates that the drive is running
		Yellow on	Indicates that the drive localization is in progress
2	**Warning/Error**	Red flashing	Indicates that the drive has detected a warning
		Red on	Indicates that the drive has detected an error
3	**STO**	Yellow on	Indicates that the safety function is activated or has been triggered

Following table provides the details of the embedded Modbus serial or BacNet MSTP LEDs:

Item	LED	Color & status	Description
4	**COM**	Yellow flashing	Modbus or BacNet MSTP communication activity

Following table provides the details of the fieldbus module LEDs:

Item	LED	Color & status	Description
5	**NET 1**	Green/Yellow	for details, refer to the fieldbus manual
	NET 2	Green/Red	for details, refer to the fieldbus manual
	NET 3	Green/Yellow	for details, refer to the fieldbus manual
	NET 4	Green/Red	for details, refer to the fieldbus manual

Graphic Display Terminal Connected to a Computer

NOTICE

INOPERATIVE EQUIPMENT

Do not connect equipment to the RJ45 port and to the USB port of the Graphic Display Terminal at the same time.

Failure to follow these instructions can result in equipment damage.

The Graphic Display Terminal is recognized as a USB storage device named SE_VW3A1123 while plugged on a computer.

This allows to access the saved drive configurations (*DRVCONF* folder) and the Graphic Display Terminal screenshots (*PRTSCR* folder).

Screenshots can be stored by a simultaneous press on *F1* and *F4* function keys

How To Update Language Files on the Graphic Display Terminal

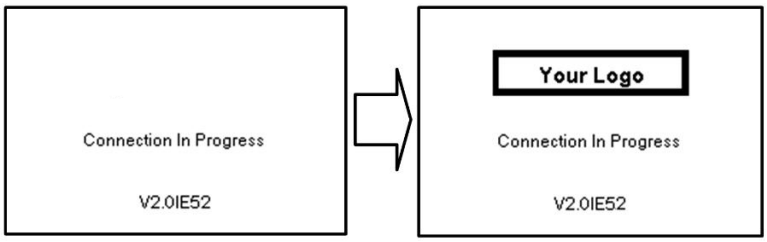
The Graphic Display Terminal (VW3A1123) language files can be updated.

Download the latest version of language files here: Languages_Drives_VW3A1123

The following table describe the procedure to update the language files of the Graphic Display Terminal:

Action	Step
1	Download the latest version of language files here: Languages_Drives_VW3A1123
2	Save the downloaded file on your computer.
3	Unzip the file and follow the instructions of the ReadMe text file.

How to customize the logo displayed at power on of the Graphic Display Terminal?



From the firmware version V2.0 of the Graphic Display Terminal, the logo displayed at power on by the Graphic Display Terminal can be customized.

To modify the displayed logo, you must:

- Create your own logo and save it as a bitmap file (.bmp) with the name logo_ini. The logo must be saved in black & white and the dimensions must be 137x32 pixels.
- Connect the Graphic Display Terminal to a computer via an USB cable.
- Copy your logo (logo_init.bmp) in the folder KPCONFIG of the Graphic Display Terminal.

At next power on of the Graphic Display Terminal connected to the drive, your own logo should be displayed.

If the logo of Blemo is still displayed, verify the characteristics of your file and the location where it has been copied.

SoMove

SoMove is a setup software for PC designed to configure Blemo motor control devices. It incorporates functions for device setup, monitoring, fieldbus management and maintenance via an user-friendly interface.

To download SoMove go to SoMove FDT.

To download the required DTM ER330: DTM, page 15.

A contextual help for SoMove is available by pressing F1 on the keyboard.

Multipoint Screen

Overview

Generally, a Graphic Display Terminal is connected to only one drive. However, communication is possible between a Graphic Display Terminal and several blemo drives ER330 connected on the same Modbus serial fieldbus via the RJ45 port (HMI or Modbus serial). In such a case, the multipoint mode is automatically applied on the Graphic Display Terminal.

The multipoint mode allows you to:

- Have an overview of all the drives connected on the fieldbus (drive state and two selected parameters).
- Access to all the menus of each drive connected on the fieldbus.
- Command a stop on all the connected drives with the OFF/RESET key (irrespective of the present screen displayed). The type of stop can be individually configured on each drive with the parameter **[Stop Key Enable]** PST in the menu **[Cmd and Reference]** CRP– , page 211.

Apart the Stop function linked to the OFF/RESET key, the multipoint mode does not allow to apply a Fault Reset and command the drive via the Graphic Display Terminal: in multipoint mode, the HAND key is deactivated.

Prerequisites

To use the multipoint mode:

- Use the Graphic Display Terminal VW3A1121

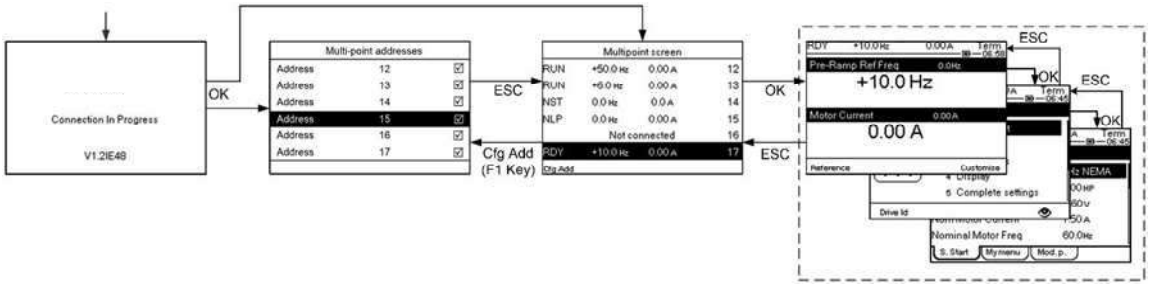
  NOTE: To use Multipoint with blemo drives (ER41...) or blemo Soft Starter (SH71...) products, only the Graphic Display Terminal VW3A1111 is compatible, and the software version must be equal or higher than V2.0
- For each drive, the command channel and the reference channel must be set in advance to a value different from **[HMI]** LCC , page 211.
- The address of each drive must be configured in advance to different values by setting the parameter **[Modbus Address]** ADD in the **[Modbus Fieldbus]** MD1–.
- If the connection to the drive is done via the HMI RJ45 port, the parameter settings in **[Modbus HMI]** MD2– must be compliant with the Graphic Display Terminal usage.
- If the connection to the drive is done via the Modbus serial RJ45 port, the parameter settings in **[Modbus Fieldbus]** MD1– must be compliant with the Graphic Display Terminal usage.

Example of Installation Topology

The following figure gives a topology example using four drives, a Modbus “T” tap-Off (VW3A8306TF03) and one Graphic Display Terminal (VW3A1121) linked to one Modbus splitter block (LU9GC3):

Screens for Multipoint Mode

The following figure gives the browsing between the different screens linked to the multipoint mode:



On the fieldbus common with the Graphic Display Terminal, if two or more drives are powered on, you access to the **[connection in progress]** screen. If there is no address selected by the Graphic Display Terminal or no recognized address, the Graphic Display Terminal is locked on this screen. Press OK key to access to the [Multi-point Addresses] screen. Otherwise, if there are addresses-selected and one of them have been recognized by the Graphic Display Terminal, the screen switches automatically to **[Multipoint screen]**.

The **[Multi-point Addresses]** screen allows to select, by pressing OK key, the addresses of the drives you want to connect with. Up to 32 addresses can be selected (address setting range: 1…247). When all the addresses have been selected, press ESC key to access to the **[Multipoint screen]**.

> **NOTE:** To help to prevent a low refresh rate of the Graphic Display Terminal screen, do not select addresses that are not corresponding to drive addresses.

On the **[Multipoint screen]**, the touch wheel is used to navigate between the drive overviews. Access to the menus of the selected drive by pressing OK key. Return to the **[Multipoint screen]** by pressing ESC key.

> **NOTE:** To access the **[Multi-point Addresses]** screen from the [Multipoint screen], press F1 key.

If a drive triggers an error, the Graphic Display Terminal goes automatically to the **[Multipoint screen]** on the overview of the latest drive who has triggered an error.

The two parameters given in the drive overview can be modified individually on each drive in **[Bar Selection]** PBS– menu , page 515.

Structure of the Parameter Table

General Legend

Pictogram	Description
★	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.
( )	Setting of this parameter can be done during operation or when stopped. **NOTE:** It is advisable to stop the motor before modifying any of the settings.
⧗	To modify the assignment of the parameter, reinforced validation is required.

Parameter Presentation

Below is an example of a parameter presentation:

[Sample Menu] CODE– Menu

Access

Parameters described below can be accessed by:
[Path] → [Sub-path]

About This Menu

Description of the menu or function

[Short Label for Parameter 1] CODE1

Long Label for parameter 1
Description of the parameter

Example of a table with a setting range:

Setting ( )	Description
0.0… 10,000.0	Setting range **Factory setting:** 50.0

Example of a table with a value range (For display parameters):

Value range	Description
0.0… 10,000.0	**Factory setting:** _

[Short Label for Parameter 2] CODE2

Long Label for parameter 2
Description of the parameter

Example of a table with a list of choices:

Setting ( )	Code / Value	Description
[50 Hz IEC]	50	IEC **Factory setting**
[60 Hz NEMA]	60	NEMA

Example of a table with a list of possible value (For display parameters):

Value range	Code / Value	Description
[50 Hz IEC]	50	IEC
[60 Hz NEMA]	60	NEMA

Finding a Parameter in This Document

With the Graphic Display Terminal

Select the required parameter and press .

The parameter code is displayed at the top of the information window.

Example: **[Acceleration]** code is ACC.

With the Manual

It is possible to use either the parameter name or the parameter code to search in the manual the page giving details of the selected parameter.

Difference Between Menu and Parameter

A dash after menu and submenu codes is used to differentiate menu commands from parameter codes.

Example:

Level	Name	Code
Menu	**[Ramp]**	RAMP–
Parameter	**[Acceleration]**	ACC

Cybersecurity Generalities

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Overview

The objective of Cybersecurity is to help provide increased levels of protection for information and physical assets from theft, corruption, misuse, or accidents while maintaining access for their intended users.

No single Cybersecurity approach is adequate. blemo recommends a defense-in-depth approach. Conceived by the National Security Agency (NSA), this approach layers the network with security features, appliances, and processes.

The basic components of this approach are:

- Risk assessment
- A security plan built on the results of the risk assessment
- A multi-phase training campaign
- Physical separation of the industrial networks from enterprise networks using a demilitarized zone (DMZ) and the use of firewalls and routing to establish other security zones
- System access control
- Device hardening
- Network monitoring and maintenance

This chapter defines the elements that help you configure a system that is less susceptible to cyber-attacks.

⚠WARNING

POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

- Change default password to help prevent unauthorized access to device settings and information.
- Disable unused ports/services and default accounts, where possible, to minimize pathways for malicious attacks.
- Place networked devices behind multiple layers of cyber defenses (such as firewalls, network segmentation, and network intrusion detection and protection).
- Use cybersecurity best practices (for example: least rights, separation of duties) to help prevent unauthorized exposure, loss or modification of data and logs, interruption of services, or unintended operation.

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

Protected Environment Assumptions

Machines, controllers, and related equipment are usually integrated into networks. Unauthorized persons and malware may gain access to the machine as well as to other devices on the network/fieldbus of the machine and connected networks via insufficiently secure access to software and networks.

⚠WARNING

UNAUTHORIZED ACCESS TO THE MACHINE VIA SOFTWARE AND NETWORKS

- In your hazard and risk analysis, consider all hazards that result from access to and operation on the network/fieldbus and develop an appropriate cybersecurity concept.
- Verify that the hardware infrastructure and the software infrastructure into which the machine is integrated as well as all organizational measures and rules covering access to this infrastructure consider the results of the hazard and risk analysis and are implemented according to best practices and standards covering ITsecurity and cybersecurity (such as: ISO/IEC 27000 series, Common Criteria for Information Technology Security Evaluation, ISO/ IEC 15408, IEC 62351, ISA/IEC 62443, NIST Cybersecurity Framework, Information Security
- Verify the effectiveness of your ITsecurity and cybersecurity systems using appropriate, proven methods.

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

Additionally, use a layered network approach with multiple security and defense controls in your IT and control system to minimize data protection gaps, reduce single-points of failure and create a strong cybersecurity posture. The more layers of security in your network, the harder it is to breach defenses, take digital assets or cause disruption.

Control System - Cybersecurity policy

- Cybersecurity governance – available and up-to-date guidance on governing the use of information and technology assets in your company that is matching with a dedicated risk analysis about the control system
- The access control policy defined in the cybersecurity governance is strictly applied. In particular, it guarantees the authenticity of privileged operations. For example operations that can alter the critical assets.
- The instructions and procedures should structure the roles and responsibilities in terms of security within the organization; in other words, who is authorized to perform what and when. These should be known by the users.
- Define information security continuous monitoring (ISCM) to maintain the awareness of information security, vulnerabilities and threats to your organization.
- Perform patch management by applying security patches from vendor to ensure stability and completeness.

Physical perimeter security

- Set up the devices in an enclosed area with physical access control to prevent authorized access to the device, with dedicated monitoring

Physical network segmentation

Independence from non-control system networks – the control system provides network services to control system networks, critical or non-critical, without a connection to non-control system networks

- Physically segment control system networks from non-control system network
- Physically segment critical control system networks from non- critical control system networks

Logical isolation of critical networks

The control system provides the capability to logically and physically isolate critical control system networks from non-critical control system networks. For example, using VLANs.

Zone boundary protection – the control system provides the capability to:

- Manage connections through managed interfaces consisting of appropriate boundary protection devices, such as: proxies, gateways, routers, firewalls, and encrypted tunnels
- Use an effective architecture, for example, firewalls protecting application gateways residing in a DMZ
- Control system boundary protections at any designated alternate processing sites should provide the same levels of protection as that of the primary site, for example, data centers

No public internet connectivity – access from the control system to the internet is not recommended

Information disclosure prevention

- Encrypt protocol transmissions over all external connections using an encrypted tunnel, TLS wrapper or a similar solution
- Reduce access to control system information by distributing permissions according to predefined access control with least privilege practices

Control against malware

- Detection, prevention, and recovery controls to help protect against malware are implemented and combined with appropriate user awareness
- Any computer in use on the control system either on premise or temporarily connected, should have an updated anti-virus, anti-malware, anti-ransomware application activated during the use

Resource & control system availability

- Ensure continuity of service – ability to break the connections between different network segments or use duplicate devices in response to an incident. Redundancy of controllers or network devices like switches or similar solution.
- Manage communication loads – the control system provides the capability to manage communication loads to mitigate the effects of information flooding types of DoS (Denial of Service) events
- Manage the retention cycles of data and programs with the retention periods determined as appropriate.

Security Policy

⚠WARNING

ACCESSIBILITY LOSS

- Setup a security policy to your device and backup the device image with security administrator user account.
- Define and regularly review the password policy.
- Periodic change of the passwords, Blemo recommends a modification of the password each 90 days.

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

Cybersecurity helps to provide:

- Confidentiality (to help prevent unauthorized access)
- Integrity (to help prevent unauthorized modification)
- Availability/authentication (preventing the denial of service and assuring authorized access)
- Non-repudiation (preventing the denial of an action that took place)
- Traceability/detection (logging and monitoring)

Norm IEC 62443 is the worldwide standard for security of industrial control system (ICS) networks.

The blemo HVAC ER330 holds certification for IEC 62443-4-1 for Secure Development Lifecycle and IEC 62443-4-2 Security Level 1 (SL1) for Security features provided. The certification applies to products with a firmware version V1.1 IE03 or later. The firmware can be updated, please refer to **[Firmware update]** FWUP– Menu, page 507.

blemo HVAC ER330 security features prevent the unauthorized disclosure of information via eavesdropping or casual exposure.

All the security rules implemented in the ER330 are in complement of the points mentioned above.

The device does not have the capability to transmit data encrypted using the following protocols: Modbus slave/BACnet MS/TP over serial. If other users gained access to your network, transmitted information can be disclosed or subject to tampering.

⚠WARNING

CYBERSECURITY HAZARD

- For transmitting data over an internal network, physically or logically segment the network, the access to the internal network needs to be restricted by using standard controls such as firewalls.
- For transmitting data over an external network, encrypt protocol transmissions over all external connections using an encrypted tunnel, TLS wrapper or a similar solution.

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

Any computer using SoMove or DTM should have an updated anti-virus, anti-malware, anti-ransomware application activated during the use.

The ER330 has the capability to export its settings and files manually or automatically. It is recommended to archive any settings and files (device backup images, device configuration, device security policies) in a secure area.

Product Defense-in-Depth

ER330 offers the following security features:

Threats	Desired security property on Embedded Device	ER330 security features
Information disclosure	Confidentiality	Password encrypted in a non-reversible way
		User access control
Tampering	Device integrity	Cryptographic signature of firmware package
		Secure root of trust
Denial of Service	Availability	Device backup/restore
		Security export/import
Spoofing/Elevation of privilege	User Authentication / Authorization	Strong password and user account policy
		Access control local display terminal
		Access control commissioning tools Modbus Serial
		Access control commissioning through option board
Elevation of privilege	Authorization	Port hardening
		User roles & rights
Repudiation	Non-repudiability	Secure event logging

Confidentiality

Information confidentiality capacity prevents unauthorized access to the device and information disclosure.

- The user access control helps on managing users that are authorized to access the device. Protect user credential at usage.
- The user's passwords are encrypted in non-reversible way at rest

Device Integrity Protection

The device integrity protection prevents unauthorized modification of the device with tampered or spoofed information.

This security capability helps protect the authenticity and integrity of the firmware running on the ER330 and facilitates protected file transfer: digitally signed firmware is used to help protect the authenticity of the firmware running on the and only allows firmware generated and signed by Blemo.

- Cryptographic signature of the firmware package executed at the firmware update
- Secure root of trust ensures integrity and authenticity of the device firmware at each power-up

Availability

The control system backup is essential for recovery from a control system failure and/or misconfiguration and participate on preventing denial of service. It also helps ensure global availability of the device by reducing operator overhead on security application/deployment.

These security capabilities help manage control system backup with the device:

- Independent security policy import/export for local secure backup and security policy sharing with other devices.
- Complete device backup/restore available on local HMI, DTM.

Authentication and Authorization

The user authentication helps prevent the repudiation issue by managing user identification and prevents information disclosure and device integrity issues by unauthorized users.

These security capabilities help enforce authorizations assigned to users, segregation of duties and least rights:

- User authentication is used to identify and authenticate software processes and devices managing accounts
- Device Password policy and password strength configurable using SoMove and DTM
- Authorization managed according to channels
- User account lockouts configurable with number of unsuccessful login attempts

In line with user authentication and authorization, the device has access control cryptographic features to check user credential before access is granted to the system.

In the ER330, the control of accessibility to the settings, parameters, configuration, and logging database is done with a user authentication after "Log in", with a name and password.

The ER330 controls the access through:

- SoMove DTM (Serial and through Option Board connection)

Port Hardening

The communication ports of the ER330 can be disabled. Logical ports can be enabled/disabled. Port hardening configuration can be set from SoMove DTM with the ADMIN or SecAdmin right.

Security Event Logging

The security event logging prevents the repudiation issues by ensuring traceability and detection of any service executed and affecting the security policy of the device.

These security capabilities support the analysis of security events, help protect the device from unauthorized alteration and records configuration changes and user account events:

- Human-readable reports for device security settings
- Audit event logs to identify:
  - The ER330 security configuration modification
  - The device users' activity (e.g. login, logout)
  - The device firmware updates
  - Audit storage capacity of 500 security event logs
  - Timestamps, including date and time, match ER330 clock

ER330 Security Policy

To facilitate cybersecurity first configurations, the ER330 offers 2 security policies with preset ER330 security features. This operation applies default values adapted to the security level targeted by the system of which the device is part.

Selection of these 2 security policies can be done upon first power up of the device, both with the display terminal (Refer to First Power Up, page 22 for more information) and Commissioning tool (DTM).

Security Policy “Minimum”

This policy offers a minimum of cybersecurity features. User access control (login & password check at connection) is disabled across various software tools and platforms used for system configuration. These connections remain unsecured and open to potential elevation of privilege. This policy is intended for installations where authentication and authorization constraints are managed by external access control mitigation. When the Minimum policy is selected, each user accessing the device is considered to have ADMIN role and privileges.

Security Policy “Advanced”

This policy presets the device security by enabling security features. The user access control is enabled across various software tools and platforms used for system configuration. When activating the "Advanced" security policy, the user is identified as ADMIN and is requested to create a password unique to the device. During the initial setup, the user is invited to define a new password even if a default password is proposed.
If initial setup is done on DTM, there is no use of default password

Refer to the following cybersecurity features summary per security policy:

ER330 security feature	Open for configuration (activation or settings)	Preset security policy	
		Minimum	Advanced
Password encrypted in a non-reversible way	-	-	✓
User access control	-	-	✓
Cryptographic signature of firmware package	-	✓	✓
Secure root of trust	-	✓	✓
Device backup	ADMIN or SecAdmin only	✓	✓
Device restore	ADMIN or SecAdmin only	✓	✓
Security Save	ADMIN or SecAdmin only	-	✓
Security Restore	ADMIN or SecAdmin only	✓	✓
User management	ADMIN or SecAdmin only	-	✓
Strong password/pin code policy	ADMIN or SecAdmin only	-	✓
Brute force and session timeout	ADMIN or SecAdmin only	-	✓
System use notification	ADMIN or SecAdmin only	-	✓
Access control: • Display terminal • Commissioning tools (Modbus Serial and Option Module)	For all users	✓	✓
Secure events recorded	ADMIN or SecAdmin only	✓	✓
Port hardening	ADMIN or SecAdmin only	-	✓

Import / Export Security Policy

The device security settings can be exported from a device to be archived and/or applied in the same or another device. Exporting a security policy generates a corresponding security policy file, which uses the .secp file extension.

The following table describes the security settings included in the security policy export:

Security settings	Included in import / export operation
User access control settings	✓
Password & Pin code policy, including session lock and user account lockout configuration	✓
User database, including username, password, pin codes and roles	✓
Password history	✓
Ports and Service management, Brute force mitigation and session timeout, system use notification	✓
Device default password	For security reasons, the default password is unique to each device and cannot be exported.
Security events	The security events base is private property of a device and cannot be applied to another device.

NOTE: When a security configuration file is loaded, please restart the device to apply it.

Potential Risks and Compensating Controls

Address potential risks using these compensating controls:

Area	Issue	Risk	Compensating controls
User accounts.	Default account settings are often the source of unauthorized access by malicious users.	If you do not change default password or disable the user access control, unauthorized access can occur.	Ensure User access control is enabled on all the communication ports and change the default passwords to help reduce unauthorized access to your device.
Secure protocols.	The device does not have the capability to transmit data encrypted using these protocols: • Modbus Serial • BACNet MS/TP • BACNet IP • Modbus TCP Some protocols implemented in option modules may not have the ability to encrypt data, refer to the corresponding fieldbus manual.	If a malicious user gained access to your network, they could intercept communication.	For transmitting data over internal network, physically or logically segment your network. For transmitting data over external network (Option module), encrypt protocol transmissions over all external connections using an encrypted tunnel, TLS wrapper or a similar solution. See **Protected Environment Assumptions**, page 50.
Security banners	The local display terminal cannot display the security banner.	The users connecting to the ER330 will not be able to be warned about potential security notifications.	If such security notification shall be shared with users, then a local message shall be added close to the ER330. Example: A sticker on the electrical cabinet or the electrical room can inform user about specific security considerations

Data Flow Restriction

A firewall device is required to secure the access to the device and limit the data flow.

For detailed information, refer to the TVDA.

Device Recovery and Reconstitution

Control system backup – available and up-to-date backups for recovery from a control system failure.
Available and up-to-date firmware package for recovery from a system disaster. The customer stores the current used firmware version package or the latest up-to-date firmware package available on **blemo.com**.

Both Control System backup and firmware package, shall be considered as assets with dedicated risk analysis according to your local Cybersecurity policy. Make sure the access and use of these files are protected by appropriate security controls to ensure the trust, availability and effectiveness of the device's disaster recovery plan.

NOTE:

- Complete device recovery can be performed by applying the firmware update package and the device backup image previously stored by the customer.
- In case of a firmware recovery on the product is not possible, please contact your local Blemo representative.

Programming

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[Simply Start] SYS–

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Introduction

[Simply Start] SYS– menu contains 3 tabs for quick access to mains features:

- Simply Start tab which gives a quick access to basic parameters to set.
- My Menu tab which is a user-defined menu for quick access to specific parameters.
- Modified Parameters tab which gives a quick access to the 10 last modified parameters.

[Simply start] SIM– Menu

Access

[Simply Start] SYS– ➜ **[Simply start]** SIM–

About This Menu

⚠WARNING

LOSS OF CONTROL

- Fully read and understand the manual of the connected motor.
- Verify that all motor parameters are correctly set by referring to the nameplate and the manual of the connected motor.
- If you modify the value of one or more motor parameters after having performed autotuning, the value of **[Tune selection]** STUN is reset to **[Default]** TAB and you must re-perform autotuning.

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

This menu provides a quick access to basic parameters to set in case of a single asynchronous motor in open loop control.

NOTE: On Graphic Display Terminal, **[Simply start]** SIM– is the first tab displayed in the **[Simply Start]** SYS– menu (the tab name is “S. Start”).

For more information on the setting of the parameters present in this menu or to set your drive in another use case (such as synchronous motor and/or with specific functions) refer to **[Complete settings]** CST– menu.

NOTE: To help set basic parameters of the drive, a dedicated view exists in SoMove/DTM.

The following table shows a standard procedure for a simply start configuration of the drive used with an asynchronous motor in open loop control. This procedure only uses the basic parameters that can be accessed in this menu:

Step	Parameter	Menu	Description	Factory setting
1 – Motor Standard	**[Motor Standard]** BFR (1)	**[data]** MTD–	Help to preset the drive parameters and units according to the standard 50 Hz IEC or 60 Hz NEMA. **NOTE:** First parameter to modify. Otherwise, the drive configuration must be performed again.	**[50 Hz]** 50Hz (7)
2 – Motor nameplate	**[Nominal Motor Power]** NPR (1)	**[data]** MTD–	Set these parameters according to the motor nameplate. By default, **[Motor 1 Cosinus Phi]** COS does not need to be entered. To enter the motor nameplate using COS, the parameter **[Motor param choice]** MPC must be set to **[Motor 1 Cosinus Phi]** COS. In this case, **[Nominal Motor Power]** NPR does not need to be entered.	- (4)
	[Nom Motor Voltage] UNS (1)			- (4)
	[Nom Motor Current] NCR (1)			- (4)
	[Nominal Motor Freq] FRS (1)			50 Hz (6)
	[Nominal Motor Spd] NSP (1)			- (4)
	[Motor 1 Cosinus Phi] COS (1) (2)			- (4)
	[Motor Th Current] ITH			- (4)
3 — Type of wiring	**[2/3-Wire Control]** TCC	**[Cmd and Refer-ence]** CRP–	Select between 2-wire and 3-wire control.	**[2-Wire Control]** 2C
4 — Maximum motor frequency	**[Max Frequency]** TFR	**[data]** MTD–	Maximum output frequency.	60 Hz (5)
5 — Standstill motor tune	**[Autotuning]** TUN	**[Motor tune]** MTU–	Use to perform a standstill motor tune (autotuning) to measure internal motor characteristics. Set **[Autotuning]** TUN to **[Apply Autotuning]** YES to start the standstill motor tune. TUN and STUN are used to monitor the tune status. **NOTE:** If you modify the value of one or more motor parameters after having performed autotuning, you must re-perform autotuning.	**[No Action]** NO
	[Autotuning Status] TUS			**[Not Done]** TAB (3)
	[Tune selection] STUN			**[Default]** TAB (3)
6 — Dynamics and limits of the reference	**[Acceleration]** ACC	**[Ramp]** RAMP–	Time to accelerate from 0 Hz to **[Nominal Motor Freq]** FRS and time to decelerate from **[Nominal Motor Freq]** FRS to 0 Hz. **NOTE:** If these parameters are set to **[AUTO]** AUTO, the drive will monitor its own loading level and optimize the acceleration/deceleration ramp. The acceleration/deceleration rate will be automatically adjusted between 1/8 to 8 times the default value of the ramp acceleration/deceleration time, depending on the drive's current rating and the load level on the motor. These parameters should be appropriately set for an average load in the application. If the load on the motor increases rapidly during ramp up, the auto ramp adaptation feature may not help prevent the drive from experiencing an overcurrent or overvoltage. **NOTE:** To have a repeatability in the ramps, the value of these parameters must be set according to the possibility of the application (for example the inertia must be considered).	**[AUTO]** AUTO
	[Deceleration] DEC			**[AUTO]** AUTO
	[Low Speed] LSP	**[Speed Limits]** SLM–	Minimum motor frequency reference.	0.0 Hz
	[High Speed] HSP		Maximum motor frequency reference.	50.0 Hz (6)

Step	Parameter	Menu	Description	Factory setting
7 — Output Phase Rotation	**[Output Ph Rotation]** PHR	**[Motor control]** DRC –	Modifying this parameter operates as an inversion of 2 of the three motor phases. This results in changing the direction of rotation of the motor.	**[ABC]** ABC

(1): This parameter can only be accessed with asynchronous motor control law.

(2): The access to this parameter depends on **[Motor param choice]** MPC. This parameter can be accessed in **[data]** MTD– menu.

(3): Read-only parameter.

(4): The factory setting, the unit and/or the increment is impacted by the drive rating and/or **[Motor Standard]** BFR.

(5): The factory setting value is changed to 72 Hz if **[Motor Standard]** BFR is set to **[60 Hz] NEMA** 60Hz.

(6): The factory setting value is changed to 60 Hz if **[Motor Standard]** BFR is set to **[60 Hz] NEMA** 60Hz.

[My menu] MYMN– Menu

Access

[Simply Start] ➜ **[My menu]**

About This Menu

This menu contains the parameters selected in the **[My menu config.]** MYC– Menu.

NOTE: This menu is empty by default.

[Modified parameters] LMD– Menu

Access

[Simply Start] ➜ **[Modified parameters]**

About This Menu

This menu gives a quick access to the 10 last modified parameters.

[Dashboard] DSH–

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Introduction

[Dashboard] DSH– menu contains tabs for quick access to system and display features:

- System tab to configure the main system parameters.
- Energy tab which provides a complete access for instantaneous power counters and energy reports by means of graphics on the Graphic Display Terminal.

NOTE: This menu is only accessible with the graphic display terminal.

[Pump Dashboard] PMT– Menu

Access

[Dashboard]➡ [Pump Dashboard]

About This Menu

This menu provides informations related to the pump.

This menu can be accessed if **[Application Selection]** APPT is not set to **[Generic Fan Ctrl]** FAN.

[Pre-Ramp Ref Freq] FRH

Reference frequency before ramp (signed value).

Actual frequency reference linked to the motor regardless of which channel for reference value has been selected. This parameter is in read-only mode.

Setting	Description
-**[High Speed]** HSP...**[High Speed]** HSP Hz	Setting range **Factory setting: –**

[Device State] HMIS

Device state.

Setting	Code / Value	Description
[Autotuning]	TUN	AutoTuning
[In DC inject.]	DCB	DC Injection breaking
[Ready]	RDY	Drive ready
[Freewheel]	NST	Freewheel stop control
[Running]	RUN	Motor in steady state or run command present and zero reference
[Accelerating]	ACC	Acceleration
[Decelerating]	DEC	Deceleration
[Current Limitation]	CLI	In current limitation
[Fast stop]	FST	Fast stop
[No Mains Voltage]	NLP	Control is powered on but the DC bus is not loaded
[control.stop]	CTL	Controlled stop
[Dec. adapt.]	OBR	Adapted deceleration
[Output cut]	SOC	Downstream contactor open
[UnderV Warn]	USA	Undervoltage warning
[TC Mode Active]	TC	TC indus mode activated
[In autotest]	ST	Self test in progress

Setting	Code / Value	Description
[Autotest error]	FA	Self test failed
[Autotest OK]	OK	Self test ok
[EEprom test]	EP	Self test EEPROM fault
[Operating State "Fault"]	FLT	Product has detected an error
[DCP Flash Mode]	DCP	DCP flashing mode
[Fire Mode Active]	DCP	Fire mode enable
[Forced Mode Active]	FORC	Force mode enable
[Wait Confirm]	PERM	Run permissive: wait confirm signal
[Waiting For Interlock]	INT	Run permissive: wait interlock signal
[STO active]	STO	Safe Torque Off active
[Waiting For Damper]	DMP	Wait Damper
[Energy Saving]	IDLE	Idle stop and go mode
[Firmware Update]	FWUP	Firmware update

[MultiPump State] MPS ★

This parameter can be accessed if **[Pump System Archi]** MPSA is not set to **[Mono-Pump]** NO.

Setting	Code / Value	Description
[None]	NONE	None
[Ready]	READY	Ready
[Running]	RUN	Running
[Warning]	ALARM	Warning
[Error]	FAULT	Error
[Not Available]	NAVL	Not available

[Available Pumps] MPAN ★

This parameter can be accessed if **[Pump System Archi]** MPSA is not set to **[Mono-Pump]** NO.

Setting	Description
0...**[Nb Of Pumps]** MPPN	Setting range **Factory setting: –**

[Nb of Staged Pumps] MPSN ★

This parameter can be accessed if **[Pump System Archi]** MPSA is not set to **[Mono-Pump]** NO.

Setting	Description
0...**[Nb Of Pumps]** MPPN	Setting range **Factory setting: –**

[Motor Current] LCR

Motor current

Setting	Description
According to drive rating	Setting range **Factory setting: –**

[Motor Speed] SPD

This parameter displays the estimated rotor speed without motor slip.

Setting	Description
0...65,535 rpm	Setting range **Factory setting: –**

[Motor Therm State] THR

The normal motor thermal state is 100%, the **[Motor Overload]** OLF threshold is set to 118%.

Setting	Description
0...200%	Setting range **Factory setting: –**

[Fan Dashboard] FAN– Menu

Access

[Dashboard] ➡ [Fan Dashboard]

About This Menu

This menu provides informations related to the fan.

This menu can be accessed if **[Application Selection]** APPT is set to **[Generic Fan Ctrl]** FAN.

[Pre-Ramp Ref Freq]FRH

Reference frequency before ramp (signed value).

Actual frequency reference linked to the motor regardless of which channel for reference value has been selected. This parameter is in read-only mode.

Setting	Description
-**[High Speed]** HSP...**High Speed]** HSP Hz	Setting range **Factory setting: –**

[Device State] HMIS

Device state.

Setting	Code / Value	Description
[Autotuning]	TUN	Autotuning
[In DC inject.]	DCB	DC Injection breaking
[Ready]	RDY	Drive ready
[Freewheel]	NST	Freewheel stop control
[Running]	RUN	Motor in steady state or run command present and zero reference
[Accelerating]	ACC	Acceleration
[Decelerating]	DEC	Deceleration
[Current Limitation]	CLI	In current limitation
[Fast stop]	FST	Fast stop
[No Mains Voltage]	NLP	Control is powered on but the DC bus is not loaded
[control.stop]	CTL	Controlled stop
[Dec. adapt.]	OBR	Adapted deceleration
[Output cut]	SOC	Stand by output cut
[UnderV Warn]	USA	Undervoltage warning
[Operating State "Fault"]	FLT	Product has detected an error

Setting	Code / Value	Description
[DCP Flash Mode]	DCP	DCP flashing mode
[STO active]	STO	Safe Torque Off active
[Energy Saving]	IDLE	Idle stop and go mode
[Firmware Update]	FWUP	Firmware update
[TC Mode Active]	TC	***TC mode active***
[Forced Mode Active]	FORCE	***Forced mode is active***
[Fire Mode Active]	FIRE	***Fire mode is active***
[Waiting For Run Perm]	PRM	***Waiting for run permissive signal***
[Waiting For Interlock]	INT	***Waiting for interlock signal***
[Waiting For Damper]	DMP	***Waiting for damper opening***

[Motor Current] LCR

RMS motor current. Average of the three line currents based on the measurement of the fundamental of the motor line currents.

Setting	Description
Unit depends on the drive rating	Setting range **Factory setting: –**

[Motor Speed] SPD

This parameter displays the estimated rotor speed without motor slip.

Setting	Description
0...65,535 rpm	Setting range **Factory setting: –**

[Motor Therm State] THR

The nominal motor thermal state is 100%, the **[Motor Overload]** OLF threshold is set to 118%.

Setting	Description
0...200%	Setting range **Factory setting: –**

[Control] CTR– Menu

Access

[Dashboard] ➜ **[Control]**

About This Menu

This menu can be accessed if **[Application Selection]** APPT is not set to **[Generic Fan Ctrl]** FAN.

[Application state] APPS

This parameter indicates the drive application state.

Setting	Code / Value	Description
[Running]	RUN	No application function in progress; the drive is running
[Stop]	STOP	No application function in progress; the drive is not running
[Local Mode Active]	LOCAL	Forced local mode activated
[Channel 2 Active]	OVER	Override speed control mode activated
[Manual Mode Active]	MANU	Motor running; manual PID mode is active
[PID Active]	AUTO	Motor running; auto PID mode is active
[Boost In progress]	BOOST	The boost is in progress
[Sleep Active]	SLEEP	The sleep is active
[Undefined]	UNDEF	Undefined

[Booster Status] BCS ★

This parameter can be accessed if **[Application Selection]** APPT is set to **[Pump Booster Ctrl]** BOOST and **[Booster Control]** BCM is set to **[Yes]** YES.

Setting	Code / Value	Description
[None]	NONE	Not configured
[Inactive]	NACT	Inactive
[Running]	RUN	Running
[Stage Pending]	STGP	Stage pending
[Destage pending]	DSTGP	Destage pending
[Staging]	STG	Staging in progress
[Destaging]	DSTG	Destage in progress

[PID reference] RPC ★

This parameter can be accessed if **[PID feedback Assign]** PIF is not set to **[Not Configured]** NO.

Setting	Description
0...65,535%	Setting range **Factory setting: –**

[PID feedback] RPF ★

This parameter can be accessed if **[PID feedback Assign]** PIF is not set to **[Not Configured]** NO.

Setting	Description
0...65,535%	Setting range **Factory setting: –**

[Outlet Pressure] PS2V

This parameter can be accessed if **[OutletPres Assign]** PS2A is not set to **[Not Configured]** NO.

Setting	Description
-32,767...32,767	Setting range according to **[P sensor unit]** SUPR **Factory setting: –**

[Control] FTR– Menu

Access

[Dashboard] ➜ [Control]

About This Menu

This menu can be accessed if **[Application Selection]** APPT is set to **[Generic Fan Ctrl]** FAN.

[PID reference] RPC ★

This parameter can be accessed if **[PID feedback Assign]** PIF is not set to **[Not Configured]** NO.

Setting	Description
0...65,535%	Setting range **Factory setting: –**

[PID feedback] RPF ★

This parameter can be accessed if **[PID feedback Assign]** PIF is not set to **[Not Configured]** NO.

Setting	Description
0...65,535%	Setting range **Factory setting: –**

[Dashboard] DSH– Menu

Access

[Dashboard]

About This Menu

Using **F4** function key on the Graphic Display Terminal, it is possible to select one of the following view for the **[Control]** tab.

[PID feedback trend] PFT

Displays the instantaneous PID controller feedback curve.

[Oulet pressure trend] OPT

Displays the instantaneous outlet pressure curve.

[kWh Counters] KWC– menu

Access

[Dashboard] ➜ [kWh Counters]

About This Menu

This menu presents many energy objects available for instantaneous data and kW consumption reports.

It offers the possibility to display logged data with graphics by pressing the F4 function key.

[Elc Energy Cons] OC4 ★

This parameter can be accessed if **[Elc Energy Cons]** OC4 is not set to 0.

Setting	Description
0...999 TWh	Setting range **Factory setting**: Read Only

[Elc Energy Cons] OC3 ★

Electrical energy consumed by the motor (GWh)

Setting	Description
0...999 GWh	Setting range **Factory setting**: Read Only

[Elc Energy Cons] OC2 ★

Electrical energy consumed by the motor (MWh)

Setting	Description
0...999 MWh	Setting range **Factory setting**: Read Only

[Elc Energy Cons] OC1 ★

Electrical energy consumed by the motor (KWh)

Setting	Description
0...999 kWh	Setting range **Factory setting**: Read Only

[Elc Energy Cons] OC0 ★

Electrical energy consumed by the motor (Wh)

Setting	Description
0...999 Wh	Setting range **Factory setting**: Read Only

[Acv Elc Out Pwr in kW] EPRW

Active Electrical output power in kW

Setting	Description
-32,767...32,767	Setting range Value in kW or HP according to **[Motor Standard]** BFR setting **Factory setting**: Read Only

[Elc Egy Today] OCT

Electrical energy consumed TODAY by the motor (KWh)

Setting	Description
0...4,294,967,295 kWh	Setting range in kWh **Factory setting**: Read Only

[Elc Egy Yesterday] OCY

Electrical energy consumed YESTERDAY by the motor (KWh)

Setting	Description
0...4,294,967,295 kWh	Setting range in kWh **Factory setting**: Read Only

[Diagnostics] DIA–

What's in This Chapter

[Diag. data] DDT– Menu 80
[Error history] PFH– Menu.....82
[Warnings] ALR– Menu.....84

Introduction

[Diagnostics] DIA– menu presents drive and application data useful when diagnostics is required.

[Diag. data] DDT– Menu

Access

[Diagnostics] ➜ **[Diag. data]**

About This Menu

This menu presents the last warning and detected error in addition to drive data.

[Last Warning] LALR

The list of warning codes is available in the chapter Warning Codes, page 529.

NOTE: This parameter is only accessible with the Graphic Display Terminal and not visible using the Plain Text Display Terminal.

[Last Error] LFT

The list of error codes is available in the chapter Error Codes, page 532.

NOTE: This parameter is only accessible with the Graphic Display Terminal and not visible using the Plain Text Display Terminal.

[Internal Error 6] INF6 ★

This parameter can be accessed if **[Last Error]** LFT is **[Internal Error 6]** INF6 in order to provide more information on the related error.

Setting	Description
0...12 (value in Hex.)	0x00 : No error detected 0x01 : No response of the option module 0x02 : Signature reception timeout 0x03 : ACK reception timeout 0x04 : Signature length 0x05 : CheckSum 0x06 : Unknown state 0x07 : UART receive 0x08 : Unknown protocol version 0x09 : Unknown module type 0x0A : More than 5 unsuccessful tries 0x0B : Unknown module type 0x0C : Option module not supported by the slot 0x0D : Same option module in more than one slot 0x0E : O1SV not received 0x0F : O1SV option module software version not compatible 0x10 : reserved 0x11 : reserved 0x12 : Control terminal module not present or not recognized **Factory setting**: Read-only parameter

[Nb Of Starts] NSM

Number of motor starts (resettable).

NOTE: This parameter is only accessible with the Graphic Display Terminal and not visible using the Plain Text Display Terminal.

Setting	Description
0...4,294,967,295	Setting range **Factory setting**: —

[Motor Run Time] RTHH

Run elapsed time display (resettable) in 0.1 hours (length of time the motor has been switched on).

NOTE: This parameter is only accessible with the Graphic Display Terminal and not visible using the Plain Text Display Terminal.

Setting	Description
0.0...119,304.5 h	Setting range **Factory setting**: _

[Service Message] SER– menu

This menu presents the service message.

This service message is defined using **[My preferences]** MYP–➞ **[Customization]** CUS–➞**[Service Message]** SER– menu.

[Other State] SST– menu

This menu shows the list of present secondary states.

For more information refer to **[Display]** MON–➞ **[Other State]** SST–.

[Diagnostics] DAU– menu

This menu allows to make simple test sequences for diagnostics such as Fan(s), HMI LED(s) and IGBT(s) diagnostics.

For more information refer to **[Complete settings]** CST–➞ **[Maintenance]** CSMA–➞**[Diagnostics]** DAU–.

[Identification] OID– menu

This is a read-only menu that cannot be configured. It enables the following information to be displayed:

- Drive reference, power rating, and voltage
- Drive software version
- Drive serial number
- Type of option modules present, with their software version
- Display Terminal type and version.

[Error history] PFH– Menu

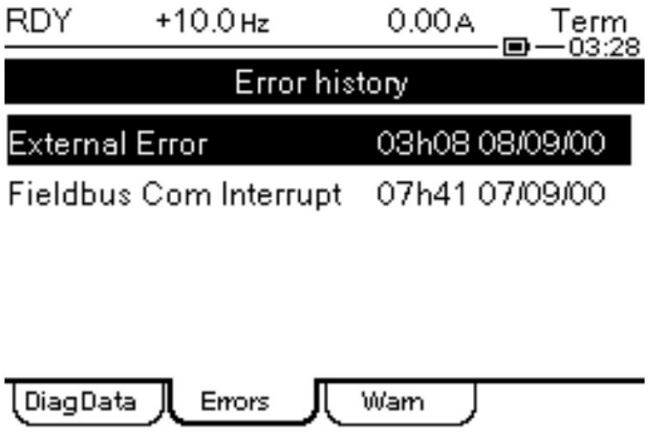
Access

[Diagnostics] ➜ **[Error history]**

About This Menu

This menu shows the 15 last detected errors (**[Last Error 1]** DP1 to **[Last Error 15]** DPF). **[Last Error 1]** DP1 is the last stored error.

With the Graphic Display Terminal, the date and time, at which the error has been triggered, is displayed in this menu. The date and time could be set through the **[Set Date/Time]** DTO , page 506



NOTE: The list of error codes is available in the chapter "Diagnostics and Troubleshooting" , page 532.

NOTE: If **[Auto Fault Reset]** ATR is active, a triggered error is not stored in the error history until the attempts to perform the Fault Reset end unsuccessful.

Pressing OK key on the selected error code in the error history list displays the drive data recorded when the error has been detected.

NOTE: Pressing F1 on the Graphic Display Terminal can give more information about the selected error.

The below table shows the list of drive data recorded for each detected error (these are read-only parameters).

Parameter	Code	Description	Related to the parameter...
[Device State]	HS1...HSF	HMI Status.	**[Device State]** HMIS
[Last Error x Status]	EP1...EPF	ETA state word: status of last error x. DRIVECOM status register displayed in hexadecimal	**CIA402** [StAtuS rEG iSteR] ETA
[ETI state word]	IP1...IPF	ETI state word (displayed in hexadecimal). **NOTE: [Internal State Reg]** ETI can be accessed using fieldbus communication.	**[Internal State Reg]** ETI
[Cmd word]	CMP1...CMPF	Cmd word (displayed in hexadecimal).	**[Cmd Register]** CMD
[Motor Current]	LCP1...LCPF	Motor current (unit is similar to **[Motor Current]** LCR)	**[Motor Current]** LCR

Parameter	Code	Description	Related to the parameter...
[Motor Frequency]	RFP1...RFPF	Output frequency (signed value).	**[Motor Frequency]** RFR
[Run Elapsed time]	RTP1...RTPF	Elapsed time (value in hours).	**[Motor Run Time]** RTHH
[DC bus voltage]	ULP1...ULP8	DC bus voltage (value in 0.1 V) **NOTE: [No meas.]** ULNUNK is displayed if no value is measured.	**[DC bus voltage]** VBUS
[Motor Therm State]	THP1...THPF	Motor thermal state.	**[Motor Therm State]** THR
[Command Channel]	DCC1...DCCF	Command channel. **NOTE:** The command channel can be different from the reference frequency channel in separated mode.n	**[Command Channel]** CMDC
[Ref Freq Channel]	DRC1...DRCF	Channel for reference frequency.	**[Ref Freq Channel]** RFCC
[Motor torque]	OTP1...OTPF	Motor torque (estimated value in 0.1 % of **[Nom Motor torque]** TQN). **NOTE:** The displayed value is always positive in motor mode and negative in generator mode whatever the direction.	**[Motor torque]** OTR
[Drive Therm State]	TDP1...TDPF	Drive thermal state (measured).	**[Drive Therm State]** THD
[IGBT Junction Temp]	TJP1...TJPF	IGBT junction temperature (estimated value in 1 °C).	Not applicable
[Switching frequency]	SFP1...SFPF	Switching Frequency (value in 1 Hz).	**[Switching frequency]** SFR

[Warnings] ALR– Menu

[Actual Warnings] ALRD– Menu

Access

[Diagnostics] ➜ [Warnings] ➜ [Actual Warnings]

About This Menu

List of current warnings.

If a warning is active, ✓ and ! appears on the Graphic Display Terminal.

List of Available Warnings

The list of warning codes is available in the chapter Diagnostics and Troubleshooting, page 528.

[Warn grp 1 definition] A1C– to [Warn grp 5 definition] A5C– Menus

Access

[Diagnostics] ➜ [Warnings] ➜ [Warn grp 1 definition] to **[Warn grp 5 definition]**

About This Menu

The following submenus group the warnings into 1 to 5 groups, each of which can be assigned to a relay or a digital output for remote signaling.

When one or a number of warnings selected in a group occurs, this warning group is activated.

List of Warnings

The list of warning codes is available in the chapter Diagnostics and Troubleshooting, page 528.

[Warnings] ALR– Menu

Access

[Diagnostics] ➜ [Warnings]

About This Menu

This menu presents the warning history (30 past warnings).

[Warning History] ALH

Identical to **[Last Warning]** LALR.

[Display] MON–

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[Counter Management] ELT– Menu..... 114
[Other State] SST– Menu 116
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[Communication map] CMM– Menu 120
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Introduction

[Display] MON– menu shows monitoring data related to the drive and the application.

This menu is accessible if **[Access Level]** LAC is set to a different value than **[Basic]** BAS.

It offers an application-oriented display in terms of energy, cost, cycle, efficiency, ...

This is available with customized units and graphics view.

[Energy parameters]

[Elec Ener Inp Count] ELI– Menu

Access

[Display] ➞ [Energy parameters] ➞ [Elec Ener Inp Count]

About This Menu

This menu presents the input electrical energy data.

NOTE: On blemo HVAC ER330, the power and energy parameters are estimated based on the output current of the drive.

[Active Input Power] IPRW

Instantaneous active input power.

Value range	Description
According to the drive rating	Unit is in kW if **[Motor Standard]** BFR is set to **[50 Hz] IEC** 50Hz or in HP if **[Motor Standard]** BFR is set to **[60 Hz] NEMA** 60Hz **Factory setting**: _

[Real Input Energy] IE4 ★

Real input Energy (TWh).

This parameter can be accessed if **[Real Input Energy]** IE4 is not set to 0.

NOTE: This parameter must be set to 0 before switching from a negative value to a positive value or vice versa.

Value range	Description
-999...999 TWh	**Factory setting**: _

[Real Input Energy] IE3 ★

Real input Energy (GWh).

NOTE: This parameter must be set to 0 before switching from a negative value to a positive value or vice versa.

Value range	Description
-999...999 GWh	**Factory setting**: _

[Real Input Energy] IE2 ★

Real input Energy (MWh).

NOTE: This parameter must be set to 0 before switching from a negative value to a positive value or vice versa.

Value range	Description
-999...999 MWh	**Factory setting**: _

[Real Input Energy] IE1 ★

Real input Energy (kWh).

NOTE: This parameter must be set to 0 before switching from a negative value to a positive value or vice versa.

Value range	Description
-999...999 kWh	**Factory setting**: _

[Real Input Energy] IE0 ★

Real input Energy (Wh).

NOTE: This parameter must be set to 0 before switching from a negative value to a positive value or vice versa.

Value range	Description
-999...999 Wh	**Factory setting**: _

[Elec Ener Out Count] ELO– Menu

Access

[Display] ➞ [Energy parameters] ➞ [Elec Ener Out Count]

About This Menu

This menu presents the output electrical energy data.

[Acv Elc Out Pwr in kW] EPRW

Active Electrical output power in kW.

Value range	Description
According to the drive rating	Unit is in kW if **[Motor Standard]** BFR is set to **[50 Hz] IEC** 50Hz or in HP if **[Motor Standard]** BFR is set to **[60 Hz] NEMA** 60Hz **Factory setting**: _

[Real Consumption] OE4 ★

Real energy consumption (TWh).

This parameter can be accessed if **[Real Consumption]** OE4 is not set to 0.

Value range	Description
-999...999 TWh	**Factory setting**: _

[Real Consumption] OE3

Real energy consumption (GWh).

Value range	Description
-999...999 GWh	**Factory setting**: _

[Real Consumption] OE2

Real energy consumption (MWh).

Value range	Description
-999...999 MWh	**Factory setting**: _

[Real Consumption] OE1

Real energy consumption (kWh).

Value range	Description
-999...999 kWh	**Factory setting**: _

[Real Consumption] OE0

Real energy consumption (Wh).

Value range	Description
-999...999 Wh	**Factory setting**: _

[Elc Egy Today] OCT

Electrical energy consumed TODAY by the motor (KWh).

Value range	Description
0...4,294,967,295 kWh	**Factory setting**: _

[Elc Egy Yesterday] OCY

Electrical energy consumed YESTERDAY by the motor (KWh).

Value range	Description
0...4,294,967,295 kWh	**Factory setting**: _

[Over-Cons Thd] PCAH

Over-consumption threshold.

Value range	Description
[Under-Cons Thd] PCAL...200.0%	**Factory setting**: 0.0%

[Under-Cons Thd] PCAL

Under-consumption threshold.

Maximum value = PCAH if PCAH ≤ 100%.

Value range	Description
0.0...100.0% or **[Over-Cons Thd]** PCAH if PCAH ≤ 100%	**Factory setting**: 0.0%

[Over/Under-Cons Delay] PCAT

Over/Under-consumption time delay.

Value range	Description
0...60 min	**Factory setting**: 1 min

[Peak Elec Out Power] MOEP

Peak electrical output power.

Value range	Description
According to the drive rating	**Factory setting**: _

[Mechanical Energy] MEC– Menu

Access

[Display] ➞ **[Energy parameters]** ➞ **[Mechanical Energy]**

About This Menu

This menu presents the output mechanical energy data.

[Power Estim Value] OPRW

Motor mechanical power estimation.

Value range	Description
According to the drive rating	Unit is in kW if **[Motor Standard]** BFR is set to **[50 Hz] IEC** 50Hz or in HP if **[Motor Standard]** BFR is set to **[60 Hz] NEMA** 60Hz **Factory setting**: _

[Motor Consumption] ME4 ★

Motor energy consumption (TWh).

This parameter can be accessed if **[Motor Consumption]** ME4 is not set to 0.

Value range	Description
0...999 TWh	**Factory setting**: _

[Motor Consumption] ME3 ★

Motor energy consumption (GWh).

Value range	Description
0...999 GWh	**Factory setting**: _

[Motor Consumption] ME2 ★

Motor energy consumption (MWh).

Value range	Description
0...999 MWh	**Factory setting**: _

[Motor Consumption] ME1 ★

Motor energy consumption (kWh).

Value range	Description
0...999 kWh	**Factory setting**: _

[Motor Consumption] ME0 ★

Motor energy consumption (Wh).

Value range	Description
0...999 Wh	**Factory setting**: _

[Energy Saving] ESA– Menu

Access

[Display] ➞ [Energy parameters] ➞ [Energy Saving]

About This Menu

This menu presents the comparison in term of cost, energy, CO2 between solutions with and without drive.

[Reference Power] PREF

Reference power without drive.

Value range	Description
0.00...655.35 kW	Unit is in kW if **[Motor Standard]** BFR is set to **[50 Hz] IEC** 50Hz or in HP if **[Motor Standard]** BFR is set to **[60 Hz] NEMA** 60Hz. **Factory setting**: 0.00 kW

[kWh Cost] ECST

kWh Cost.

Value range	Description
0.00...655.35 $	Unit is in € if **[Motor Standard]** BFR is set to **[50 Hz] IEC** 50Hz or in $ if **[Motor Standard]** BFR is set to **[60 Hz] NEMA** 60Hz. **Factory setting**: _

[CO2 ratio] ECO2

CO2 ratio.

Value range	Description
0.000...65.535 kg/kWh	**Factory setting**: 0.000 kg/kWh

[Energy Saved] ESAV

Energy Saved.

Value range	Description
0...4,294,967,295 kWh	**Factory setting**: _

[Money Saved] CASH

Money saved.

Value range	Description
0.00...42,949,672 $	Unit is in € if **[Motor Standard]** BFR is set to **[50 Hz] IEC** 50Hz or in $ if **[Motor Standard]** BFR is set to **[60 Hz] NEMA** 60Hz. **Factory setting**: _

[Co2 Saved] CO2S

Co2 Saved.

Value range	Description
0.0...429,496,729.5 t	**Factory setting**: _

[App Parameters] APR– Menu

Access

[Display] ➡ **[App Parameters]**

About This Menu

This menu displays information related to the application.

[Application state] APPS

This parameter indicates the drive application state.

Setting	Code / Value	Description
[Running]	RUN	No application function in progress; the drive is running
[Stop]	STOP	No application function in progress; the drive is not running
[Local Mode Active]	LOCAL	Forced local mode activated
[Channel 2 Active]	OVER	Override speed control mode activated
[Manual Mode Active]	MANU	Motor running; manual PID mode is active
[PID Active]	AUTO	Motor running; auto PID mode is active
[Boost In progress]	BOOST	The boost is in progress
[Sleep Active]	SLEEP	The sleep is active
[Undefined]	UNDEF	Undefined

[Booster Status] BCS ★

This parameter can be accessed if **[Application Selection]** APPT is set to **[Pump Booster Ctrl]** BOOST and the **[Booster Control]** BCM is set to **[Yes]**.

Value range	Code / Value	Description
[None]	NONE	Not configured
[Inactive]	NACT	Inactive
[Running]	RUN	Running
[Stage Pending]	STGP	Stage pending
[Destage pending]	DSTGP	Destage pending
[Staging]	STG	Staging in progress
[Destaging]	DSTG	Destage in progress

[PID reference] RPC ★

This parameter can be accessed if **[PID feedback Assign]** PIF is not set to **[Not Configured]** NO.

Value range	Description
0...65,535%	**Factory setting: –**

[PID feedback] RPF ★

This parameter can be accessed if **[PID feedback Assign]** PIF is not set to **[Not Configured]** NO.

Value range	Description
0...65,535%	**Factory setting: –**

[Outlet Pressure] PS2V

This parameter can be accessed if **[OutletPres Assign]** PS2A is not set to **[Not Configured]** NO.

Value range	Description
-32,767...32,767	The value depends on the **[P sensor unit]** SUPR parameter **Factory setting: –**

[Pump parameters]

[Variable Speed Pump] MPP– Menu

Access

[Display] ➞ [Pump parameters] ➞ [Variable Speed Pump]

NOTE: The menu is visible when **[Application Selection]** is set to **[Generic Pump Ctrl]** or **[Pump Booster Ctrl]**.

About This Menu

This menu shows the pump-related parameters.

[Motor Run Time] RTHH

Run elapsed time display (resettable) in 0.1 hours (length of time the motor has been switched on).

NOTE: This parameter is only accessible with the graphic display terminal VW3A1121.

Value range	Description
0.0...119,304.5 h	**Factory setting**: _

[Motor Mech speed] SPDM

This parameter displays the estimated rotor speed with motor slip.

Value range	Description
0...65,535 rpm	**Factory setting**: _

[Nb Of Starts] NSM

Number of motor starts (resettable).

NOTE: This parameter is only accessible with the graphic display terminal VW3A1121.

Value range	Description
0...4,294,967,295	**Factory setting**: _

[Acv Elc Out Pwr in kW] EPRW

Active Electrical output power in kW

Value range	Description
-327.67...327.67 kW	Unit is in kW if **[Motor Standard]** BFR is set to **[50 Hz] IEC** 50Hz or in HP if **[Motor Standard]** BFR is set to **[60 Hz] NEMA** 60Hz. **Factory setting**: _

[Outlet Pressure] PS2V ★

This parameter can be accessed if **[OutletPres Assign]** PS2A is not set to **[Not Configured]** NO.

Value range	Description
-32,767...32,767	The value depends on the **[P sensor unit]** SUPR parameter **Factory setting: –**

[Efficiency] EFY

The efficiency is based on mechanical power.

Value range	Description
0.0...100.0 %	**Factory setting**: _

[Energy Cons. Ind.] ECI

Energy consumption indication is based on the consumption of the electrical power

Value range	Description
-32,767...32,767	**Factory setting: –**

[Energy Perf. Ind] EPI

Energy performance indicator is based on the electrical power

Value range	Description
-32,767...32,767	**Factory setting: –**

[Highest Eff.] EFYK

Highest Efficiency.

Value range	Description
0.0...100.0 %	**Factory setting**: _

[Lowest Eff.] EFYJ

Lowest Efficiency.

Value range	Description
0.0...100.0 %	**Factory setting**: _

[Multipump System] MPS– Menu

Access

[Display] ➞ [Pump parameters] ➞ [Multipump System]

About This Menu

This menu can be accessed if **[Pump System Archi]** MPSA is not set to **[Mono-Pump]** NO.

[MultiPump State] MPS

MultiPump function state.

Value range	Code / Value	Description
[None]	NONE	None
[Ready]	READY	Ready
[Running]	RUN	Running
[Warning]	ALARM	Warning
[Error]	FAULT	Error
[Not Available]	NAVL	Not available

[Available Pumps] MPAN

Number of available pumps.

Value range	Description
0...65,535	**Factory setting: –**

[Nb of Staged Pumps] MPSN

Number of staged pumps.

Value range	Description
0...65,535	**Factory setting: –**

[Lead Pump] PLID

Lead pump.

Value range	Code / Value	Description
[None]	NONE	None
[Pump 1]	P01	Pump number 1
[Pump 2]	P02	Pump number 2
[Pump 3]	P03	Pump number 3
[Pump 4]	P04	Pump number 4

Value range	Code / Value	Description
[Pump 5]	P05	Pump number 5
[Pump 6]	P06	Pump number 6

[Next Staged Pump] PNTS

Identical to **[Lead Pump]** PLID , page 100.

[Next Destaged Pump] PNTD

Identical to **[Lead Pump]** PLID , page 100.

[Pump 1 State] P1S ★

This parameter can be accessed if **[Nb Of Pumps]** MPPN or **[Nb of Devices]** MPGN is set to 1 or higher.

Value range	Code / Value	Description
[None]	NONE	Not configured
[Not Available]	NAVL	Unavailable
[Ready]	RDY	Ready
[Running]	RUN	Running

[Pump 1 Type] P1T ★

This parameter can be accessed if **[Nb Of Pumps]** MPPN or **[Nb of Devices]** MPGN is set to 1 or higher.

Value range	Code / Value	Description
[Undefined]	NONE	Undefined
[Lead]	LEAD	Lead pump
[Lead or Auxiliary]	LAF	Lead or auxiliary fixed speed pump
[Lead or Aux. Variable]	LAV	Lead or auxiliary variable speed pump
[Auxiliary]	AUXF	Auxiliary fixed speed pump
[Auxiliary Variable]	AUXV	Auxiliary variable speed pump
[Error]	ERR	Error

[Pump 1 Runtime] P1OT ★

This parameter can be accessed if **[Nb Of Pumps]** MPPN or **[Nb of Devices]** MPGN is set to 1 or higher.

Value range	Description
0...4,294,967,295 s	**Factory setting: –**

[Pump 1 Nb Starts] P1NS ★

This parameter can be accessed if **[Nb Of Pumps]** MPPN or **[Nb of Devices]** MPGN is set to 1 or higher.

Value range	Description
0...4,294,967,295 s	**Factory setting: –**

[Pump 2 State] P2S ★

This parameter can be accessed if **[Nb Of Pumps]** MPPN or **[Nb of Devices]** MPGN is set to 2 or higher.

Identical to **[Pump 1 State]** P1S , page 101.

[Pump 2 Type] P2T ★

This parameter can be accessed if **[Nb Of Pumps]** MPPN or **[Nb of Devices]** MPGN is set to 2 or higher.

Identical to **[Pump 1 Type]** P1T , page 101.

[Pump 2 Runtime] P2OT ★

This parameter can be accessed if **[Nb Of Pumps]** MPPN or **[Nb of Devices]** MPGN is set to 2 or higher.

Identical to **[Pump 1 Runtime]** P1OT , page 101.

[Pump 2 Nb Starts] P2NS ★

This parameter can be accessed if **[Nb Of Pumps]** MPPN or **[Nb of Devices]** MPGN is set to 2 or higher.

Identical to **[Pump 1 Nb Starts]** P1NS , page 102.

[Pump 3 State] P3S ★

This parameter can be accessed if **[Nb Of Pumps]** MPPN or **[Nb of Devices]** MPGN is set to 3 or higher.

Identical to **[Pump 1 State]** P1S , page 101.

[Pump 3 Type] P3T ★

This parameter can be accessed if **[Nb Of Pumps]** MPPN or **[Nb of Devices]** MPGN is set to 3 or higher.

Identical to **[Pump 1 Type]** P1T , page 101.

[Pump 3 Runtime] P3OT ★

This parameter can be accessed if **[Nb Of Pumps]** MPPN or **[Nb of Devices]** MPGN is set to 3 or higher.

Identical to **[Pump 1 Runtime]** P1OT , page 101.

[Pump 3 Nb Starts] P3NS ★

This parameter can be accessed if **[Nb Of Pumps]** MPPN or **[Nb of Devices]** MPGN is set to 3 or higher.

Identical to **[Pump 1 Nb Starts]** P1NS , page 102.

[Pump 4 State] P4S ★

This parameter can be accessed if **[Nb Of Pumps]** MPPN or **[Nb of Devices]** MPGN is set to 4 or higher.

Identical to **[Pump 1 State]** P1S , page 101.

[Pump 4 Type] P4T ★

This parameter can be accessed if **[Nb Of Pumps]** MPPN or **[Nb of Devices]** MPGN is set to 4 or higher.

Identical to **[Pump 1 Type]** P1T , page 101.

[Pump 4 Runtime] P4OT ★

This parameter can be accessed if **[Nb Of Pumps]** MPPN or **[Nb of Devices]** MPGN is set to 4 or higher.

Identical to **[Pump 1 Runtime]** P1OT , page 101.

[Pump 4 Nb Starts] P4NS ★

This parameter can be accessed if **[Nb Of Pumps]** MPPN or **[Nb of Devices]** MPGN is set to 4 or higher.

Identical to **[Pump 1 Nb Starts]** P1NS , page 102.

[Pump 5 State] P5S ★

This parameter can be accessed if **[Nb Of Pumps]** MPPN or **[Nb of Devices]** MPGN is set to 5 or higher.

Identical to **[Pump 1 State]** P1S , page 101.

[Pump 5 Type] P5T ★

This parameter can be accessed if **[Nb Of Pumps]** MPPN or **[Nb of Devices]** MPGN is set to 5 or higher.

Identical to **[Pump 1 Type]** P1T , page 101.

[Pump 5 Runtime] P5OT ★

This parameter can be accessed if **[Nb Of Pumps]** MPPN or **[Nb of Devices]** MPGN is set to 5 or higher.

Identical to **[Pump 1 Runtime]** P1OT , page 101.

[Pump 5 Nb Starts] P5NS ★

This parameter can be accessed if **[Nb Of Pumps]** MPPN or **[Nb of Devices]** MPGN is set to 5 or higher.

Identical to **[Pump 1 Nb Starts]** P1NS , page 102.

[Pump 6 State] P6S ★

This parameter can be accessed if **[Nb Of Pumps]** MPPN or **[Nb of Devices]** MPGN is set to 6.

Identical to **[Pump 1 State]** P1S , page 101.

[Pump 6 Type] P6T ★

This parameter can be accessed if **[Nb Of Pumps]** MPPN or **[Nb of Devices]** MPGN is set to 6.

Identical to **[Pump 1 Type]** P1T , page 101.

[Pump 6 Runtime] P6OT ★

This parameter can be accessed if **[Nb Of Pumps]** MPPN or **[Nb of Devices]** MPGN is set to 6.

Identical to **[Pump 1 Runtime]** P1OT , page 101.

[Pump 6 Nb Starts] P6NS ★

This parameter can be accessed if **[Nb Of Pumps]** MPPN or **[Nb of Devices]** MPGN is set to 6.

Identical to **[Pump 1 Nb Starts]** P1NS , page 102.

[Motor parameters] MMO– Menu

Access

[Display] ➞ [Motor parameters]

About This Menu

This menu shows the motor-related parameters.

The parameters available in this menu are in read-only mode, they cannot be configured.

[Motor Speed] SPD

This parameter displays the estimated rotor speed without motor slip.

Value range	Description
0...65,535 rpm	**Factory setting**:

[Signed Mech Speed] SPD1

Signed mechanical speed

Value range	Description
-100,000...100,000 rpm	**Factory setting**:–

[Motor voltage] UOP

Motor voltage.

Value range	Description
0...**[Nom Motor Voltage]** UNS (step: 1 V)	**Factory setting**:–

[Mot Mech Power in %] OPR

Estimated output mechanical power in % (100% = nominal motor mechanical power).

Value range	Description
-300...300 % (step: 1 %)	**Factory setting**: –

[Nom Motor torque] TQN

Computed nominal motor torque (+/- 2% tolerance).

In case of synchronous motors, this parameter is impacted by a modification of **[Syn. EMF constant]** PHS.

In case of asynchronous motors, this parameter is impacted by a modification of **[Magnetizing Current]** IDA .

According to **[Nom Motor Tq Scaling]** TQNC setting, **[Nom Motor torque]** TQN parameter displays the value of the optimized torque **[Expert Motor Tq]** TQNO or the nameplate torque **[Plate Nom Motor Tq]** TQNP.

Value range	Description
0.01...65,535 Nm	The value depends on the drive ratings and **[Torque Scaling]** INRT setting. **Factory setting**: Read only

[Motor torque] OTR

Output torque value (100% = **[Nom Motor torque]** TQN).

NOTE: The displayed value is always positive in motor mode and negative in generator mode whatever the direction.

Value range	Description
-300.0... 300.0 % (step: 0.1 %)	**Factory setting**: Read only

[Motor Torque (Nm)] OTQN

NOTE: The displayed value is always positive in motor mode and negative in generator mode whatever the direction.

Value range	Description
-32,767...32,767 Nm	The value depends on the drive ratings and **[Torque Scaling]** INRT setting. **Factory setting**: Read only

[Motor Current] LCR

Motor current (estimation).

Value range	Description
0...2 IN(1) (step: 0.01 A (2))	The value depends on the drive ratings **Factory setting**: –
(1): IN corresponds to the rated drive current indicated in the Installation Manual and on the drive nameplate. (2): For drives with power range ≤ 15 kW. If the power range is between 18 and 160 kW (limits included), the step is 0.1 A else it is 1 A.	

[Motor Therm State] THR

The normal motor thermal state is 100 %, the **[Motor Overload]** OLF threshold is set to 118 %.

Value range	Description
0...200 % (step: 1 %)	**Factory setting**: –

[Drive parameters] MPI– Menu

Access

[Display] ➞ **[Drive parameters]**

About This Menu

This menu shows the drive-related parameters.

[AIV1 Image input] AIV1

This parameter is read-only. It enables to display the speed reference applied to the motor, or the sensor value, via the fieldbus channel.

Setting	Description
-10,000...10,000 (1)	**Factory setting**: –
1): range according to **[AIV1 Type]** AV1T.	

[AIV2 Image input] AIV2

This parameter is read-only. It enables to display the speed reference applied to the motor, or the sensor value, via the fieldbus channel.

Value range	Description
-10,000...10,000 (1)	**Factory setting**: –
1): range according to **[AIV2 Type]** AV2T.	

[AIV3 Image input] AIV3

This parameter is read-only. It enables to display the speed reference applied to the motor, or the sensor value, via the fieldbus channel.

Value range	Description
-10,000...10,000 (1)	**Factory setting**: –
1): range according to **[AIV3 Type]** AV3T.	

[Pre-Ramp Ref Freq] FRH

This parameter is read-only. It enables to display the reference frequency applied to the motor, regardless of which channel for reference value has been selected.

Value range	Description
-500.0...500.0 Hz	**Factory setting**: 0 Hz

[Ref Frequency] LFR

This parameter only appears if the function has been enabled. It is used to change the reference frequency from the remote control. OK does not have to be pressed to enable a change of reference.

Setting	Description
-500.0...500.0 Hz	**Factory setting**: –

[Motor Frequency] RFR

This parameter displays the estimated motor frequency without motor slip.

Value range	Description
-3,276.7...3,276.7 Hz	**Factory setting**: –

[Stator Frequency] SFQ★

This parameter displays the estimated stator frequency.

Value range	Description
-3,276.7...3,276.7 Hz	**Factory setting**: –

[Rotor Frequency] RFQ★

This parameter displays the estimated rotor frequency.

Value range	Description
-3,276.7...3,276.7 Hz	**Factory setting**: –

[Multiplying coeff.] MFR

This parameter can be accessed if **[Ref Freq 2 Multiply]** MA2 or **[Ref Freq 3 Multiply]** MA3 are not set to **[Not Configured]** NO.

Setting	Description
0...100 %	**Factory setting**: –

[Mains Voltage] ULN

Mains voltage based on AC bus measurement, motor running or stopped.

Value range	Description
1.0...6,553.5 Vac	**[No meas.]** ULNUNK is displayed if no value is measured. **Factory setting**: –

[Mains voltage phase 1-2] UL1

Mains voltage on phase 1-2 rms

This parameter cannot be accessed on ER41-220/4KOD and ER41-250/4KOD.

Value range	Description
-3,276.7...3,276.7 Vac	**[No meas.]** ULNUNK is displayed if no value is measured. **Factory setting**: –

[Mains voltage phase 2-3] UL2

Mains voltage on phase 2-3 rms

This parameter cannot be accessed on ER41-220/4KOD and ER41-250/4KOD.

Value range	Description
-3,276.7...3,276.7 Vac	**[No meas.]** ULNUNK is displayed if no value is measured. **Factory setting**: –

[Mains voltage phase 3-1] UL3

Mains voltage on phase 3-1 rms

This parameter cannot be accessed on ER41-220/4KOD and ER41-250/4KOD.

Value range	Description
-3,276.7...3,276.7 Vac	**[No meas.]** ULNUNK is displayed if no value is measured. **Factory setting**: –

[Mains Frequency] FAC

Mains frequency

Value range	Description
0.0...999.9 Hz	**Factory setting**: –

[DC bus voltage] VBUS

DC bus voltage.

Value range	Description
0...6,553.5 Vdc	**[No meas.]** ULNUNK is displayed if no value is measured. **Factory setting**: –

[Drive Therm State] THD

The normal drive thermal state is 100%, the **[Device Overheat]** OHF threshold is set to 118%

Value range	Description
0...200%	**Factory setting**: –

[Used param. set] CFPS ★

Configuration parameter status (can be accessed if parameter switching function has been enabled).

Value range	Code / Value	Description
[None]	NO	Not assigned
[Set No.1]	CFP1	Parameter set 1 active
[Set No.2]	CFP2	Parameter set 2 active
[Set No.3]	CFP3	Parameter set 3 active

[Config. active] CNFS

Active configuration.

Value range	Code / Value	Description
[In progress]	NO	Transitory state
[Config. No.0]	CNF0	Configuration 0 active
[Config. No.1]	CNF1	Configuration 1 active
[Config. No.2]	CNF2	Configuration 2 active
[Config. No.3]	CNF3	Configuration 3 active

[Thermal Monitoring] TPM– Menu

Access

[Display] ➞ **[Thermal Monitoring]**

About This Menu

The content of this menu can be accessed if **[Thermal monitoring]** TPP– function has been activated About This Menu, page 169.

This menu shows the present thermal value measured via analog inputs used.

[AI1 Th Value] TH1V, [AI2 Th Value] TH2V, [AI3 Th Value] TH3V, [AI4 Th Value] TH4V, [AI5 Th Value] TH5V ★

AI1 thermal value, AI2 thermal value, AI3 thermal value, AI4 thermal value and AI5 thermal value.

NOTE: AI4 and AI5 can only be accessed if the I/O extension option module (VW3A3203) has been inserted.

Value range	Description
-15.0...200.0 °C (step: 0.1 °C) 5.0...392.0 °F (step: 0.1 °F)	The unit depends on the setting of **[Temperature unit]** SUTP). **Factory setting:** Read-only parameter.

[PID display] PIC– Menu

Access

[Display] ➞ [PID display]

About This Menu

[Internal PID ref] RPI ★

Internal PID reference.

Setting	Description
0...32,767	**Factory setting**: 150

[PID reference] RPC ★

PID reference.

Value range	Description
0...65,535	**Factory setting**: 0

[PID feedback] RPF ★

PID feedback.

Value range	Description
0...65,535	**Factory setting**: 0

[PID Error] RPE ★

PID error.

Value range	Description
-32,767...32,767	**Factory setting: –**

[PID Output] RPO ★

PID output.

Value range	Description
[PID Min Output] POL...**[PID Max Output]** POH	**Factory setting**: _

[Counter Management] ELT– Menu

Access

[Display] ➡ **[Counter Management]**

About This Menu

This menu shows the drive and motor-related counters.

[Motor Run Time] RTHH

Run elapsed time display (resettable) in 0.1 hours (length of time the motor has been switched on).

NOTE: This parameter is only accessible with the graphic display terminal.

Setting	Description
0.0...119,304.5 h	**Factory setting**: _

[Power-on time] PTHH

Power-on time (resettable) or counter can be set to 0 by using the **[Counter Reset]** RPR parameter.

Value range	Description
0.0...119,304.5 h	**Factory setting**: _

[Fan Operation Time] FPBT

As soon as **[Fan Operation Time]** FPBT reach the predefined value of 45,000 hours, a warning **[Fan Counter Warn]** FCTA is triggered.

[Fan Operation Time] FPBT counter can be set to 0 by using the **[Counter Reset]** RPR parameter.

Value range	Description
0...500,000 h	**Factory setting**: Read Only

[Nb Of Starts] NSM

Number of motor starts (resettable) or counter can be set to 0 by using the **[Counter Reset]** RPR parameter.

NOTE: This parameter is only accessible with the graphic display terminal.

Value range	Description
0...4,294,967,295	**Factory setting**: _

[Counter Reset] RPR

Counter reset.

Value range ( )	Code / Value	Description
[No]	NO	No **Factory setting**
[Reset Run Time]	RTH	Run time reset
[Reset Pw On Time]	PTH	Power ON time reset
[Reset Fan Count]	FTH	Reset fan counter
[Reset Start Count]	NSM	Clear number of motor starts
[Efficiency MAX]	EFYK	Efficiency max
[Efficiency MIN]	EFYJ	Efficiency min

[Other State] SST– Menu

Access

[Display] ➞ [Other State]

About This Menu

List of secondary states.

List

[Sleep Active] SLM

[Sleep Boost active] SLPB

[Sleep Check Active] ASLC

[set 1 active] CFP1

[set 2 active] CFP2

[set 3 active] CFP3

[set 4 active] CFP4

[Automatic restart] AUTO

[DC charged] DBL

[Fast stop Active] FST

[Fallback Freq] FRF

[Speed Maintained] RLS

[Type of stop] STT

[DC Bus Ripple Warn] DCRW

[Ref Freq Warning] SRA

[Run Forward] MFRD

[Run Reverse] MRRS

[Autotuning] TUN

[Waiting For Damper]DMP

[I/O Map] IOM– Menu

Access

[Display] ➞ [I/O Map]

About this Menu

This menu shows information about the inputs and the outputs of the drive such as: the function assigned, the configuration and the present value or state.

The information is separated in different categories/menus:

- **[Digital Input Map]** LIA–: The mapping of the digital inputs,
- **[Analog inputs image]** AIA– : The image of the analog inputs,
- **[Digital Output Map]** LOA–: The mapping of the digital outputs and relays,
- **[Analog outputs image]** AOA– : The image of the analog outputs.

The parameters available in this menu are in read-only mode, they cannot be configured.

For more information on the inputs/outputs configuration, refer to the submenus in **[Complete settings] ➞ [Input/Output]**.

[Digital Input Map] LIA–

This menu is used to display the state of digital inputs. Use the touch wheel to scroll through the digital inputs:

- STO_A and STO_B: inputs of the safety STO function. For more information, refer to the embedded safety function manual of the drive.
- Digital inputs DI1 to DI6 of the drive,
- Optional digital inputs DI11 to DI16 if VW3A3203 Extended I/O module has been inserted.

On the Display Terminal, click the digital input to see all the functions that are assigned to the digital input in order to verify the compatibility with the multiple assignments (low level assignment and high level assignment). If no functions have been assigned, **[No]** NO is displayed.

For more information on the digital inputs refer to **[Complete settings]➞ [Input/Output] ➞ [DI/DQ]**.

[Analog inputs image] AIA–

This menu is used to display the value of analog inputs. Use the touch wheel to scroll through the analog inputs:

- **[AI1]** AI1C to **[AI3]** AI3C: Analog inputs AI1 to AI3 of the drive.
- **[AI4]** AI4C and **[AI5]** AI5C: Optional analog inputs AI4 and AI5 if VW3A3203 Extended I/O module has been inserted,

The physical value of the analog input AIx shown in this menu corresponds to the parameter **[AIx]** AIxC. The range and the unit depend on the customer configuration.

On the Display Terminal, click the analog input AIx (with 'x' from 1 to 5) to display:

- **[AIx assignment]** AIxA: all the functions associated with the analog input in order to verify, for example, compatibility problems with the multiple assignments,

- The minimum and maximum values according to the configured type **[AIx Type]** AIxT:
  - **[AIx Min. Value]** UILx and **[AIx Max Value]** UIHx with **[Voltage]** 10U type,
  - **[AIx Min. Value]** CRLx and **[AIx Max Value]** CRHx with **[Current]** 0A type.
- The configured value of the interference filtering: **[AIx filter]** AIxF.

For more information on the analog inputs refer to **[Complete settings]** ➞ **[Input/Output]** ➞ **[AI/AQ]**.

[Digital Output Map] LOA–

This menu is used to display the state of relays and digital outputs. Use the touch wheel to scroll through them:

- R1 to R3: the relays of the drive.
- R4 to R6: the optional relays if VW3A3204 Extended relay module has been inserted.
- DQ11 and DQ12: the optional digital output if VW3A3203 Extended I/O module has been inserted.

On the Display Terminal, click the relay or the digital output to display:

- The function assigned to the digital output or the relay. If no functions have been assigned, **[No]** NO is displayed,
- The delay time,
- The active level (high or low),
- The holding time.

For more information on the configuration of the digital outputs and the relays refer to **[Complete settings]** ➞ **[Input/Output]**.

[Analog outputs image] AOA–

This menu is used to visualize the value of analog outputs . Use the touch wheel to scroll through the outputs **[AQ1]** AO1C, **[AQ2]** AO2C and .

The physical value of the analog output AQx displayed in this menu corresponds to the parameter **[AQx]** AOxC. The range and the unit depend on the customer configuration.

On the Display Terminal, click the analog outputs to display:

- **[AQx assignment]** AOx: the function associated with the analog output in order to verify, for example, compatibility problems with the multiple assignments,
- The minimum and maximum values according to the configured type **[AQx Type]** AOxT:
  - **[AQx min Output]** UOLx and **[AQx max Output]** UOHx with **[Voltage]** 10U type,
  - **[AQx min output]** AOLx and **[AQx max output]** AOHx with **[Current]** 0A type.
- **[Scaling AQx Min]** ASLx (respectively **[Scaling AQx Max]** ASHx): The scaling of the lower limit (respectively upper limit) of the assigned parameter, as a percentage of the minimum (respectively maximum) possible variation.
- The configured value of the interference filtering:
  - **[AQx Filter]** AOxF with a range from 0.00 to 10.00s and a default value 0.00s

  .

For more information (such as the configuration), refer to **[Complete settings]➞ [Input/Output]➞ [AI/AQ]**.

[Communication map] CMM– Menu

Access

[Display] ➞ **[Communication map]**

About This Menu

This menu gives access to monitoring parameters linked to:

- The sources of command and references,
- The command and state registers,
- Fieldbus communication.

For more information about the command and reference refer to **[Cmd and Reference]** CRP– Menu , page 211.

Topic	Description
[Command Channel] CMDC parameter	This monitoring parameter shows the current active command channel. For more information , page 120.
[Cmd Register] CMD parameter	This parameter shows the current value of the command register in hexadecimal. For more information see below , page 121.
[Ref Freq Channel] RFCC parameter	This monitoring parameter shows the current active reference channel. For more information see below , page 122.
[Pre-Ramp Ref Freq] FRH parameter	This monitoring parameter shows the current value of the Frequency reference before ramp. For more information see below , page 122.
CIA402 [Status Register] ETA parameter	This monitoring parameter shows the current value of the CIA402 state register in hexadecimal. For more information , page 122.
[Modbus network diag] MND– Menu	This menu is related to the Modbus serial communication port on the bottom of the control block.
[Modbus HMI Diag] MDH– Menu	This menu is related to the Modbus serial communication port on the front of the control block. It is used by default for the Display Terminal.
[Cmd word image] CWI– Menu	This menu contains command word images according to the communication sources. The description is similar to **[Cmd Register]** CMD. • **[Modbus Cmd]** CMD1 • **[COM. Module cmd.]** CMD3.
[Freq. ref. word map] RWI– Menu	This menu contains frequency reference images according to the communication sources. The description is similar to **[Ref Frequency]** LFR. • **[Modbus Ref Freq]** LFR1 • **[Com Module Ref Freq]** LFR3. **NOTE:** the unit depends on the bit 9 of CMI: the internal command register. Refer to the communication parameters for more information.

[Command Channel] CMDC

Read only parameter. This monitoring parameter shows the current active command channel.

Value range	Code / Value	Description
[Terminal]	TER	Command via terminal block **Factory Setting**
[HMI]	LCC	Command via Display Terminal
[Modbus]	MDB	Command via Modbus
[Com. Module]	NET	Command via fieldbus module if a fieldbus module has been inserted
[BACnet MS/TP]	EBM	Command via BACnet MS/TP
[PC tool]	PWS	Command via commissioning software.
[HAND Mode]	HND	Command via Display Terminal

[Cmd Register] CMD

Command register (depending on the selected profile using **[Control Mode]** CHCF and depending on the type of wire control using **[2/3-Wire Control]** TCC).

This parameter shows the current value of the command register in hexadecimal.

NOTE: For specific registers information, refer to the communication protocol manuals.

Bit	Description, Value		
	CiA402 profile **(CHCF = SIM or SEP)**	**2-wire I/O profile** **(CHCF = IO and TCC= 2C)**	**3-wire transition I/O profile** **(CHCF=IO, TCC=3C)**
0	Set to 1: "Switch on"/ Contactor command	Forward (on state) command: 0: No forward command 1: Forward command **NOTE:** The assignment of bit 0 cannot be modified. It corresponds to the assignment of the terminals. It can be switched. Bit 0 Cd00 is only active if the channel of this control word is active.	Stop (run authorization): 0: Stop 1: Run is authorized on a forward or reverse command **NOTE:** The assignment of bits 0 and 1 cannot be modified. It corresponds to the assignment of the terminals. It can be switched. Bits 0 Cd00 and 1 Cd01 are only active if the channel of this control word is active.
1	Set to 0: "Disable voltage" /Authorization to supply AC power	Can be assigned to commands	Forward (on 0 to 1 rising edge) command
2	Set to 0: "Quick stop"		Can be assigned to commands
3	Set to 1: "Enable operation" /Run command		
4 to 6	Reserved (=0)		
7	"Fault reset" acknowledgment active on 0 to 1 rising edge **NOTE:** The method is valid only if fieldbus is the active command channel		
8	Set to 1: Halt stop according to the **[Type of stop]** STT parameter without leaving the operation enabled state		
9 and 10	Reserved (=0)		

Bit	Description, Value		
	CiA402 profile (**CHCF** = **SIM or SEP**)	**2-wire I/O profile** (**CHCF** = **IO and TCC**= **2C**)	**3-wire transition I/O profile** (**CHCF**=IO, **TCC**=3C)
11 to 15	Can be assigned to commands		

[Ref Freq Channel] RFCC

Read-only parameter.

This monitoring parameter shows the current active reference channel.

Value range	Code / Value	Description
[Terminal]	TER	Reference via terminal block **Factory Setting**
[HMI]	LCC	Referencevia Display Terminal
[Ref. Freq-Modbus]	MDB	Reference via Modbus
[Ref. Freq-Com. Module]	NET	Reference via fieldbus module if a fieldbus module has been inserted
[MS/TP Ref Freq]	EBM	Reference via BACnet MS/TP
[PC tool]	PWS	Reference via commissioning software.

[Pre-Ramp Ref Freq] FRH

Read-only parameter.

It enables to display the reference frequency (before ramp) applied to the motor, regardless of which channel for reference value has been selected (see , page 211)

Value range	Description
-500.0...500.0 Hz	The value cannot go higher than **[High Speed]** HSP and lower than –1* **[High Speed]** HSP.

CIA402 [Status Register] ETA

With CIA402 profile, the combination of bits 0, 1, 2, 4, 5 and 6 defines the state in the DSP 402 state chart (see the annex).

The value is identical in the CiA402 profile and the I/O profile. In the I/O profile, the description of the values is simplified and does not refer to the CiA402 (Drivecom) state chart.

Bit	Description	
	CiA402 profile (CHCF = SIM or SEP)	**I/O profile (CHCF = IO)**
0	"Ready to switch on", 1 = awaiting power section line supply	Reserved (= 0 or 1)
1	"Switched on", ready	0: Not ready / 1: Ready
2	"Operation enabled", running	Running:

Bit	Description	
	CiA402 profile (CHCF = SIM or SEP)	**I/O profile (CHCF = IO)**
		0: The drive does not start if a reference other than zero is applied 1: Running, if a reference other than zero is applied, the drive can start
3	Operating detected error state: 0: Inactive / 1: Active	Operating detected error state: 0: Inactive / 1: Active
4	"Voltage enabled", 1=power stage supply present NOTE: When the drive is powered by the power stage only, this bit is always at 1.	Power stage supply (1=present / 0= unavailable) **NOTE**: When the drive is powered by the power stage only, this bit is always at 1.
5	Quick stop (0 = active)	Reserved (= 1)
6	"Switched on disabled", power stage supply locked	Reserved (= 0 or 1)
7	1: Warning	1: Warning
8	Reserved (= 0)	Reserved (= 0)
9	Remote: 0: Command or reference via the Graphic Display Terminal **For not separate mode (SIM):** 1: Reference via network. **For separate (SEP) or I/O profile mode:** 1: Command via network.	
10	1: The targeted reference has been reached NOTE: When the drive is in speed mode, this is the speed reference.	1: The reference has been reached
11	"Internal limit active": 0: The reference is within the limits 1: The reference is not within the limits NOTE: When the drive is in speed mode, the limits are defined by LSP and HSP parameters.	Reference outside limits: 0: The reference is within the limits 1: The reference is not within the limits NOTE: When the drive is in speed mode, the limits are defined by LSP and HSP parameters.
12	Reserved (=0)	Reserved (= 0)
13	Reserved (=0)	Reserved (= 0)
14	"Stop key", STOP via stop key: 0: STOP key not pressed 1: Stop triggered by the STOP key	
15	"Direction", direction of rotation: 0: Forward rotation at output 1: Reverse rotation at output	

[Data logging]

[Distributed logging] DLO– Menu

Access

[Display] ➞ [Data logging] ➞ [Distributed logging]

About This Menu

This menu is used to store data following specific parameters.

NOTE: This menu is only accessible with the graphic display terminal VW3A1121.

The distributed logging function allows to log up to four parameter distributions at the same time. Each parameter storage is synchronized with the same sample time.

The result of this function gives the possibility to extract a bar graph with 10 bars (every 10% of the defined maximum value) to visualize the distribution for each of the four selected parameters.

NOTE: Any modification of the data logging function configuration clears the data previously stored.

This function aims at extracting samples of data to store them. When available, these samples can be uploaded by other tools (SoMove). Data logging meets the need to record and store data over time.

The drive can store the following data:

Type of [Data logging]	Description	[Data logging] storage: Automatic/ Manual	Access
Drive identification	Drive identification data	Automatic, in **[Dashboard]** DSH– menu	SoMove
Even warning logging	Warning logging	Automatic, in **[Dashboard]** DSH– menu	SoMove
Even error logging	Error logging	Automatic, in **[Dashboard]** DSH– menu	SoMove
Energy logging	1 Energy logging data	Automatic, in **[Dashboard]** DSH– menu	SoMove

Activation

To activate **[Distributed logging]** DLO–:

- Select 1 to 4 data to store with **[Log dstrb prm select]** LDP–
- Set **[Log Distrib State]** LDEN to **[Start]** START

The logging starts as soon as the motor is running.

To stop logging, set **[Log Distrib State]** LDEN to **[Stop]** STOP.

[Log Distrib State] LDEN

Logging Distribution State.

Value range ( )	Code / Value	Description
[Stop]	STOP	Distribution logging disabled **Factory setting**
[Start]	START	Distribution logs only when the motor is started
[Always]	ALWAYS	Distribution logs all the time
[Reset]	RESET	Distribution logging reset (configuration, data)
[Clear]	CLEAR	Clear distribution data
[Error]	ERROR	An error has been detected during distribution logging

[Log dstrb prm select] LDP– Menu

Access

[Display] ➞ [Data logging] ➞ [Distributed logging] ➞ [Log dstrb prm select]

About This Menu

This menu allows you to select up to 4 parameters for data logging. The peak value for each parameter is also stored.

NOTE: This menu is only accessible with the graphic display terminal.

The distributed logging function allows to log up to four parameter distributions at the same time. Each parameter storage is synchronized with the same sample time.

[Log Distrib. Data 1] LDD1 to [Log Distrib. Data 4] LDD4

Log Distribution Data **1** to ***Log Distribution Data*** **4**.

Setting ( )	Code / Value	Description
[Distrib. Log. DISABLE]	NO	Distribution logging disable **Factory setting**
[Motor Frequency]	RFR	Motor frequency
[Motor Current]	LCR	Motor current
[Motor Speed]	SPD	Motor speed
[Motor Voltage]	UOP	Motor voltage
[Motor Mech. Pwr]	OPRW	Motor mechanical power
[Input Elec. Power]	IPRW	Input electrical power
[Output Elec. Power]	EPRW	Output electrical power
[Motor Torque]	OTR	Motor torque
[Mains Voltage]	ULN	Mains voltage
[DC BUS Voltage]	VBUS	DC BUS voltage
[PID feedback]	RPF	PID feedback
[AI2 Th Value]	TH2V	Thermal sensor AI2
[AI3 Th Value]	TH3V	Thermal sensor AI3
[AI4 Th Value]	TH4V	Thermal sensor AI4

Setting	Code / Value	Description
[AI5 Th Value]	TH5V	Thermal sensor AI5
[Drive Th State]	THD	Drive thermal state
[Motor Th State]	THR	Motor thermal state
[Outlet Pressure]	PS2V	Outlet pressure sensor
[Mains Current]	ILN	Main estimated current
[Input Reactive Power]	IQRW	Re-active Electrical input power estimation

[Distributed logging] DLO– Menu

Access

[Display] ➞ [Data logging] ➞ [Distributed logging]

About This Menu

NOTE: If a log data exceeds the user defined maximum values for log distribution data, this value is not stored in the log distribution.

NOTE: This menu is only accessible with the graphic display terminal.

[Log Distrib Spl Time] LDST

Logging Distribution Sample time.

Setting	Code / Value	Description
[200 ms]	200MS	200 ms
[1 second]	1S	1 s **Factory setting**
[2 seconds]	2S	2 s
[5 seconds]	5S	5 s

[Dist Max Val 1] LDM1 to [Dist Max Val 4] LDM4

Distribution data max value **1** to ***Distribution data max value*** **4**.

The defined maximum value corresponds to 100 % of the stored data. Adjust the maximum value to adapt the full range of the logging distribution data.

Setting	Description
10...65,535	**Factory setting**: 65,535 (the setting can be adapted when modifying **[Log Distrib. Data 1]** LDD1...**[Log Distrib. Data 4]** LDD4.

[Complete settings] CST–

What's in This Chapter

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Introduction

[Complete settings] CST– menu presents all the settings related to drive functions for:

- Motor and drive configuration
- Application functions
- Monitoring functions

Application Control Mode

Introduction

There are five application control modes for the pump controller.

The application control mode is determined according to the selected channel and **[PID controller]** PID mode.

This table presents the control modes:

Channel	Function	Control mode
Local	FLO	Local
Channel 2	FR2	Override
Channel 1	PIM	PID manu
Channel 1	PISP	PID auto
Channel 1	FR1 or FR1B	Speed control

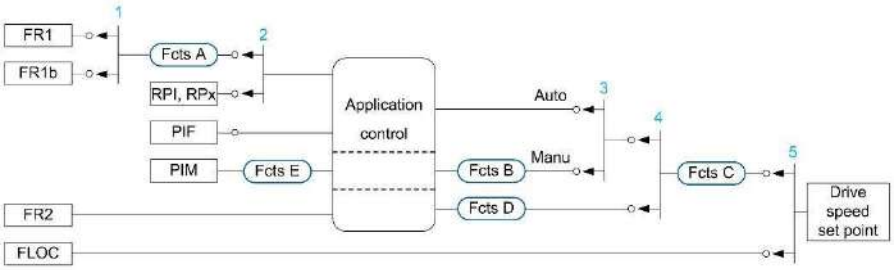
Application Control Functions

Application control functions are not all available in all modes. This table presents the availability of each function according to the selected active command channel:

Function	Channel 1			Channel 2	Local	Applica-tion status
	PID Manu	PID Auto	No PID			
Reference Frequency Source	PIM	PISP	FR1 or FR1B	FR2	BMP or FLOC	–
Centrifugal Pump Start & Stop	Yes	Yes	Yes	Yes	Yes	–
Thermal Pump Monitoring	Yes	Yes	Yes	Yes	Yes	–
Dry Run Pump Monitoring	Yes	Yes	Yes	No	No	–
Pump Low Flow Monitoring	Yes	Yes	Yes	No	No	–
Pumpcycle Monitoring	Yes	Yes	Yes	No	No	–
Outlet Pressure Monitoring	Yes	Yes	Yes	No	No	–
Process Control (PID)	Yes (Manu)	Yes (Auto)	Not config-ured	No	No	AUTO MANU
PID Controller	Yes	Yes	No	No	No	BOOST SLEEP
Sleep Wake-Up (Pressure Control)	No	Yes	No	No	No	–
Advanced sleep Checking (Pressure Control)	No	Yes	No	No	No	–
PID Feedback Monitoring	No	Yes	No	No	No	–
Stop After Speed Timeout	Yes	No	Yes	Yes	Yes	SLEEP

Function	Channel 1			Channel 2	Local	Application status
	PID Manu	PID Auto	No PID			
Multi-pump Management	Yes (1)	Yes (1)	Yes (1)	–	–	–
Booster Control	Yes	Yes	Yes	No	No	–
1 Multi-pump Management is active for Booster Control. When Booster Control is inactive, all auxiliary pumps are stopped.						

Reference Channel Overview with PID Configured



1 Commutation between channel 1 and channel 1b done with **[Ref 1B switching]** RCB parameter

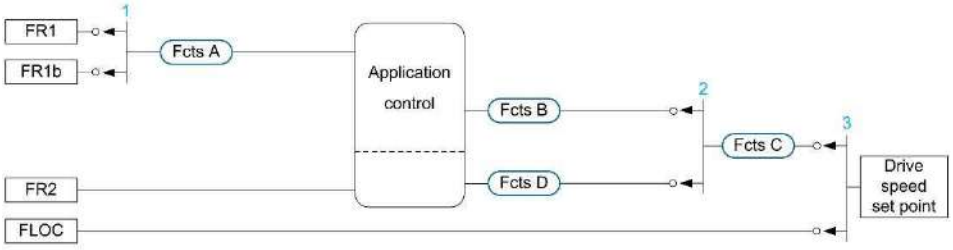
2 Choice of the process setpoint done with **[Intern PID Ref]** PII parameter

3 Manual function of the **[PID regul.]** PID, commutation done with **[Auto/Manual assign.]** PAU parameter

4 Choice between channel 1 and channel 2 done with **[Freq Switch Assign]** RFC parameter

5 Forced local mode activated by the function **[Forced Local Assign]** FLO

Reference Channel Overview with PID Not Configured



1 Commutation between channel 1 and channel 1b done with **[Ref 1B switching]** RCB parameter

2 Choice between channel 1 and channel 2 done with **[Freq Switch Assign]** RFC parameter

3 Forced local mode activated by the function **[Forced Local Assign]** FLO

Monitoring Functions

This table presents the function availability depending on the application status:

Application status	System monitoring functions	
	Outlet low pressure	Outlet high pressure
RUN, STOP, LOCAL, OVER, MANU, AUTO,	Yes	Yes
BOOST	Yes	Yes
SLEEP	Yes	Yes

Compatibility Table

Function	Reference operations	+/- speed (3)	Preset speeds	PID controller / summing feedback	Reference switching	Jump frequency	Auto DC injection	Catch on the fly	Output contactor command	DC injection stop	Fast stop	Freewheel stop	Treshold reached	Mains contactor command	Reverse disable	Torque limitation	Stop after timeout
Reference operations			↑	●(2)	↑	↑											
+/- speed (3)					↑	↑											
Preset speeds	←				↑	↑											
PID controller / summing feedback	●(2)				↑	↑											
Reference switching	←	←	←	←		↑											
Jump frequency	←	←	←	←	←												
Auto DC injection								●(3)		↑		↑					
Catch on the fly							●(3)										
Output contactor command																	
DC injection stop						←					●(1)	↑					
Fast stop										●(1)		↑					
Freewheel stop						←				←	←						
Treshold reached																	
Mains contactor command																	
Reverse disable																	
Torque limitation																	
Stop after timeout																	
Stop and go														●			
circuit breaker														●			
Booster control																	
Sleep/wake up																	
Configuration switching																	
Feedback monitoring																	
Pump start stop																	
Synchronous command law										●							
Fault inhibition																	
Safe Torque Off (5)																	
Fire Mode (6)		←(4)	←(4)	←(4)			←			←(4)	←(4)	←(4)			←	←	←
Run permessive				←													
Damper control				←													
Broken belt detection																	
Prestart management	←	←	←	←	←	↑											

Function	Reference operations	+/- speed (3)	Preset speeds	PID controller / summing feedback	Reference switching	Jump frequency	Auto DC injection	Catch on the fly	Output contactor command	DC injection stop	Fast stop	Freewheel stop	Treshold reached	Mains contactor command	Reverse disable	Torque limitation	Stop after timeout
Oiling management	←	←	←	←	←	↑											
Scroll protection																	
Discharge gas by analog sensor	←	←	←	←	←	↑											
Crankcase heating																	
Complementary PID																	

Function	Stop and go	circuit breaker	Booster control	Sleep/wake up	Configuration Switching	Feedback monitoring	Pump start stop	Synchronous command law	Fault inhibition	Safe torque off (5)	Fire mode (6)	Run permissive	Damper control	Broken belt detection	Prestart management	Oiling management	Scroll protection	Discharge gas by analog sensor	Crankcase heating	Complementary PID
Reference operations																				
+/- speed (3)																				
Preset speeds																				
PID controller / summing feedback												↑	↑							
Reference switching																				
Jump frequency																				
Auto DC injection											↑									
Catch on the fly																				
Output contactor command																				
DC injection stop								●												
Fast stop																				
Freewheel stop																				
Treshold reached																				
Mains contactor command	●	●																		
Reverse disable																				
Torque limitation																				
Stop after timeout																				
Stop and go																				
circuit breaker																				
Booster control																				
Sleep/wake up																				

Function	Stop and go	circuit breaker	Booster control	Sleep/wake up	Configuration Switching	Feedback monitoring	Pump start stop	Synchronous command law	Fault inhibition	Safe torque off (5)	Fire mode (6)	Run permissive	Damper control	Broken belt detection	Prestart management	Oiling management	Scroll protection	Discharge gas by analog sensor	Crankcase heating	Complementary PID
Configuration switching																				
Feedback monitoring																				
Pump start stop																				
Synchronous command law																				
Fault inhibition											●									
Safe Torque Off (5)																				
Fire Mode (6)	←	(4)							●			←	←	←						
Run permissive											↑		●							
Damper control											↑	●								
Broken belt detection											↑									
Prestart management																←		←		
Oiling management															↑			←		
Scroll protection																				
Discharge gas by analog sensor															↑	↑				
Crankcase heating																				
Complementary PID																				

(1) Priority is given to the first of these two stop modes to be activated.

(2) Only the multiplier reference is incompatible with the PID regulator.

(3) Only continuous ADC is incompatible with catch on fly

(4) Compatible only if accurate mode is selected in Fire mode function configuration, else priority to Fire mode.

(5) Safe torque off has priority over all other functions that can give the run order

(6) Force mode in Fire mode function has priority over all other functions except Safe torque off

● Incompatible functions

Compatible functions

Not applicable

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

[Macro Configuration] MCR– Menu

Access

[Complete settings] ➞ **[Macro Configuration]**

About This Menu

This menu allows to select an application type in order to display only the parameters and menus useful for the selected application.

The application type selection should be done prior to the application settings.

Application compatibility

The following table shows the functions that can be configured depending of **[Application Selection]** APPT value.

Function	[Application Selection] APPT			
	[Generic Pump Ctrl] GPMP	[Pump Booster Ctrl] BOOST	[Generic Fan Ctrl] FAN	[Generic Comp Control] COMP
[Pump start stop] PST–	Yes	Yes	Not available	Not available
[Thermal monitoring] TPP–	Yes	Yes	Yes	Yes
[Dry run Monit] DYR–	Yes	Only for Lead Pump in architectures with 1 variable speed pump. Available for all pumps in multiple variable speed pump architectures.	Yes	Yes
[Pump low flow Monit] PLF–	Yes	Only for Lead Pump in architectures with 1 variable speed pump. Available for all pumps in multiple variable speed pump architectures.	Yes	Yes
[Pumpcycle monitoring] CSP–	Yes	Only for Lead Pump in architectures with 1 variable speed pump if no Lead Pump Alternation configured. Available for all pumps in multiple variable speed pump architectures.	Yes	Yes
[Outlet pressure mon] OPP–	Yes	Yes	Yes	Yes
[PID controller] PID–	Yes	Required	Yes	Yes

Function	[Application Selection] APPT			
	[Generic Pump Ctrl] GPMP	[Pump Booster Ctrl] BOOST	[Generic Fan Ctrl] FAN	[Generic Comp Control] COMP
[Sleep/wakeup] SPW–	Yes	Yes	Not available	Not available
[Feedback Monitoring] FKM–	Yes	Yes	Yes	Yes
[Booster Control] BST–	Not available	Yes	Not available	Not available
[Fire modes] FMOR–	Not available	Not available	Yes	Not available
[Run permissive] RPRV–	Yes	Yes	Yes	Yes
[Damper control] DMCT–	Not available	Not available	Yes	Not available
[Broken belt detection] BBDT–	Yes	Yes	Yes	Not available
[Prestart management] PM –	Not available	Not available	Not available	Yes
[Oiling management] OM –	Not available	Not available	Not available	Yes
[Overload monitoring] SP –	Not available	Not available	Not available	Yes
[Crankcase heating] CH –	Not available	Not available	Not available	Yes
[Discharge gas] DG –	Not available	Not available	Not available	Yes
[Additional PIDs] CPID–	Yes	Yes	Yes	Yes

[Application Selection] APPT

⚠WARNING

UNANTICIPATED EQUIPMENT OPERATION

If this parameter is changed, the functions of the current configuration are disabled. The assignments of the inputs and/or outputs of functions that are no longer used as a result of the modified setting of the parameter are reset to the factory settings.

- Verify that this change is compatible with the type of wiring used.

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

Setting	Code / Value	Description
[Generic Pump Ctrl]	GPMP	Generic pump control application **Factory setting**
[Pump Booster Ctrl]	BOOST	Pump booster control application
[Generic Fan Ctrl]	FAN	Generic fan control application
[Generic Comp Control]	COMP	Compressor control application

[Motor parameters] MPA– Menu

Access

[Complete settings] ➡ [Motor parameters]

About This Menu

For an application where less than 110% of overload is required

- Power rating of the drive could be equal to power rating of the motor
- Normal rating should be used

For an application where more that 110% of overload is required (up to 150%)

- Power rating of the drive should be greater than power rating of the motor
- High rating could be used to pre-adjust motor nameplate parameter

High rating or Normal rating depend of the machine cycle.

If high rating is selected, drive current limitation is extended to 1.5 x In and maximum values of motor parameters linked to current and/or power are reduced. When switching from one to another selection, all the related parameters are set to their factory setting values.

In any case, the maximum current of the drive does not change. Setting the drive to high rating mode decreases the nominal values for the motor parameters. It means that for the same motor, an oversized drive is required in high rating mode.

ER330 Motor Control Types

ER330 drive embeds 5 motor control types which covers all the use cases depending of the application.

The following table shows the Motor Control types selection depending of the application needs:

Control	Motor Type	[Motor control type] CTT selection	Description
Open-Loop	Asynchronous motor	**[U/F VC Standard]** STD	U/F vector control law
		[SVC V] VVC	Voltage vector control law with slip compensation
		[U/F VC Quad.] UFQ	U/F vector control law for variable torque applications (pumps and fans).
		[Energy Sav.] NLD	Energy saving control law
	Synchronous motor	**[Sync. mot.]** SYN	Permanent magnet control law

Parameters List for Asynchronous Motors

The following table shows the minimum parameters list that needs to be configured for asynchronous motors depending of **[Motor control type]** CTT selection:

NOTE: After setting these parameters, it is recommended to perform an **[Autotuning]** TUN to optimize the performances. If one of these parameters is modified, autotuning must be re-performed.

Parameters	[U/F VC Standard] STD	[SVC V] VVC	[U/F VC Quad.] UFQ	[Energy Sav.] NLD
[Motor Standard] BFR	✓	✓	✓	✓
[Nominal Motor Power] NPR or **[Motor 1 Cosinus Phi]** COS (1)	✓	✓	✓	✓
[Nom Motor Voltage] UNS	✓	✓	✓	✓
[Nom Motor Current] NCR	✓	✓	✓	✓
[Nominal Motor Freq] FRS	✓	✓	✓	✓
[Nominal Motor Spd] NSP	✓	✓	✓	✓
(1) Depending on **[Motor param choice]** MPC.				

Parameters List for Synchronous Motors

The following table shows the minimum parameters list that needs to be configured for synchronous motors depending of **[Motor control type]** CTT selection:

NOTE: After setting these parameters, it is recommended to perform an **[Autotuning]** TUN to optimize the performances. If one of these parameters is modified, autotuning must be re-performed.

Parameters	[Sync. mot.] SYN
[Sync Nominal I] NCRS	✓
[Nom SyncMotor Spd] NSPS	✓
[Nom Motor torque] TQS	✓
[Pole pairs] PPNS	✓
[Angle setting type] AST	✓

[Dual rating] DRT

Select the normal/heady duty depending on the overload required on the application.

NOTE: Modifying this parameter resets the motor tune parameters and, **[Tune selection]** STUN and/or **[Rotation Tune Select]** STUR to **[Default]** TAB. You need to re-perform autotuning.

Value range	Code / Value	Description
[Normal Duty]	NORMAL	Normal rating, drive current limitation is 1.1 x In. **Factory setting**
[Heavy Duty]	HIGH	High rating, drive current limitation is 1.5 x In.

[Motor control type] CTT

Set this parameter according to the application and the type of motor. The selection must be done before entering motor parameter values.

NOTE: Modifying this parameter resets the motor tune parameters and, **[Tune selection]** STUN and/or **[Rotation Tune Select]** STUR to **[Default]** TAB. You need to re-perform autotuning.

Value range	Code / Value	Description
[SVC V]	VVC	Voltage vector control (Sensorless flux vector V): Open-loop voltage flux vector control with automatic slip compensation according to the load. It supports operation with a number of motors connected in parallel on the same drive (if motors are identical).
[U/F VC Standard]	STD	U/F VC Standard motor control type. For applications that require torque at low speed. This motor control type can be used for motors connected in parallel.
[Sync. mot.]	SYN	Open-loop synchronous motors: Motor control type specific for permanent magnet synchronous motors.
[U/F VC Quad.]	UFQ	U/F VC Quadratic: Motor control type dedicated to variable torque applications, typically used for pumps and fans. **Factory setting**
[Energy Sav.]	NLD	Specific motor control type optimized for energy saving. This motor control type automatically reduces the drive output current according to the motor load. This automatic current level adaptation allows energy saving for periods when load is kept to a minimum and preserves the drive performance up to full load. **NOTE:** Compared to constant flux vector control laws, as flux level is adjusted according to the load level, it is normal for the output voltage to be very low under low load conditions.

[data] MTD– Menu

Access

[Complete settings] ➞ **[Motor parameters]** ➞ **[Motor data]** ➞ **[data]**

About This Menu

⚠WARNING

LOSS OF CONTROL

- Fully read and understand the manual of the connected motor.
- Verify that all motor parameters are correctly set by referring to the nameplate and the manual of the connected motor.
- If you modify the value of one or more motor parameters after having performed autotuning, the value of **[Tune selection]** STUN is reset to **[Default]** TAB and you must re-perform autotuning.

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

This menu contains motor-related data such as, but not limited to, motor nameplate parameters and parameters resulting from motor tuning. The parameters displayed in the menu mainly depend on **[Motor control type]** CTT selection:

- Asynchronous motor control types, i.e. if **[Motor control type]** CTT is set to:
  - **[SVC V]** VVC,
  - **[U/F VC Standard]** STD,
  - **[U/F VC Quad.]** UFQ,
  - **[Energy Sav.]** NLD,

Perform the **[Rotation Tune Enable]** TUNR to optimize the motor data for asynchronous motor. Refer to **[Motor tune]** MTU– –**[Rotation Tune]** TRAM– Menu, page 158.

- Synchronous motor control types, i.e. if **[Motor control type]** CTT is set to:
  - **[Sync. mot.]** SYN,

Perform the **[Rotation Tune Enable]** TUNR to optimize the motor data for synchronous motor, Refer to **[Motor tune]** MTU– –**[Rotation Tune]** TRAM– Menu, page 158. Or do it manually using the parameter **[Relative d-axis error]** RDAE.

[Motor Standard] BFR ★

This parameter is used to modify the presets and/or the units of several parameters, such as:

- **[High Speed]** HSP
- **[Motor Freq Thd]** FTD
- **[Nom Motor Voltage]** UNS
- **[Nominal Motor Freq]** FRS
- **[Max Frequency]** TFR

This parameter can only be accessed with asynchronous motor control types.

NOTE: Modifying this parameter resets the motor tune parameters and, **[Tune selection]** STUN and/or **[Rotation Tune Select]** STUR to **[Default]** TAB. You need to re-perform autotuning.

Value range	Code / Value	Description
[50 Hz]	50Hz	50Hz motor frequency — IEC **Factory setting**
[60 Hz]	60Hz	60Hz motor frequency — NEMA

[Max Frequency] TFR

To help prevent **[Motor Overspeed]** SOF error, it is recommended to have **[Max Frequency]** TFR equal to or higher than 110% of **[High Speed]** HSP.

NOTE: The max value of this parameter is 400 Hz for drives with nominal power below 22 kW. Refer to ER330 Installation Manual, page 15, in the “Electric Data – Drives Ratings” chapter, for more information.

Value range	Description
10.0...500.0 Hz (1) (step: 0.1 Hz)	**Factory setting**: 60 Hz, or preset to 72 Hz if **[Motor Standard]** BFR is set to **[60 Hz]** 60Hz.
(1) The maximum of the range is 10 * **[Nominal Motor Freq]** FRS for an asynchronous law or 10 * **[Sync Nominal Freq]** FRSS for a synchronous law.	

[Nominal Motor Power] NPR ★

This parameter can only be accessed with asynchronous motor control types and if **[Motor param choice]** MPC is set to **[Nominal Motor Power]** NPR.

NOTE: Modifying this parameter resets the motor tune parameters and, **[Tune selection]** STUN and/or **[Rotation Tune Select]** STUR to **[Default]** TAB. You need to re-perform autotuning.

Value range	Description
According to drive rating (1)	Unit is in kW if **[Motor Standard]** BFR is set to **[50 Hz]** 50Hz, in HP if **[Motor Standard]** BFR is set to **[60 Hz]** 60Hz **Factory setting**: according to the drive rating
(1): If **[Motor Standard]** BFR is set to **[50 Hz]** 50Hz, the step is 0.01 kW for drives with power range ≤ 15 kW. If the power range is between 18 and 160 kW (limits included), the step is 0.1 kW else it is 1 kW. If **[Motor Standard]** BFR is set to **[60 Hz]** 60Hz, the step is 0.01 HP for drives with power range ≤ 20 HP. If the power range is between 25 and 250 HP (limits included), the step is 0.1 HP else it is 1 HP.	

[Nom Motor Voltage] UNS ★

This parameter can only be accessed with asynchronous motor control types.

NOTE: Modifying this parameter resets the motor tune parameters and, **[Tune selection]** STUN and/or **[Rotation Tune Select]** STUR to **[Default]** TAB. You need to re-perform autotuning.

Value range	Description
100...690 Vac (step: 1 Vac)	**Factory setting**: according to drive rating and **[Motor Standard]** BFR

[Nom Motor Current] NCR ★

This parameter can only be accessed with asynchronous motor control types.

NOTE: Modifying this parameter resets the motor tune parameters and, **[Tune selection]** STUN and/or **[Rotation Tune Select]** STUR to **[Default]** TAB. You need to re-perform autotuning.

Value range	Description
0.15...1.5 In (1) (step: 0.01 A (2))	**Factory setting**: according to drive rating and **[Motor Standard]** BFR
(1): Corresponding to the rated drive current indicated in the installation manual and on the drive nameplate. (2): For drives with power range ≤ 15 kW. If the power range is between 18 and 160 kW (limits included), the step is 0.1 A else it is 1 A.	

[Nominal Motor Freq] FRS ★

This parameter can only be accessed with asynchronous motor control types.

NOTE: Modifying this parameter resets the motor tune parameters and, **[Tune selection]** STUN and/or **[Rotation Tune Select]** STUR to **[Default]** TAB. You need to re-perform autotuning.

NOTE: The max value of this parameter is 400 Hz for drives with nominal power below 22 kW. Refer to ER330 Installation Manual, page 15, in the “Electric Data – Drives Ratings” chapter, for more information.

Value range	Description
10.0...500.0 Hz (step: 0.1 Hz)	**Factory setting**: 50 Hz, or preset to 60 Hz if **[Motor Standard]** BFR is set to **[60 Hz]** 60Hz.

[Nominal Motor Spd] NSP ★

This parameter can only be accessed with asynchronous motor control types.

NOTE: Modifying this parameter resets the motor tune parameters and, **[Tune selection]** STUN and/or **[Rotation Tune Select]** STUR to **[Default]** TAB. You need to re-perform autotuning.

If the nameplate indicates the synchronous speed and the slip in Hz or as a %, use one of the formulas to calculate the rated speed:

- Nominal speed = Synchronous speed x $\frac{100 - \text{slip as a \%}}{100}$
- Nominal speed = Synchronous speed x $\frac{60 - \text{slip in Hz}}{60}$ (60 Hz motors)
- Nominal speed = Synchronous speed x $\frac{50 - \text{slip in Hz}}{50}$ (50 Hz motors).

Value range	Description
0...65,535 rpm (step: 1 rpm)	**Factory setting**: according to drive rating and **[Motor Standard]** BFR

[Motor param choice] MPC ★

This parameter selects which motor nameplate parameter is used between **[Motor 1 Cosinus Phi]** COS and **[Nominal Motor Power]** NPR. Set the selected parameter, depending on this parameter setting.

This parameter can only be accessed with asynchronous motor control types.

NOTE: Modifying this parameter resets the motor tune parameters and, **[Tune selection]** STUN and/or **[Rotation Tune Select]** STUR to **[Default]** TAB. You need to re-perform autotuning.

Value range	Code / Value	Description
[Nominal Motor Power]	NPR	Motor power: **[Nominal Motor Power]** NPR is used. **Factory setting**
[Motor 1 Cosinus Phi]	COS	Motor cosinus: **[Motor 1 Cosinus Phi]** COS is used.

[Motor 1 Cosinus Phi] COS ★

This parameter can only be accessed with asynchronous motor control type and if **[Motor param choice]** MPC is set to **[Motor 1 Cosinus Phi]** COS.

NOTE: Modifying this parameter resets the motor tune parameters and, **[Tune selection]** STUN and/or **[Rotation Tune Select]** STUR to **[Default]** TAB. You need to re-perform autotuning.

Value range	Description
0.50...1.00 (step: 0.01)	**Factory setting**: according to the drive rating

[AsyncMotor R Stator] RSA ★

The factory setting is replaced by a measure resulting from a standstill motor tune (autotuning) if it has been performed. Only enter manually a value if you are copying a drive configuration that has been tuned via autotuning.

This parameter can only be accessed with asynchronous motor control types and if **[Access Level]** LAC is set to **[Expert]** EPR.

Value	Code / Value	Description
[Auto]	AUTO	During the drive configuration update, when this parameter is not set by the user it takes a transient value (“Auto”) until end of the sequence.
0...65,535 mOhm (step: 1 mOhm) (1)		**Factory setting**: 0 mOhm
(1): For drives with power range ≤ 15 kW. If the power range is between 18 and 75 kW (limits included), the range is 0.0...6,553.5 mOhm (step: 0.1 mOhm). If the power range is between 90 and 500 kW (limits included), the range is 0.00...655.35 mOhm (step: 0.01 mOhm) else the range is 0.000...65.535 mOhm (step: 0.001 mOhm).		

[Magnetizing Current] IDA ★

The factory setting is replaced by the result of an internal calculation based on standstill motor tune results (autotuning). The parameter is measured if a tune in rotation is performed.

This parameter can only be accessed with asynchronous motor control types and if **[Access Level]** LAC is set to **[Expert]** EPR.

This parameter impacts the setting of **[Nom Motor torque]** TQN.

Value	Code / Value	Description
[Auto]	AUTO	During the drive configuration update, when this parameter is not set by the user it takes a transient value (“Auto”) until end of the sequence.
0.00...655.35 A (step: 0.01 A) (1)		**Factory setting**: 0.00 A
(1): For drives with power range ≤ 15 kW. If the power range is between 18 and 160 kW (limits included), the range is 0.0...6,553.5 A (step: 0.1 A) else the range is 0...65,535 A (step: 1 A).		

[AsyncMotor Lf Induct] LFA ★

The factory setting is replaced by an measure resulting from a standstill motor tune (autotuning) if it has been performed. Only enter manually a value if you are copying a drive configuration that has been tuned via autotuning.

This parameter can only be accessed with asynchronous motor control types and if **[Access Level]** LAC is set to **[Expert]** EPR.

Value	Code / Value	Description
[Auto]	AUTO	During the drive configuration update, when this parameter is not set by the user it takes a transient value (“Auto”) until end of the sequence.
0.00...655.35 mH (step: 0.01 mH) (1)		**Factory setting**: 0.00 mH
(1): For drives with power range ≤ 15 kW. If the power range is greater than 160 kW, the range is 0.0…6,553.5 µH (step: 0.1 µH) else the range is 0.00...65,535 µH (step: 1 µH).		

[Rotor Time Const] TRA ★

This parameter is the result of an internal calculation using motor nameplate parameters and motor autotuning results.

NOTE:

- If a value is manually entered, this parameter is not updated after a tune in rotation has been performed.
- A value manually entered is reset to the tabulated value if **[Adv. Motor Control]** AEMC is modified from **[Yes]** YES to **[No]** NO.

This parameter can only be accessed with asynchronous motor control types and if **[Access Level]** LAC is set to **[Expert]** EPR.

Value	Code / Value	Description
[Auto]	AUTO	During the drive configuration update, when this parameter is not set by the user it takes a transient value (“Auto”) until end of the sequence.
0.0...6,553.5 ms (step: 0.1 ms) (1)		**Factory setting**: 0.0 ms
(1): For drives with power range ≤ 15 kW else the range is 0…65,535 ms (step: 1 ms).		

[Sync Nominal I] NCRS ★

This parameter can only be accessed with synchronous motor control types.

NOTE: Modifying this parameter resets the motor tune parameters and, **[Tune selection]** STUN is reset to **[Default]** TAB. Autotuning need to be performed again.

Value range	Description
0.25...1.5 In (1) (step: 0.01 A (2))	**Factory setting**: according to the drive rating.
(1): Corresponding to the rated drive current indicated in the installation manual and on the drive nameplate. (2): For drives with power range ≤ 15 kW. If the power range is between 18 and 160 kW (limits included), the step is 0.1 A else it is 1 A.	

[Nom SyncMotor Spd] NSPS ★

This parameter can only be accessed with synchronous motor control types.

NOTE: Modifying this parameter resets the motor tune parameters and, **[Tune selection]** STUN is reset to **[Default]** TAB. Autotuning need to be performed again.

Value range	Description
0...48,000 rpm (step: 1 rpm)	**Factory setting**: according to the drive rating.

[Torque Scaling] INRT

This parameter shows the scaling of **[Motor Torque (Nm)]** OTQN, **[Nom Motor torque]** TQN, **[Nom Motor torque]** TQS, **[Nom Motor Tq Scaling]** TQNC, **[Expert Motor Tq]** TQNO and **[Plate Nom Motor Tq]** TQNP.

According to your needs, you can adjust the torque scaling multiplying by 10 the default torque unit.

Value range	Code / Value	Description
[0.001]	0001	Unit: 0.001 Nm Absolute setting range: 0.001…65.535 Nm Setting range: -32.767…+32.767 Nm
[0.01]	001	Unit: 0.01 Nm Absolute setting range: 0.01…655.35 Nm Setting range: -327.67…+327.67 Nm
[0.1]	01	Unit: 0.1 Nm Absolute setting range: 0.1…6,553.5 Nm Setting range: -3,276.7…+3,276.7 Nm
[1]	1	Unit: 1 Nm Absolute setting range: 1…65,535 Nm Setting range: -32,767…+32,767 Nm
[10]	10	Unit: 10 Nm Absolute setting range: 10…655,350 Nm Setting range: -327,670…+327,670 Nm
NOTE: Factory setting: according to the drive rating		

[Nom Motor torque] TQS ★

This parameter can only be accessed with synchronous motor control types.

NOTE: Modifying this parameter resets the motor tune parameters and, **[Tune selection]** STUN is reset to **[Default]** TAB. Autotuning need to be performed again.

Value range	Description
0.1...6,553.5 Nm	The value is according to drive ratings and **[Torque Scaling]** INRT setting. **Factory setting**: according to the drive rating.

[Pole pairs] PPNS ★

This parameter is used to calculated **[Sync Nominal Freq]** FRSS.

This parameter can only be accessed with synchronous motor control types.

NOTE: Modifying this parameter resets the motor tune parameters and, **[Tune selection]** STUN is reset to **[Default]** TAB. Autotuning need to be performed again.

Value range	Description
1...240 (step: 1)	**Factory setting**: according to the drive rating.

[Angle setting type] AST ★

This parameter can only be accessed with synchronous motor control types.

This function is used to align the rotor or to compute the angle of the rotor flux linked to permanent magnets to reduce torque jolt at start-up. **[Rotational Current Injection]** RCI may be used where **[PSI align.]** PSI and **[PSIO align.]** PSIO do not give expected performances.

Value	Code / Value	Description
[PSI align.]	PSI	Pulse signal injection. Standard alignment mode, without rotor motion. The angle measurement is realized by monitoring the stator current response to a pulse signal injection over a wide range of frequencies.
[PSIO align.]	PSIO	Pulse signal injection - optimized. Optimized alignment mode, without rotor motion. Same operation as **[PSI align.]** PSI is performed over an optimized range of frequencies The measurement time is reduced after the first run order or tune operation, even if the drive has been turned off. **Factory setting**
[Rotational Current Injection]	RCI	Rotational current injection. Alignment mode with rotor motion. This alignment mode realizes the mechanical alignment of the rotor and the stator; it requires up to 4 s. The motor needs to be stopped and without resistive torque.
[No align.]	NO	No alignment

[Syn. EMF constant] PHS ★

The factory setting is replaced by an estimation resulting from a standstill motor tune (autotuning) if it has been performed. PHS adjustment allows you to reduce the current in operation without load (or with minimum of load). **[Syn. EMF constant]**, is in 0.1 mV/RPM (peak per phase). This parameter is measured by performing a **[Rotation Tune Enable]** TUNR. To optimize the synchronous motor settings, follow the steps.

This parameter can only be accessed with z.

Value	Code / Value	Description
[Auto]	AUTO	During the drive configuration update, when this parameter is not set by the user it takes a transient value (“Auto”) until end of the sequence.
0...6,553.5 mV/rpm (step: 0.1 mV/rpm)		**Factory setting**: 0 mV/rpm

[SyncMotor Stator R] RSAS ★

The factory setting is replaced by an estimation resulting from a standstill motor tune (autotuning) if it has been performed. Only enter manually a value if you are copying a drive configuration that has been tuned via autotuning.

This parameter can only be accessed with synchronous motor control types and if **[Access Level]** LAC is set to **[Expert]** EPR.

Value	Code / Value	Description
[Auto]	AUTO	During the drive configuration update, when this parameter is not set by the user it takes a transient value (“Auto”) until end of the sequence.
0...65,535 mOhm (step: 1 mOhm) (1)		**Factory setting**: 0 mOhm
(1): For drives with power range ≤ 15 kW. If the power range is between 18 and 75 kW (limits included), the range is 0.0...6,553.5 mOhm (step: 0.1 mOhm). If the power range is between 90 and 500 kW (limits included), the range is 0.00...655.35 mOhm (step: 0.01 mOhm) else the range is 0.000...65.535 mOhm (step: 0.001 mOhm).		

[Autotune L d-axis] LDS ★

The factory setting is replaced by an estimation resulting from a standstill motor tune (autotuning) if it has been performed. Only enter manually a value if you are copying a drive configuration that has been tuned via autotuning.

NOTE: On motors with smooth poles, **[Autotune L d-axis]** LDS = **[Autotune L q-axis]** LQS = Stator inductance L.

This parameter can only be accessed with synchronous motor control types and if **[Access Level]** LAC is set to **[Expert]** EPR.

Value	Code / Value	Description
[Auto]	AUTO	During the drive configuration update, when this parameter is not set by the user it takes a transient value (“Auto”) until end of the sequence.
0.00...655.35 mH (step: 0.01 mH) (1)		**Factory setting**: According to the drive rating. **NOTE: [Autotuning Error]** TNF can be triggered if **[Autotune L d-axis]** LDS is set to a low value. Increase **[Autotune L d-axis]** LDS to a value equal to 5 times its default value.
(1): For drives with power range ≤ 15 kW. If the power range is greater than 160 kW, the range is 0.0…6,553.5 µH (step: 0.1 µH) else the range is 0.00…65,535 µH (step: 1 µH).		

[Autotune L q-axis] LQS ★

The factory setting is replaced by an estimation resulting from a standstill motor tune (autotuning) if it has been performed. Only enter manually a value if you are copying a drive configuration that has been tuned via autotuning.

NOTE: On motors with smooth poles, **[Autotune L d-axis]** LDS = **[Autotune L q-axis]** LQS = Stator inductance L.

This parameter can only be accessed with synchronous motor control types and if **[Access Level]** LAC is set to **[Expert]** EPR.

Value	Code / Value	Description
[Auto]	AUTO	During the drive configuration update, when this parameter is not set by the user it takes a transient value (“Auto”) until end of the sequence.
0.00...655.35 mH (step: 0.01 mH) (1)		**Factory setting**: According to the drive rating. **NOTE: [Autotuning Error]** TNF can be triggered if **[Autotune L q-axis]** LQS is set to a low value. Increase **[Autotune L q-axis]** LQS to a value equal to 5 times its default value.
(1): For drives with power range ≤ 15 kW. If the power range is greater than 160 kW, the range is 0.0…6,553.5 µH (step: 0.1 µH) else the range is 0.00…65,535 µH (step: 1 µH).		

[Sync Nominal Freq] FRSS★

This parameter can only be accessed with synchronous motor control types and if **[Access Level]** LAC is set to **[Expert]** EPR.

Automatically updated according to **[Nom SyncMotor Spd]** NSPS and **[Pole pairs]** PPNS data.

NOTE: Modifying this parameter resets the motor tune parameters and, **[Tune selection]** STUN is reset to **[Default]** TAB. Autotuning need to be performed again.

NOTE: The max value of this parameter is 400 Hz for drives with nominal power below 22 kW. Refer to ER330 Installation Manual, page 15, in the “Electric Data – Drives Ratings” chapter, for more information.

Value range	Description
10.0...500.0 Hz (step: 0.1 Hz)	**Factory setting**: NSPS x PPNS / 60 (the value is automatically updated and cannot be modified)

[PSI Align Curr Max] MCR ★

Current level in % of **[Sync Nominal I]** NCRS for **[Autotune L d-axis]** LDS and **[Autotune L q-axis]** LQS Identification.

This parameter can only be accessed with synchronous motor control types and if **[Access Level]** LAC is set to **[Expert]** EPR.

This current must be equal to or higher than the maximum current level of the application; otherwise an instability may occur.

NOTE: In case of instability, **[PSI Align Curr Max]** MCR should be increased by steps up to obtain the requested performances.

Value	Code / Value	Description
[Auto]	AUTO	**[PSI Align Curr Max]** MCR is adapted by the drive according to the motor data settings. **Factory setting**
1...300 % (step: 1 %)		setting range

[Current Level Align] ACR ★

Current level in % of **[Sync Nominal I]** NCRS for **[PSI align.]** PSI and **[PSIO align.]** PSIO angle shift measurement modes.

This parameter can only be accessed with synchronous motor control types and if **[Access Level]** LAC is set to **[Expert]** EPR.

Value	Code / Value	Description
[Auto]	AUTO	Represents 100 % of nominal motor current. **Factory setting**
1...150 % (step: 1 %)		setting range

[Current Filter Time] CRTF ★

This parameter defines the filter time of the feedback currents data internally used by the drive.

This parameter can be accessed if **[Access Level]** LAC is set to **[Expert]** EPR.

Value	Code / Value	Description
[Auto]	AUTO	Currents filter time applied is defined by **[Currents Filter]** CRFA. **Factory setting**
1...100.0 ms (step: 0.1 ms)		setting range

[Currents Filter] CRFA ★

Default currents filter time used if **[Current Filter Time]** CRTF is set to **[Auto]** AUTO.

This parameter can be accessed if **[Access Level]** LAC is set to **[Expert]** EPR.

Value range	Description
0.0...100.0 ms (step: 0.1 ms)	**Factory setting**: Read-only parameter.

[Relative d-axis error] RDAE ★

This parameter can only be accessed with synchronous motor control types .

This parameter is used to perform adjustments manually on **[Syn. EMF constant]** PHS for synchronous motors :

This parameter should be close to 0 %. If **[Relative d-axis error]** RDAE is:

- Lower than 0%:
  - **[Syn. EMF constant]** PHS may be increased for synchronous motors.
- Greater than 0%:
  - **[Syn. EMF constant]** PHS may be reduced for synchronous motors.

NOTE: The adjustments can be automatically done with **[Rotation Tune Enable]** TUNR.

The following table presents a manual step by step way to optimize the synchronous motors using the RDAE parameter:

Step	Action
1	Enter the motor nameplate
2	Perform the **[Autotuning]** TUN operation
3	Adjust **[Syn. EMF constant]** PHS to optimize the behavior. This adjustment can be done if **[Motor control type]** CTT is set to **[Sync. mot.]** SYN: • Start the motor at minimal stable frequency available on the machine (at minimum load and without boost). • Check and note the **[Relative d-axis error]** RDAE value: ◦ If the **[Relative d-axis error]** RDAE value is lower than 0%, then **[Syn. EMF constant]** PHS may be increased. ◦ If the **[Relative d-axis error]** RDAE value is upper than 0%, then **[Syn. EMF constant]** PHS may be reduced. **[Relative d-axis error]** RDAE value should be closed to 0%. • Stop the motor for modify **[Syn. EMF constant]** PHS in accordance with the value of the **[Relative d-axis error]** RDAE (previously noted).

Value range	Description
0.0...6,553.5 % (step: 0.1 %)	**Factory setting**: Read-only parameter

[Nom Motor Tq Scaling] TQNC

This parameter allows to select the reference nominal torque.

This parameter can be accessed if **[Access Level]** LAC is set to **[Expert]** EPR.

Value	Code / Value	Description
[Expert]	OPTI	Optimized torque is the nominal electromagnetic torque computed based on the electrical parameters of the motor. **Note:** Selecting this setting allows a precise use of the load. **Factory setting**
[Nameplate]	NAMP	Nameplate torque is the nominal mechanical torque calculated based on the nameplate data of the motor.

[Nom Motor torque] TQN ★

Computed nominal motor torque (+/- 2% tolerance).

In case of synchronous motors, this parameter is impacted by a modification of **[Syn. EMF constant]** PHS.

In case of asynchronous motors, this parameter is impacted by a modification of **[Magnetizing Current]** IDA and the magnetic saturation parameters (i.e **[Flux curve coeff A]** ALFA, **[Flux curve coeff B]** BET0, **[Tangential Main Inductance]** L0A).

NOTE: A tune in rotation modifies the magnetic saturation parameters.

According to **[Nom Motor Tq Scaling]** TQNC setting, **[Nom Motor torque]** TQN parameter displays the value of the optimized torque **[Expert Motor Tq]** TQNO or the nameplate torque **[Plate Nom Motor Tq]** TQNP.

Value range	Description
0...65,535	The value is according to drive ratings and **[Torque Scaling]** INRT setting. **Factory setting**: Read only

[Expert Motor Tq] TQNO ★

This parameter can be accessed if **[Access Level]** LAC is set to **[Expert]** EPR.

Value range	Description
0...65,535	The value is according to drive ratings and **[Torque Scaling]** INRT setting. **Factory setting**: Read only

[Plate Nom Motor Tq] TQNP ★

This parameter can be accessed if **[Access Level]** LAC is set to **[Expert]** EPR.

Value range	Description
0...65,535	The value is according to drive ratings and **[Torque Scaling]** INRT setting. **Factory setting**: Read only

[Motor tune] MTU– Menu

Access

[Complete settings] ➞ **[Motor parameters]** ➞ **[Motor data]** ➞ **[Motor tune]**

About This Menu

This menu is used to perform motor autotuning (or standstill motor tuning).

The tune operation optimizes:

- The motor performances at low speed.
- The estimation of the motor torque.
- The accuracy of the estimation of the process values in sensorless operation and monitoring.

Before performing a motor autotuning

- The motor parameters must be set first. If a motor parameter is modified (or a parameter impacting a motor parameter setting), autotuning must be re-performed.
- The motor has to be stopped. Verify that the application does not make the motor turn during the tune operation.
- The motor must be at cold state: the motor thermal state has a significant influence on the tuning result.

Autotuning can be performed:

- manually on request by setting **[Autotuning]** TUN to **[Apply Autotuning]** YES,
- manually using the digital input or bit assigned to **[Autotuning Assign]** TUL,
- automatically at drive power-up if **[Automatic autotune]** AUT is set to **[Yes]** YES.

[Autotuning] TUN

⚠WARNING

UNEXPECTED MOVEMENT

Autotuning moves the motor in order to tune the control loops.

- Only start the system if there are no persons or obstructions in the zone of operation.

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

During autotuning, noise development and oscillations of the system are normal.

⚠WARNING

LOSS OF CONTROL

- If you modify the value of one or more motor parameters after having performed autotuning, the value of **[Tune selection]** STUN is reset to **[Default]** TAB and you must re-perform autotuning.

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

Autotuning is only performed if no stop command has been activated. If a “freewheel stop” or “fast stop” function has been assigned to a digital input, this input must be set to 1 (active at 0).

Autotuning takes priority over any run, which is taken into account after the autotuning sequence.

If autotuning has detected an error, this parameter automatically switches back to **[No Action]** NO and, the error response depends on the configuration of **[Tuning Error Resp]** TNL.

Autotuning may last from several seconds to approximately a minute. Do not interrupt the process. Wait for theDisplay Terminal to change to **[No Action]** NO.

To redo a motor tuning, wait that it is stopped and cold. Set first **[Autotuning]** TUN to **[Erase Autotuning]** CLR, then redo the motor tuning.

The cable length has an influence on the tune result. If the wiring is modified, it is necessary to redo the tune operation.

Value	Code / Value	Description
[No Action]	NO	Autotuning not in progress. **Factory setting**
[Apply Autotuning]	YES	Autotuning is performed immediately if possible, then the parameter automatically changes to **[No Action]** NO. If the drive state does not allow the tune operation immediately, the parameter changes to **[No]** NO and the operation must be done again. **NOTE:** The motor parameters must be set before performing autotuning.
[Erase Autotuning]	CLR	The motor parameters measured by the autotuning function are reset. The default motor parameter values are used to control the motor. **[Autotuning Status]** TUS is set to **[Not Done]** TAB.

[Autotuning Status] TUS

Read-only parameter. This parameter is not saved at drive power-off. It shows the autotuning status since the last power-on.

NOTE: To know about which are the values used by the drive to control the motor (e.g. if the values used are the results of an autotuning) refer to **[Tune selection]** STUN , page 155.

Value	Code / Value	Description
[Not Done]	TAB	The autotuning is not done **Factory setting**
[Pending]	PEND	The autotuning has been requested but not yet performed
[In Progress]	PROG	The autotuning is in progress
[Error]	FAIL	The autotuning has detected an error
[Autotuning Done]	DONE	The motor parameters measured by the autotuning function are used to control the motor

[Autotuning Usage] TUNU ★

On some applications that require high torque at low speed, the temperature of the motor has a significant influence on the behavior and the capability to maintain the optimization of the performance resulting from the autotuning. In such case, setting the parameter **[Autotuning Usage]** TUNU to **[Therm mot]** TM helps to compensate the stator resistance according to the thermal state of the motor.

This parameter shows the way used to modify the motor parameters according to its estimated thermal state.

This parameter can be accessed if **[Access Level]** LAC is set to **[Expert]** EPR.

Value	Code / Value	Description
[No]	NO	No thermal state estimation. **Factory setting**
[Therm mot]	TM	Statoric thermal state estimation based on nominal current and current consumed by the motor. It helps to take into account the thermal deviation of the statoric resistor impacting the application response (especially with open loop application).

[Tuning Error Resp] TNL ★

Response to autotune error (**[Autotuning Error]** TNF).

This parameter can be accessed if **[Access Level]** LAC is set to **[Expert]** EPR.

Value	Code / Value	Description
[Ignore]	NO	Detected error ignored.
[Freewheel Stop]	YES	A freewheel stop is requested and the error is triggered. **Factory setting**

[Autotuning Assign] TUL ★

The autotuning is performed when the assigned input or bit changes to 1.

This parameter can be accessed if **[Access Level]** LAC is set to **[Expert]** EPR.
NOTE: The autotuning causes the motor to start up.

Value range	Code / Value	Description
[Not Assigned]	NO	Not assigned **Factory setting**
[DI1]...**[DI6]**	LI1...LI6	Digital input DI1...DI6
[DI11]...**[DI16]**	LI11...LI16	Digital input DI11...DI16 if VW3A3203 I/O extension module has been inserted
[CD00]... **[CD10]**	CD00...CD10	Virtual digital input CMD.0...CMD.10 in **[I/O profile]** IO configuration
[CD11]... **[CD15]**	CD11...CD15	Virtual digital input CMD.11...CMD.15 regardless of configuration

[Automatic autotune] AUT ★

⚠WARNING

UNEXPECTED MOVEMENT

If this function is activated, autotuning is performed each time the drive is switched on.

- 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.

The motor must be stopped when switching on the drive.

This parameter can be accessed if **[Access Level]** LAC is set to **[Expert]** EPR.

Value	Code / Value	Description
[No]	NO	Function deactivated **Factory setting**
[Yes]	YES	A tuning is automatically done at each power-up

[Tune selection] STUN ★

Read-only parameter.

Value	Code / Value	Description
[Default]	TAB	The default motor parameter values are used to control the motor. Return to default value if a motor parameter is modified after autotuning has been performed. **Factory setting**
[Measure]	MEAS	The values measured by the autotuning function are used to control the motor. This parameter switches automatically to this value after an autotuning is successfully performed.
[Custom]	CUS	The values manually set are used to control the motor

[Autotuning Lvl Of Cur] TCR ★

Level of current for autotuning.

This parameter can be accessed if **[Access Level]** LAC is set to **[Expert]** EPR.

This parameter shows the level of current applied to the motor during auto tuning, in percent of the drive nominal current.

This parameter has an impact on the inductor measurement for asynchronous motor, page 140 control types.

NOTE: In case of instability, **[PSI Align Curr Max]** MCR should be increased by steps up to obtain the requested performances.

Value	Code / Value	Description
[Auto]	AUTO	**Factory setting**
1...300 % (step: 1 %)		setting range

[Angle setting type] AST★

This parameter can be accessed with synchronous motor control type (**[Motor control type]** set to **[Sync. mot.]** SYN).

This function is used to align the rotor or to compute the angle of the rotor flux linked to permanent magnets in order to reduce torque jolt at start-up.

Value	Code / Value	Description
[PSI align.]	PSI	Pulse signal injection. Standard alignment mode, without rotor motion The angle measurement is realized by monitoring the stator current response to a pulse signal injection over a wide range of frequencies
[PSIO align.]	PSIO	Pulse signal injection - optimized. Optimized alignment mode, without rotor motion

Value	Code / Value	Description
		Same operation as **[PSI align.]** PSI is performed over an optimized range of frequencies. The measurement time is reduced after the first run order or tune operation, even if the drive has been turned off. **Factory setting**
[Rotational Current Injection]	RCI	Rotational current injection. Alignment mode with rotor motion. This alignment mode realizes the mechanical alignment of the rotor and the stator; it requires up to 4 s. The motor needs to be stopped and without resistive torque.
[No align.]	NO	No alignment

[PSI Align Curr Max] MCR ★

Current level in % of **[Sync Nominal I]** NCRS for **[Autotune L d-axis]** LDS and **[Autotune L q-axis]** LQS Identification.

This parameter can only be accessed with synchronous motor control types and if **[Access Level]** LAC is set to **[Expert]** EPR.

This current must be equal to or higher than the maximum current level of the application; otherwise an instability may occur.

NOTE: In case of instability, **[PSI Align Curr Max]** MCR should be increased by steps up to obtain the requested performances.

Value	Code / Value	Description
[Auto]	AUTO	**[PSI Align Curr Max]** MCR is adapted by the drive according to the motor data settings. **Factory setting**
1...300 % (step: 1 %)		setting range

[Current Level Align] ACR ★

Current level in % of **[Sync Nominal I]** NCRS for **[PSI align.]** PSI and **[PSIO align.]** PSIO angle shift measurement modes.

This parameter can only be accessed with synchronous motor, page 140 control types and if **[Access Level]** LAC is set to **[Expert]** EPR.

Value	Code / Value	Description
[Auto]	AUTO	Represents 100 % of nominal motor current. **Factory setting**
1...150 % (step: 1 %)		setting range

[Rotational Cur Level] RCL★

This parameter can be accessed if **[Angle setting type]** AST is set to **[Rotational Current Injection]** RCI.

The current level should be set according to the torque required during the alignment operation.

Value range	Description
10...300% (step: 1 %)	The value is displayed as percentage of the nominal motor current **Factory setting**: 75%

[Rotational Trq Current] RTC ★

This parameter can be accessed:

- if **[Access Level]** LAC is set to **[Expert]** EPR, and
- if **[Angle setting type]** AST is set to **[Rotational Current Injection]** RCI, and
- with synchronous motor control type.

Value range	Description
0...300% (step: 1 %)	The value is displayed as a percentage of the nominal motor current **Factory setting**: 0%

[RCI Max Freq] RCSP ★

This parameter can be accessed:

- if **[Access Level]** LAC is set to **[Expert]** EPR, and
- if **[Angle setting type]** AST is set to **[Rotational Current Injection]** RCI, and
- with synchronous motor control type.

Value	Code / Value	Description
[Auto]	AUTO	**Factory setting**
0.0...500.0 Hz (step: 0.1 Hz)		setting range

[RCI Round Nb] RCRP ★

This parameter can be accessed:

- if **[Access Level]** LAC is set to **[Expert]** EPR, and
- if **[Angle setting type]** AST is set to **[Rotational Current Injection]** RCI, and
- with synchronous motor control type.

Value	Code / Value	Description
[Auto]	AUTO	**Factory setting**
0...32,767 (step: 1)		setting range

[RCI With Transformer] RCIR ★

This parameter can be accessed:

- if **[Access Level]** LAC is set to **[Expert]** EPR, and
- if **[Angle setting type]** AST is set to **[Rotational Current Injection]** RCI, and
- with synchronous motor control type.

Value	Code / Value	Description
[No]	NO	Function inactive **Factory setting**
[Yes]	YES	Function active

[Motor tune] MTU– –[Rotation Tune] TRAM– Menu

Access

[Complete settings] ➜ **[Motor parameters]** ➜ **[Motor data]** ➜ **[Motor tune]** ➜ **[Rotation Tune]**

Overview

The tune in rotation

- For asynchronous motor control types, page 140 : used to estimate the nominal magnetizing current (**[Magnetizing Current]** IDA), to identify and take into account the magnetic saturation by tracking the electrical operating range of the motor.
- For synchronous motor control types, page 140 : used to optimize automatically the **[Syn. EMF constant]** PHS parameter.

The tune in rotation helps to improve the performances especially at low frequency, at frequency greater than the motor nominal frequency.

Example of application

Application requiring torque control accuracy, torque dynamics and motor frequency greater than **[Nominal Motor Freq]** FRS.

Prerequisites to perform a tune in rotation

- Expert access: **[Access Level]** LAC = **[Expert]** EPR,
- **[Motor control type]** CTT is set to **[Energy Sav.]** NLD, **[SVC V]** VVC or **[Sync. mot.]** SYN.
- Motor nameplate is entered,
- The motor must be at cold state to perform a tune in rotation,
- It is advisable to perform the tune in rotation with minimum of load or without load,
- The motor must be free to operate all along the execution of tune in rotation. During the tune in rotation, the motor should operate in stable and normal conditions. For example, no current limitation must be triggered.

Standard procedure for performing a tune in rotation

⚠WARNING

UNEXPECTED MOVEMENT

Autotuning moves the motor in order to tune the control loops.

- Only start the system if there are no persons or obstructions in the zone of operation.

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

⚠WARNING

LOSS OF CONTROL

- If you modify the value of one or more motor parameters after having performed autotuning, the value of **[Rotation Tune Select]** STUR is reset to **[Default]** TAB and you must re-perform autotuning.

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

Even if some parameters are unchanged, some others parameters, not accessible, are computed again.

These settings include, but not limited to, selection of motor control type, settings of the motor parameters according to the motor nameplate, autotuning of the motor.

Step	Action
1	Set **[Rotation Tune Type]** EFAP to **[Saturation]** SATF. This step is required only for asynchronous motor control types, page 140.
2	Set **[Rotation Tune Enable]** TUNR to **[Apply Autotuning]** YES.

Step	Action
3	At next run order, the tune in rotation is performed. During the tune in rotation, the motor operates at a frequency defined by the parameter **[Rotation Tune Freq]** TLFR and **[Device State]** HMIS shows **[Autotuning]** TUN. **Note:** • The run order must remain active during the tune in rotation. • At the beginning of the tune in rotation, a standstill motor tuning is performed in order to measure ◦ for asynchronous motor control types, page 140, the motor stator resistance (**[AsyncMotor R Stator]** RSA) and the leakage inductance (**[AsyncMotor Lf Induct]** LFA). ◦ for synchronous motor control types, page 140, the motor stator resistance (**[SyncMotor Stator R]** RSAS), **[Autotune L q-axis]** LQS and **[Autotune L d-axis]** LDS. • For asynchronous motor control types, page 140, **[Rotor Time Const]** TRA and **[Magnetizing Current]** IDA are not measured via standstill motor tuning. It is the result of an internal calculation. • For asynchronous motor control types, page 140, after the standstill motor tuning, several current cycles are repeated (number depending on **[Nb Of Repetitions]** TNBR). The motor operates all through this phase without stopping. • The tune in rotation can last more than a minute depending on the motor, the drive setting and the configuration of the tune in rotation.
4	At the end of the tune in rotation, **[Rotation Tune Status]** TURS switches to **[Autotuning Done]** DONE. The motor is stopped and the run order can be removed. For asynchronous motor control types, page 140**[Rotor Time Const]** TRA, **[Magnetizing Current]** IDA, **[Tangential Main Inductance]** L0A, **[Flux curve coeff A]** ALFA and **[Flux curve coeff B]** BET0 are updated. For synchronous motor control types, page 140, **[Syn. EMF constant]** PHS is updated. Also, at the end of the tune in rotation: • **[Rotation Tune Enable]** TUNR switches back to **[No Action]** NO, • **[Rotation Tune Select]** STUR switches to **[Measure]** MEAS, • **[Autotuning Status]** TUS switches to **[Autotuning Done]** DONE.

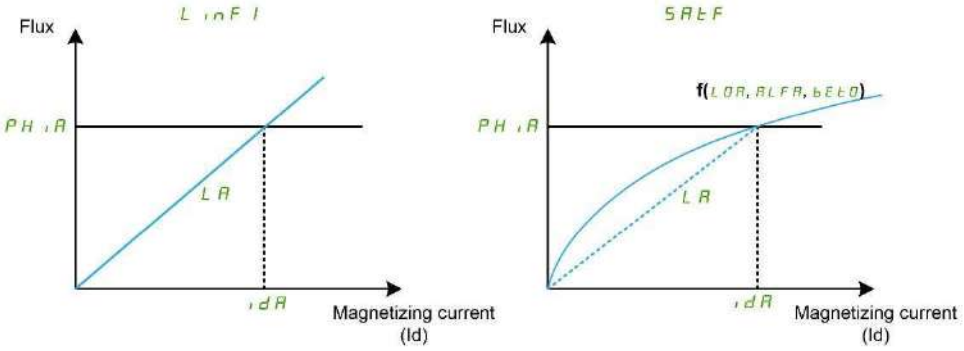
Error detected during tune in rotation

Refer to **[Autotuning Error]** TNF description , page 568.

[Rotation Tune Type] EFAP

This parameter modifies the used Flux/Current model.

This parameter can be accessed if **[Access Level]** LAC is set to **[Expert]** EPR.



Setting	Code / Value	Description
[Standard]	LINF1	Standard. Linear approach of the magnetic curve calculated from motor nameplate parameters. **Factory setting**
[Saturation]	SATF	Saturation. Non-linear approach of the magnetic saturation curve. This setting requires to perform a tune in rotation to estimate IDA, L0A, ALFA and BET0.

[Rotation Tune Enable] TUNR

⚠WARNING

UNEXPECTED MOVEMENT

Autotuning moves the motor in order to tune the control loops.

- Only start the system if there are no persons or obstructions in the zone of operation.

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

⚠WARNING

LOSS OF CONTROL

- If you modify the value of one or more motor parameters after having performed autotuning, the value of **[Rotation Tune Select]** STUR is reset to **[Default]** TAB and you must re-perform autotuning.

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

Even if some parameters are unchanged, some others parameters, not accessible, are computed again.

These settings include, but not limited to, selection of motor control type, settings of the motor parameters according to the motor nameplate, autotuning of the motor.

This parameter can be accessed if **[Rotation Tune Type]** EFAP is set to **[Saturation]** SATF or **[Motor control type]** CTT is set to **[Sync. mot.]** SYN.

Setting	Code / Value	Description
[No Action]	NO	The tune in rotation is not in progress and not requested. **Factory setting**
[Apply Autotuning]	YES	The tune in rotation is performed at next run order, then the parameter automatically changes to **[No Action]** NO. To help repeatability of the results, it is advisable to erase the tune in rotation before performing a new one. **NOTE: [Rotation Tune Enable]** TUNR is set to factory setting **[No Action]** NO after a power cycle, if previously set to **[Apply Autotuning]** YES
[Erase Autotuning]	CLR	L0A, IDA, ALFA and BET0 are reset for asynchronous motors. PHS is reset for synchronous motors. The default values are used to control the motor. **[Rotation Tune Status]** TURS switches to **[Not Done]** TAB. NOTE: It does not affect standstill motor tuning parameters (RSA and LFA are not reset).

[Rotation Tune Status] TURS

Read-only parameter.

This parameter can be accessed if **[Rotation Tune Type]** EFAP is set to **[Saturation]** SATF or **[Motor control type]** CTT is set to **[Sync. mot.]** SYN.

This parameter is not saved at drive power-off. It shows the status of the tune in rotation since the last power-on.

Setting	Code / Value	Description
[Not Done]	TAB	The tune in rotation is not done since the last power-on. **Factory setting**
[Pending]	PEND	The tune in rotation has been requested but not yet performed.
[In Progress]	PROG	The tune in rotation is in progress.
[Error]	FAIL	The tune in rotation has detected an error.
[Autotuning Done]	DONE	The tune in rotation is done. The motor parameters measured by the tune in rotation are used to control the motor.

[Rotation Tune Select] STUR

Read-only parameter.

This parameter can be accessed if **[Rotation Tune Type]** EFAP is set to **[Saturation]** SATF or **[Motor control type]** CTT is set to **[Sync. mot.]** SYN.

Setting	Code / Value	Description
[Default]	TAB	The default motor parameter values are used to control the motor. Return to default value if a motor parameter is modified after rotation tune has been performed. **Factory setting**
[Measure]	MEAS	The values measured by the tune in rotation are used to control the motor.
[Custom]	CUS	The values manually set are used to control the motor. **NOTE**: At least one of the following parameters has been entered manually: • L0A, ALFA or BET0 for asynchronous motor control types, page 140 • PHS for synchronous motor control types, page 140

[Autotuning Status] TUS

Read-only parameter.

This parameter is not saved at drive power-off. It shows the standstill motor tuning status since the last power-on (for information only, cannot be modified).

Setting	Code / Value	Description
[Not Done]	TAB	Standstill motor tuning is not done since the last power-on. **Factory setting**
[Pending]	PEND	Standstill motor tuning has been requested but not yet performed
[In Progress]	PROG	Standstill motor tuning is in progress

Setting	Code / Value	Description
[Error]	FAIL	Standstill motor tuning has detected an error
[Autotuning Done]	DONE	Standstill motor tuning is done. The motor parameters measured by the autotuning function are used to control the motor

[Rotation Tune Freq] TLFR

During the tune in rotation, the motor operates at this frequency. If **[High Speed]** HSP is lower than **[Rotation Tune Freq]** TLFR, the motor operates at **[High Speed]** HSP.

This parameter can be accessed if **[Rotation Tune Type]** EFAP is set to **[Saturation]** SATF or **[Motor control type]** CTT is set to **[Sync. mot.]** SYN.

This parameter is reset to factory settings if **[Motor Standard]** BFR or **[Nominal Motor Freq]** FRS is modified.

For robustness, it is advisable to let this parameter set to its factory setting.

Setting	Code/Value	Description
[Auto]	AUTO	it corresponds to • **[Nominal Motor Freq]** FRS/2 for asynchronous motor control types, page 140 • **[Nominal Motor Freq]** FRSS/3 for synchronous motor control types, page 140 **Factory setting**
0.1...599.0 Hz		Setting range

[Nb Of Repetitions] TNBR

During the tune in rotation, one or several current cycles are repeated. The motor operates all through this phase without stopping. This parameter modifies the number of cycles.

This parameter can be accessed if **[Rotation Tune Type]** EFAP is set to **[Saturation]** SATF.

Increasing the number of cycles helps to improve the accuracy of the tune in rotation. The duration of tune in rotation is also increased.

Setting	Description
1...3	Setting range **Factory setting**: 1

[Main Inductance] LA

Read-only parameter.

This parameter is the result of an internal calculation using **[Rotor Nominal Flux]** PHIA and **[Magnetizing Current]** IDA.

This parameter can be accessed if **[Access Level]** LAC is set to **[Expert]** EPR.

Setting	Description
0...65535 mH (1)	Setting range **Factory setting**: -
(1): For drives with power range≤ 15 kW. If the power range is greater than 160 kW, the range is 0…65,535 µH else the range is 0.00…655.35 mH.	

[Tangential Main Inductance] L0A

This parameter is estimated via the tune in rotation and is used by the magnetic saturation curve. Only enter manually a value if you are copying a drive configuration that has been tuned via the tune in rotation.

This parameter can be accessed if:

- **[Access Level]** LAC is set to **[Expert]** EPR, and
- **[Rotation Tune Type]** EFAP is set to **[Saturation]** SATF.

Setting	Description
0...65535 mH	Setting range **Factory setting**: 0
(1): For drives with power range ≤ 15 kW. If the power range is greater than 160 kW, the range is 0…65,535 µH else the range is 0.00…655.35 mH.	

[Nameplate Nominal Flux] PHI0

Read-only parameter.

This parameter is calculated from the motor nameplate and it is used for internal calculation. This parameter is used for Blemo services purpose

This parameter can be accessed if **[Access Level]** LAC is set to **[Expert]** EPR.

Setting	Description
0.00...655.35 Wb	Setting range **Factory setting**: -

[Rotor Nominal Flux] PHIA

Read-only parameter.

This parameter is the flux corresponding to **[Magnetizing Current]** IDA and used in the Flux/Current model for motor control.

This parameter can be accessed if **[Access Level]** LAC is set to **[Expert]** EPR.

Setting	Description
0.0...655.35 Wb	Setting range **Factory setting**: -

[Flux curve coeff A] ALFA

This parameter is estimated via the tune in rotation and it is used by the magnetic saturation curve. Only enter manually a value if you are copying a drive configuration that has been tuned via the tune in rotation.

This parameter can be accessed if:

- **[Access Level]** LAC is set to **[Expert]** EPR, and
- **[Rotation Tune Type]** EFAP is set to **[Saturation]** SATF.

Setting	Description
-327.67 %...327.67 %	Setting range **Factory setting**: 0.00 %

[Flux curve coeff B] BET0

This parameter is estimated via the tune in rotation and it is used by the magnetic saturation curve. Only enter manually a value if you are copying a drive configuration that has been tuned via the tune in rotation.

This parameter can be accessed if:

- **[Access Level]** LAC is set to **[Expert]** EPR, and
- **[Rotation Tune Type]** EFAP is set to **[Saturation]** SATF.

Setting	Description
-327.67 %...327.67 %	Setting range **Factory setting**: 0.00 %

[1st Id min current] IDL1

This parameter determines the min level of magnetizing current (Id) reached during the first current cycle of the tune in rotation. It is expressed in % of nominal magnetizing current (**[Magnetizing Current]** IDA).

This parameter is reset to factory setting if **[Magnetizing Current]** IDA is modified.

This parameter can be accessed if:

- **[Access Level]** LAC is set to **[Expert]** EPR, and
- **[Rotation Tune Type]** EFAP is set to **[Saturation]** SATF.

Setting	Description
0%...**[1st Id max current]** IDH1	Setting range **Factory setting**: 50 %

[1st Id max current] IDH1

This parameter determines the max level of magnetizing current (Id) reached during the first current cycle of the tune in rotation. It is expressed in % of nominal magnetizing current (**[Magnetizing Current]** IDA).

This parameter is reset to factory setting if **[Magnetizing Current]** IDA is modified.

This parameter can be accessed if:

- **[Access Level]** LAC is set to **[Expert]** EPR, and
- **[Rotation Tune Type]** EFAP is set to **[Saturation]** SATF.

Setting	Description
[1st Id min current] IDL1... 300 %	Setting range **Factory setting**: 100%

[2nd Id min current] IDL2

This parameter determines the min level of magnetizing current (Id) reached during all current cycles of the tune in rotation after the first one. It is expressed in % of nominal magnetizing current (**[Magnetizing Current]** IDA).

This parameter is reset to factory setting if **[Magnetizing Current]** IDA is modified.

This parameter can be accessed if:

- **[Access Level]** LAC is set to **[Expert]** EPR, and
- **[Nb Of Repetitions]** TNBR is greater than 1.

Setting	Description
0 %... **[2nd Id max current]** IDH2	Setting range **Factory setting**: 20 %

[2nd Id max current] IDH2

This parameter determines the mac level of magnetizing current (Id) reached during all current cycles of the tune in rotation after the first one. It is expressed in % of nominal magnetizing current (**[Magnetizing Current]** IDA).

This parameter is reset to factory setting if **[Magnetizing Current]** IDA is modified.

This parameter can be accessed if:

- **[Access Level]** LAC is set to **[Expert]** EPR, and
- **[Nb Of Repetitions]** TNBR is greater than 1.

Setting	Description
[2nd Id min current] IDL2... 300 %	Setting range **Factory setting**: 120 %

[Autotuning flux verif] TUNV

Read-only parameter.

This parameter can be accessed if:

- **[Access Level]** LAC is set to **[Expert]** EPR, and
- **[Rotation Tune Type]** EFAP is set to **[Saturation]** SATF.

This parameter is used for Blemo services purpose.

Setting	Code/Value	Description
[No]	NO	Value not available. The tune in rotation has not yet been performed since the last power-on or **[Nb Of Repetitions]** TNBR is set to 1. **Factory setting**
1...65,535 %		A numerical value is displayed after a successful tune in rotation if **[Nb Of Repetitions]** TNBR is set to 2 or 3.

[PMSM Tune Curr Lvl] TRCR

Tune in rotation current level for synchronous motor. It is expressed in **% of In** (Nominal motor current).

This parameter can be accessed if **[Access Level]** LAC is set to **[Expert]** EPR and **[Motor control type]** CTT is set to **[Sync. mot.]** SYN.

Value range	Description
10 ... 300 %	Setting range **Factory setting**: 50 % Unit: 1 %

[PMSM Tune Acc Time] TRAC

Tune in rotation acceleration time for synchronous motor. Represents the duration to reach the nominal frequency from 0.

This parameter can be accessed if **[Access Level]** LAC is set to **[Expert]** EPR and **[Motor control type]** CTT is set to **[Sync. mot.]** SYN.

Value range	Description
1.0 ... 999.9 s	Setting range **Factory setting**: • 10 s for drives with nominal power lower than 22 kW • 30 s for drives with nominal power equal or higher than 22 kW Unit: 0.1 s

[Syn. EMF constant] PHS

Synchronous motor: Permanent magnet flux.

This parameter can be accessed if **[Access Level]** LAC is set to **[Expert]** EPR and **[Motor control type]** CTT is set to **[Sync. mot.]** SYN.

Value range	Description
0.0 ... 6553.5	Setting range Factory setting: 0.0 Unit: 0.1 mV/rpm

[Rotation Tune Status 2] TRS1

Tune in rotation error diagnostic for Asynchronous Motors.

This parameter is used for Blemo services purpose.

This parameter can be accessed if **[Access Level]** LAC is set to **[Expert]** EPR and **[Rotation Tune Type]** EFAP is set to **[Saturation]** SATF .

[Rotation Tune PMSM] TRS2

Tune rotation status for synchronous motor.

This parameter is used for Blemo services purpose.

This parameter can be accessed if **[Access Level]** LAC is set to **[Expert]** EPR and **[Motor control type]** CTT is set to **[Sync. mot.]** SYN.

[Motor monitoring] MOP– Menu

Access

[Complete settings] ➞ **[Motor parameters]** ➞ **[Motor monitoring]**

[Motor Th Current] ITH

Motor thermal monitoring current to be set to the rated current indicated on the nameplate.

Setting	Description
0.12...1.1 In(1)	Setting range **Factory setting**: According to drive rating
(1) Corresponding to the rated drive current indicated in the installation manual and on the drive nameplate.	

[Motor Thermal Mode] THT

NOTE: An error is detected when the thermal state reaches 118% of the rated state and reactivation occurs when the state falls back below 100%.

Setting	Code / Value	Description
[No]	NO	No thermal monitoring
[Self cooled]	ACL	Self ventilated motor **Factory setting**
[Force-cool]	FCL	Fan-cooled motor

[MotorTemp ErrorResp] OLL

Motor overtemp error response.

Setting	Code / Value	Description
[Ignore]	NO	Detected error ignored
[Freewheel Stop]	YES	Free wheel **Factory setting**

[Thermal monitoring] TPP– Menu

Access

[Complete settings] ➞ [Motor parameters] ➞ [Motor monitoring] ➞ [Thermal monitoring]

About This Menu

The thermal monitoring function helps to prevent against high temperature by monitoring the real temperature by the drive.

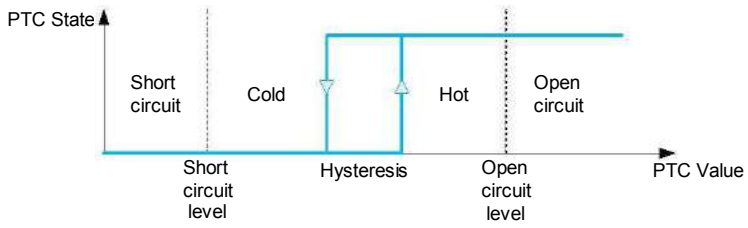
PTC, PT100, PT1000, and KTY84 thermal probes are supported by this function.

The function gives the possibility to manage 2 levels of monitoring:

- A Warning level: the drive triggers an event without stopping the application.
- An Error level: the drive triggers an event and stops the application.

The thermal probe is monitored for the following detected error:

- Overheating
- Probe break (loss of signal)
- Probe short-circuit



Activation

[AIx Th Monitoring] THxS allows you to activate the thermal monitoring on the related analog input:

- **[No]** NO: the function is disabled
- **[Yes]** YES: the thermal monitoring is enabled on the related AIx.

Type of Thermal Probe Selection

[AIx Type] AIxT allows you to select the type of thermal sensor(s) connected on the related analog input:

- **[No]** NO: no sensor
- **[PTC]** PTC: one to six PTC (in serial) is used
- **[KTY]** KTY: 1 KTY84 is used
- **[PT100]** 1PT2: 1 PT100 connected with two wires is used
- **[PT1000]** 1PT3: 1 PT1000 connected with two wires is used
- **[PT100 in 3 wires]** 1PT23: 1 PT100 connected with three wires is used (AI4 & AI5 only)
- **[PT1000 in 3 wires]** 1PT33: 1 PT1000 connected with three wires is used (AI4 & AI5 only)

2-wire thermal probes are supported on analog input 2 to analog input 5.

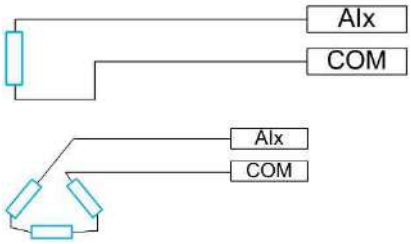
3-wire thermal probes are supported on analog input 4 and analog input 5. These inputs are available with the I/O extension option module.

If the probe is far from the drive, the 3-wire connection is recommended as compared to a 2-wire connection.

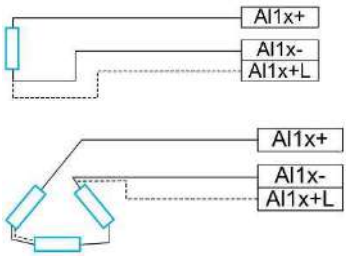
NOTE: In case of 3 serial probes, the drive monitors the average probe values.

Wiring for PT100 and PT1000 Probes

For 2-wire probes, the following wirings are possible:



For 3-wire probes, the following wirings are possible:



[AI2 Th Monitoring] TH2S

Activation of the thermal monitoring on AI2.

Setting	Code / Value	Description
[No]	NO	No **Factory setting**
[Yes]	YES	Yes

[AI2 Type] AI2T ★

This parameter can be accessed if **[AI2 Th Monitoring]** TH2S is not set to **[No]** NO.

Setting	Code / Value	Description
[Voltage]	10U	0-10 Vdc **Factory setting**
[Current]	0A	0-20 mA
[PTC]	PTC	1 to 6 PTC (in serial)
[KTY]	KTY	1 KTY84
[PT1000]	1PT3	1 PT1000 connected with 2 wires
[PT100]	1PT2	1 PT100 connected with 2 wires

Note:

- If **[AI2 Th Monitoring]** TH2S is set to **[Yes]** YES, the settings **[Voltage]** 10U and **[Current]** 0A are unavailable.

[AI2 Th Error Resp] TH2B★

Thermal monitoring response to a detected error for AI2.

This parameter can be accessed if **[AI2 Type]** AI2T is not set to

- **[Voltage]** 10U, or
- **[Current]** 0A.

Setting	Code / Value	Description
[Ignore]	NO	Detected error ignored
[Freewheel Stop]	YES	Freewheel stop
[Configured Stop]	STT	Stop according to **[Type of stop]** STT parameter but without an error triggered after stop
[Fallback Speed]	LFF	Change to fallback speed, maintained as long as the detected error persists and the command has not been removed (1)
[Ramp stop]	RMP	Stop on ramp **Factory setting**

[AI2 Th Error Level] TH2F ★

This parameter can be accessed if **[AI2 Type]** AI2T is not set to:

- **[Voltage]** 10U, or
- **[Current]** 0A, or
- **[PTC]** PTC.

Setting	Description
-15.0...200.0°C	Setting range **Factory setting**: 110.0°C

[AI2 Th Warn Level] TH2A ★

This parameter can be accessed if **[AI2 Type]** AI2T is not set to:

- **[Voltage]** 10U, or
- **[Current]** 0A, or
- **[PTC]** PTC.

Setting	Description
-15.0...200.0°C	Setting range **Factory setting**: 90.0°C

[AI2 Th Value] TH2V ★

This parameter can be accessed if **[AI2 Type]** AI2T is not set to:

- **[Voltage]** 10U, or
- **[Current]** 0A, or
- **[PTC]** PTC.

Setting	Description
-34.6...206.6°C	Setting range **Factory setting**: _

[AI3 Th Monitoring] TH3S

Activation of the thermal monitoring on AI3.

Setting	Code / Value	Description
[No]	NO	No **Factory setting**
[Yes]	YES	Yes

[AI3 Type] AI3T ★

This parameter can be accessed if **[AI3 Th Monitoring]** TH3S is not set to **[No]** NO.

Identical to **[AI2 Type]** AI2T , page 170 with factory setting: **[Current]** 0A.

[AI3 Th Error Resp] TH3B ★

This parameter can be accessed if **[AI3 Type]** AI3T is not set to:

- **[Voltage]** 10U, or
- **[Current]** 0A, or

Setting	Code / Value	Description
[Ignore]	NO	Detected error ignored
[Freewheel Stop]	YES	Freewheel stop
[Configured Stop]	STT	Stop according to **[Type of stop]** STT parameter but without an error triggered after stop
[Fallback Speed]	LFF	Change to fallback speed, maintained as long as the detected error persists and the command has not been removed (1)
[Ramp stop]	RMP	Stop on ramp **Factory setting**

[AI3 Th Error Level] TH3F ★

This parameter can be accessed if **[AI3 Type]** AI3T is not set to:

- **[Voltage]** 10U, or
- **[Current]** 0A, or
- **[PTC]** PTC.

Setting	Description
-15.0...200.0°C	Setting range **Factory setting**: 110.0°C

[AI3 Th Warn Level] TH3A ★

This parameter can be accessed if **[AI3 Type]** AI3T is not set to:

- **[Voltage]** 10U, or
- **[Current]** 0A, or
- **[PTC]** PTC.

Setting	Description
-15.0...200.0°C	Setting range **Factory setting**: 90.0°C

[AI3 Th Value] TH3V ★

This parameter can be accessed if **[AI3 Type]** AI3T is not set to:

- **[Voltage]** 10U, or
- **[Current]** 0A, or
- **[PTC]** PTC.

Setting	Description
-34.6...206.6°C	Setting range **Factory setting**: _

[AI4 Th Monitoring] TH4S ★

Activation of the thermal monitoring on AI4.

This parameter can be accessed if VW3A3203 I/O extension module has been inserted.

Setting	Code / Value	Description
[No]	NO	No **Factory setting**
[Yes]	YES	Yes

[AI4 Type] AI4T ★

This parameter can be accessed if **[AI4 Th Monitoring]** TH4S is not set to **[No]** NO.

Setting	Code / Value	Description
[Voltage]	10U	0-10 Vdc
[Current]	0A	0-20 mA **Factory setting**
[Voltage +/-]	N10U	-10/+10 Vdc
[PTC]	PTC	1 to 6 PTC (in serial)
[KTY]	KTY	1 KTY84
[PT1000]	1PT3	1 PT1000 connected with 2 wires
[PT100]	1PT2	1 PT100 connected with 2 wires

[AI4 Th Error Resp] TH4B ★

This parameter can be accessed if **[AI4 Type]** AI4T is not set to

- **[Voltage]** 10U, or
- **[Current]** 0A.

Setting	Code / Value	Description
[Ignore]	NO	Detected error ignored
[Freewheel Stop]	YES	Freewheel stop
[Configured Stop]	STT	Stop according to **[Type of stop]** STT parameter but without an error triggered after stop
[Fallback Speed]	LFF	Change to fallback speed, maintained as long as the detected error persists and the command has not been removed (1)
[Ramp stop]	RMP	Stop on ramp **Factory setting**

[AI4 Th Error Level] TH4F ★

This parameter can be accessed if **[AI4 Type]** AI4T is not set to:

- **[Voltage]** 10U, or
- **[Current]** 0A, or
- **[PTC]** PTC.

Setting	Description
-15.0...200.0°C	Setting range **Factory setting**: 110.0°C

[AI4 Th Warn Level] TH4A ★

This parameter can be accessed if **[AI4 Type]** AI4T is not set to:

- **[Voltage]** 10U, or
- **[Current]** 0A, or
- **[PTC]** PTC.

Setting	Description
-15.0...200.0°C	Setting range **Factory setting**: 90.0°C

[AI4 Th Value] TH4V ★

This parameter can be accessed if **[AI4 Type]** AI4T is not set to:

- **[Voltage]** 10U, or
- **[Current]** 0A, or
- **[PTC]** PTC.

Setting	Description
-34.6...206.6°C	Setting range **Factory setting**: _

[AI5 Th Monitoring] TH5S ★

Activation of the thermal monitoring on AI5.

This parameter can be accessed if VW3A3203 I/O extension module has been inserted.

Setting	Code / Value	Description
[No]	NO	No **Factory setting**
[Yes]	YES	Yes

[AI5 Type] AI5T ★

This parameter can be accessed if **[AI5 Th Monitoring]** TH5S is not set to **[No]** NO.

Identical to **[AI4 Type]** AI4T , page 173.

[AI5 Th Error Resp] TH5B ★

This parameter can be accessed if **[AI5 Type]** AI5T is not set to

- **[Voltage]** 10U, or
- **[Current]** 0A.

Setting	Code / Value	Description
[Ignore]	NO	Detected error ignored
[Freewheel Stop]	YES	Freewheel stop
[Configured Stop]	STT	Stop according to **[Type of stop]** STT parameter but without an error triggered after stop
[Fallback Speed]	LFF	Change to fallback speed, maintained as long as the detected error persists and the command has not been removed (1)
[Ramp stop]	RMP	Stop on ramp **Factory setting**

[AI5 Th Error Level] TH5F ★

This parameter can be accessed if **[AI5 Type]** AI5T is not set to:

- **[Voltage]** 10U, or
- **[Current]** 0A, or
- **[PTC]** PTC.

Setting ()	Description
-15.0...200.0°C	Setting range **Factory setting**: 110.0°C

[AI5 Th Warn Level] TH5A ★

This parameter can be accessed if **[AI5 Type]** AI5T is not set to:

- **[Voltage]** 10U, or

- **[Current]** 0A, or
- **[PTC]** PTC.

Setting	Description
-15.0...200.0°C	Setting range **Factory setting**: 90.0°C

[AI5 Th Value] TH5V ★

This parameter can be accessed if **[AI5 Type]** AI5T is not set to:

- **[Voltage]** 10U, or
- **[Current]** 0A, or
- **[PTC]** PTC.

Setting	Description
-34.6...206.6°C	Setting range **Factory setting**: _

[FallbackSpeed] LFF

Fall back speed.

Setting	Description
0.0...500.0 Hz	Setting range **Factory setting**: 0.0 Hz

[Motor monitoring] MOP– Menu

Access

[Complete settings] ➞ [Motor parameters] ➞ [Motor monitoring]

About This Menu

The thermal monitoring function helps to prevent the motor from overheating by an estimation of the thermal state of the motor.

[Current Limitation] CLI ★

NOTICE

OVERHEATING

- 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 current limit.

Failure to follow these instructions can result in equipment damage.

NOTE: If the setting is less than 0.25. In, the drive may lock in **[OutPhLoss Assign]** OPL if this has been enabled. If it is less than the no-load motor current, the motor cannot run.

Setting	Description
0...1.5 In (for High rating) 0...1.1 In(1) (for Normal rating)	Setting range **Factory setting**: 1.1 In(1)

(1) Corresponding to the rated drive current indicated in the installation manual and on the drive nameplate.

[Attenuation Time] SOP ★

This parameter is available for drives with nominal power equal to 22 kW or above. Refer to ER330 Installation Manual, page 15, in the “Electric Data – Drives Ratings” chapter, for more information.

This parameter can be accessed if **[Motor surge limit.]** SVL is set to **[Yes]** YES.

The value of the **[Attenuation Time]** 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 over-voltages to twice the DC bus rated voltage. As surge voltage depends on many parameters such as types of cable, different motor powers in parallel, different cable lengths in parallel, and so on. It is recommended to use an oscilloscope to check the over-voltage values obtained at the motor terminals. If the higher value of **[Attenuation Time]** SOP is not enough according to the cable lengths, an output filter or a dV/dt filter must be used.

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

Setting	Code / Value	Description
[6 µs]	6	6 µs
[8 µs]	8	8 µs

Setting	Code / Value	Description
		Factory setting (1)
[10 µs]	10	10 µs
(1) The factory setting of this parameter is 10 µs for ER330-220/4KOD and ER330-250/4KOD.		

[Out Short Circuit Test] STRT

The drive outputs are tested at every power-up irrespective of the configuration of this parameter. If this parameter is set to **[Yes]** YES, the test is also done every time a run command is applied. These tests cause a slight delay (a few ms). In the event of an error, the drive locks.

The drive output short-circuit (terminals U-V-W): SCF error can be detected.

Setting	Code / Value	Description
[No]	NO	Not test at run command For drives with nominal power equal or higher than 22 kW : **Factory setting**
[Yes]	YES	Output short circuit test at each run command For drives with nominal power less than 22 kW : **Factory setting**
(1) The factory setting value is changes depending on the catalog numbers.		

[Motor Therm Thd] TTD

Motor thermal threshold for **[Motor Th Thd reached]** TSA warning activation.

Setting (1)	Description
0...118%	Setting range **Factory setting**: 100%

[Motor2 Therm Thd] TTD2

Motor 2 thermal level for **[Mot2 Th Thd reached]** TS2 warning activation.

Setting (1)	Description
0...118%	Setting range **Factory setting**: 100%

[Motor3 Therm Thd] TTD3

Motor 3 thermal level for **[Mot3 Th Thd reached]** TS3 warning activation.

Setting (1)	Description
0...118%	Setting range **Factory setting**: 100%

[Motor4 Therm Thd] TTD4

Motor 4 thermal level for **[Mot4 Therm Thd reached]** TS4 warning activation.

Setting	Description
0...118%	Setting range **Factory setting**: 100%

[Torque Filter Time] TPFV

This parameter defines the filter time of the non-filtered output torque **[Motor torque (% of Cn motor in Q12) without filter]** SOTR and power **[OPR Without Filter]** SOPR parameters (SOTR and SOPR can only be accessed through the communication or SoMove).

The parameter can be accessed if **[Access Level]** LAC is set to **[Expert]** EPR.

Setting	Description
0...10,000 ms	Setting range **Factory setting**: 0 ms

[Motor control] DRC– Menu

Access

[Complete settings] ➞ **[Motor parameters]** ➞ **[Motor control]**

About This Menu

This menu shows the motor control related parameters.

[IR compensation] UFR

This parameter can be accessed if **[Access Level]** LAC is set to **[Expert]** EPR.

This parameter is used to optimize torque at 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]** UFR. A too high value can avoid the motor to start (locking) or change the current limiting mode.

Setting	Description
0...200%	Setting range **Factory setting**: 100%

[Slip compensation] SLP ★

This parameter can be accessed for asynchronous law and if **[Access Level]** LAC is set to **[Expert]** EPR.

This parameter is set to 0% when **[Motor control type]** CTT is set to **[U/F VC Quad.]** UFQ.

The speeds given on motor nameplates are not necessarily exact.

If the slip setting is lower than the actual slip, the motor is not rotating at the correct speed in steady state, but at a lower speed than the reference.

If the slip setting is higher than the actual slip, the motor is overcompensated and the speed is unstable.

Setting	Description
0...300%	Setting range **Factory setting**: 100%

[U/F Profile] PFL ★

This parameter can be accessed if **[Motor control type]** CTT is set to **[U/F VC Quad.]** UFQ and if **[Access Level]** LAC is set to **[Expert]** EPR.

This parameter is used to adjust the fluxing current level at zero speed, in % of nominal motor current at nominal speed.

Setting	Description
0...100%	Setting range **Factory setting**: 30%

[Output Ph Rotation] PHR

Modifying this parameter operates as an inversion of 2 of the three motor phases. This results in changing the direction of rotation of the motor.

Setting	Code / Value	Description
[ABC]	ABC	Standard rotation **Factory setting**
[ACB]	ACB	Opposite rotation

[Inertia Factor] SPGU ★

This parameter can be accessed if:

- **[Access Level]** LAC is set to **[Expert]** EPR, and
- **[Motor control type]** CTT is set to:
  - **[U/F VC Quad.]** UFQ, or
  - **[Sync. mot.]** SYN, or
  - **[Energy Sav.]** NLD, or
  - **[U/F VC Standard]** STD.

Setting	Description
1...1,000%	Setting range **Factory setting**: 40%

[Boost activation] BOA ★

This parameter can be accessed if **[Access Level]** LAC is set to **[Expert]** EPR.

The factory setting of this parameter is modified to:

- **[Inactive]** NO if **[Motor control type]** CTT is set to **[Sync. mot.]** SYN.

Setting	Code / Value	Description
[Inactive]	NO	No boost
[Dynamic]	DYNA	Dynamic boost, the magnetizing current value is modified according to the motor load. **Factory setting** **NOTE:** Drive manages itself the value **[Magnetizing Current]** IDA to optimize the performances. **NOTE:** This selection can't be accessed if **[Motor control type]** CTT is set to **[Sync. mot.]** SYN.

Setting	Code / Value	Description
[Static]	STAT	Static boost, the magnetizing current value follows the profile whatever the motor load **NOTE:** With this selection the **[Boost]** BOO and **[Freq Boost]** FAB are taken into account. **NOTE:** This selection can be used for conical motor with **[Boost]** BOO sets to a negative value.
[Constant]	CSTE	Constant boost, the magnetizing current is maintained in case of change of direction of the motor. An additional parameter is available to handle the deceleration and stop phase. CSTE can be accessed if **[Motor control type]** CTT is set to **[Sync. mot.]** SYN. **NOTE:** With this selection only **[Boost]** BOO is taken into account.

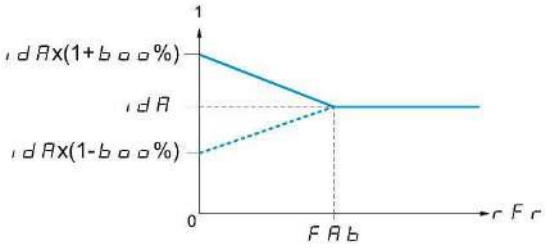
[Boost] BOO ★

Value at 0 Hz: % of nominal magnetizing current (taken into account if different from 0).

A too high value of **[Boost]** BOO can result in a magnetic saturation of the motor, which leads to a torque reduction.

This parameter can be accessed if:

- **[Access Level]** LAC is set to **[Expert]** EPR, and
- **[Boost activation]** BOA is not set to **[Inactive]** NO.



NOTE: For synchronous motors, it is recommended to set this parameter to optimize control at low speed.

Setting	Description
-100...100%	Setting range If **[Boost activation]** BOA is set to **[Dynamic]** DYNA, **[Boost]** BOO is set to 25%. **Factory setting**: 0%

[Freq Boost] FAB ★

Value at 0 Hz: speed threshold to reach nominal magnetizing current.

This parameter can be accessed if:

- **[Access Level]** LAC is set to **[Expert]** EPR, and
- **[Boost activation]** BOA is not set to **[Inactive]** NO, and
- **[Boost activation]** BOA is not set to **[Constant]** CSTE.

Setting	Description
0.0...500.0 Hz	Setting range If **[Boost activation]** BOA is set to **[Dynamic]** DYNA, **[Freq Boost]** FAB is set to 30.0 Hz. **Factory setting**: 0.0 Hz

NOTE: For synchronous motors, it is recommended to set this parameter to optimize control at low speed.

[Spd Loop Optimization] MCL– Menu

Access

[Complete settings] ➞ **[Motor parameters]** ➞ **[Motor control]** ➞ **[Spd Loop Optimization]**

About This Menu

This menu shows the speed loop optimization related parameters.

[Speed prop. gain] SPG ★

This parameter can be accessed if **[Motor control type]** CTT is not set to:

- **[U/F VC Standard]** STD, and
- **[U/F VC Quad.]** UFQ.

Setting	Description
0...1,000%	Setting range **Factory setting**: 40%

[Speed time integral] SIT ★

This parameter can be accessed if **[Motor control type]** CTT is not set to:

- **[U/F VC Standard]** STD, and
- **[U/F VC Quad.]** UFQ.

Setting	Description
1...65,535 ms	Setting range **Factory setting**: According to the drive rating.

[K speed loop filter] SFC

K speed loop filter (0(IP) to 1(PI)).

Setting	Description
0...100	Setting range **Factory setting**: 65

[Spd est. filter time] FFH ★

Filter time of the estimated speed.

This parameter can be accessed if **[Access Level]** LAC is set to **[Expert]** EPR.

Setting	Description
0.0...100.0 ms	Setting range **Factory setting**: According to the drive rating

[Motor control] DRC– Menu

Access

[Complete settings] ➞ [Motor parameters] ➞ [Motor control]

About This Menu

This menu shows the motor control related parameters.

[Output Voltage Limit] VLIM

This parameter can be accessed if **[Access Level]** LAC is set to **[Expert]** EPR.

The purpose of this parameter is to modify the output voltage limitation to a lower value than the maximum default value.

The unit of the numerical value of this parameter is in phase to phase rms voltage.

Setting	Code / Value	Description
[Default]	DEFAULT	Default value of Output Voltage limitation. **Factory setting**
0...9999 V		Setting range of the output limitation voltage. Set a value lower than the corresponding **[Default]** DEFAULT value to reduce the maximum output voltage limitation. If the numerical value is higher than the corresponding **[Default]** DEFAULT value, this corresponding value is considered.

[Cur Loop Config Gain] CRB

Gain of the current loop controller.

This parameter sets the bandwidth of the current loop controller.

By default, the drive sets this parameter automatically to optimize the performances. This automatic setting is based on the motor data.

Default value is suitable for most of the motor applications, but in some specific applications, it is recommended to modify the setting of this parameter.

Increase this value to make the response of the current loop faster, decrease this value to make the response of the current loop more robust and less sensitive to measurement noise.

> **NOTE:** It is recommended to set electrical bandwidth frequency higher than 10Hz to keep a separated time scale between inner loop (electrical control) and outer loop (mechanical control).

When **[Cur Loop Config Gain]** CRB is set to AUTO, the default bandwidth value is given by **[Cur Loop Default Gain]** CRBA.

This parameter can be accessed if **[Access Level]** LAC is set to **[Expert]** EPR.

Setting	Description
AUTO, 1 ... 250 Hz	Setting range **Factory setting**: AUTO

[Cur Loop Default Gain] CRBA

This parameter gives the default bandwidth of the current loop controller.

This parameter can be accessed if **[Access Level]** LAC is set to **[Expert]** EPR.

This is an only-read parameter.

Value range	Description
8...100 Hz	Setting range **Factory setting**: According to motor data

[Switching frequency] SWF– Menu

Access

[Complete settings] ➞ [Motor parameters] ➞ [Switching frequency]

[Switching frequency] SFR

Adjustment range: The maximum value is limited to 4 kHz if **[Motor surge limit.]** SVL parameter is configured.

NOTE: In the event of excessive temperature rise, the drive automatically reduces the switching frequency and resets it once the temperature returns to normal.

In case of high-speed motor, it is advised to increase the PWM frequency **[Switching frequency]** SFR at 8, 12 kHz or 16 kHz

Setting	Description
(1)	Setting range **Factory setting**: (1)

(1) :

- 6...16 kHz for drives with nominal power below 22 kW
  Factory setting: 6 kHz
- 2...16 kHz for drives with nominal power between 22 and 45 kW
  Factory setting: 4 kHz
- 2...8 kHz for drives with nominal power above 45 kW
  Factory setting: 2.5 kHz

Refer to ER330 Installation Manual, page 15, in the “Electric Data – Drives Ratings” chapter, for more information.

[Noise Reduction] NRD

Random frequency modulation helps to prevent any resonance, which may occur at a fixed frequency.

Setting	Code / Value	Description
[No]	NO	Fixed PWM frequency **Factory setting**
[Yes]	YES	PWM Frequency with random modulation

[Switch Freq Type] SFT ★

This parameter can be accessed if **[Access Level]** LAC is set to **[Expert]** EPR.

The motor switching frequency is modified (reduced) when the internal temperature of the drive is too high.

Setting	Code / Value	Description
[SFR type 1]	HF1	Heating loss optimization Allows the system to adapt the switching frequency according to the motor frequency. This setting optimizes the heating loss of the drive in order to improve the drive efficiency. **Factory setting**
[SFR type 2]	HF2	Allows the system to keep a constant chosen switching frequency **[Switching frequency]** SFR whatever the motor frequency **[Motor Frequency]** RFR. With this setting, the motor noise is kept as low as possible by a high switching frequency. 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.

[Motor surge limit.] SVL

This parameter is available for drives with nominal power equal to 22 kW or above. Refer to ER330 Installation Manual, page 15, in the “Electric Data – Drives Ratings” chapter, for more information.

This function limits motor over-voltages and is useful in the following applications:

- NEMA motors
- Old or poor quality motors
- Spindle motors
- Rewound motors

This parameter can remain set to **[No]** NO for 230/400 Vac motors used at 230 Vac, or if the length of cable between the drive and the motor does not exceed:

- 4 m with unshielded cables
- 10 m with shielded cables

Setting	Code / Value	Description
[No]	NO	Function inactive **Factory setting**
[Yes]	YES	Function active **NOTE:** With this setting, the maximum of **[Switching frequency]** SFR is modified.

[Attenuation Time] SOP ★

This parameter is available for drives with nominal power equal to 22 kW or above. Refer to ER330 Installation Manual, page 15, in the “Electric Data – Drives Ratings” chapter, for more information.

This parameter can be accessed if **[Motor surge limit.]** SVL is set to **[Yes]** YES.

The value of the **[Attenuation Time]** 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 over-voltages to twice the DC bus rated voltage. As surge voltage depends on many parameters such as types of cable, different motor powers in parallel, different cable lengths in parallel, and so on. It is recommended to use an oscilloscope to check the over-voltage values obtained at the motor terminals. If the higher value of **[Attenuation Time]** SOP is not enough according to the cable lengths, an output filter or a dV/dt filter must be used.

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

NOTE: The factory setting of this parameter is 10 µs for ER330-220/4KOD and ER330-250/4KOD.

Setting	Code / Value	Description
[6 µs]	6	6 µs
[8 µs]	8	8 µs **Factory setting**
[10 µs]	10	10 µs

[Input Filter] DCR– Menu

Access

[Complete settings] ➞ **[Motor parameters]** ➞ **[Input Filter]**

About This Menu

This menu contains the parameters that can be configured when an external low harmonic filter is use (References VW3A4612●)

[Input Filter] IFI

This parameter is forced to **[No]** NO if:

- Drive's nominal power is under 22 kW. Refer to ER330 Installation Manual, page 15, in the "Electric Data – Drives Ratings" chapter, for more information.
- **[Motor control type]** CTT is set to a value different from **[U/F VC Standard]** STD.

Setting	Code / Value	Description
[No]	NO	No input filter used. **Factory setting**
[Yes]	YES	Motor control performance is adjusted to consider the use of an input filter in order to help to prevent ripple on the DC bus.

[DC Bus Ripple Config] DCRC

This function monitors DC bus ripple to detect instabilities; it is not intended for detecting input phase loss.

The drive triggers a **[DC Bus Ripple Warn]** DCRW warning if DC bus oscillation frequencies deviate from the mains supply or if the amplitude exceeds the hardware capacity (such as the DC bus capacitors).

Depending on the **[DC Bus Ripple Config]** DCRC setting, a **[DC Bus Ripple Error]** DCRE error is triggered if the warning persists beyond a fixed internal time delay.

This parameter is preset to **[Error]** FLT when **[Input Filter]** IFI is set to **[Yes]**.

Setting	Code / Value	Description
[Ignore]	NO	DC bus ripple monitoring function is inactive. This selection can't be accessed if **[Input Filter]** IFI is set to **[Yes]** YES. If **[Input Filter]** IFI is set to **[No]** then this is the **Factory setting**.
[Warning]	WARN	DC bus ripple monitoring function is enabled. In case of DC bus ripple, the drive triggers **[DC Bus Ripple Warn]** DCRW warning. This selection can't be accessed if **[Input Filter]** IFI is set to **[Yes]** YES.
[Error]	FLT	The DC bus ripple monitoring function is fully enabled. The drive triggers **[DC Bus Ripple Error]** DCRE error if **[DC Bus Ripple Warn]** DCRW warning is persistent. If **[Input Filter]** IFI is set to **[Yes]** then this is the **Factory setting**.

[Cur Loop Damp Coef] CRDR

This parameter can be accessed if **[Access Level]** LAC is set to **[Expert]** EPR.

Setting	Description
1...800%	Setting range **Factory setting**: 100% if product size less than 22 kW. **Factory setting**: 75% if product size more than 22 kW.

[Tq Corr. Filter Time] TQTF

This parameter can be accessed if **[Access Level]** LAC is set to **[Expert]** EPR.

Setting	Description
0.0...100.0 ms	Setting range **Factory setting**: 0

[Field Weak. Corr. BW] FWBW

This parameter can be accessed if **[Access Level]** LAC is set to **[Expert]** EPR.

Setting	Description
-0.1...100.0 Hz	Setting range **Factory setting**: -0.1 Hz

[Define system units] SUC– Menu

Access

[Complete settings]➞ [Define system units]

About This Menu

In order to be easy to configure, commission, operate, and maintain, the drive uses the application units.

The physicals that are concerned by application units are:

- Pressure values
- Flow rate values
- Temperature values
- Currency values

NOTE: Some other default system units are automatically deduced from configurable system units or from other parameters.

System unit applies by default to all communication parameters and HMI (Graphic Display Terminal, Web server, DTM-based software).

When a system unit is changed, there is no rescaling of values. Numerical values are kept, but the meaning of these values is not the same:

- After a change, the behavior of the product does not change (the system stays numerically the same).
- If new values are written through communication or through HMI in new unit, then the behavior is impacted. In that case, all parameters should be reconfigured according to the new selected unit.
- In order to avoid issues due to a modification of system unit parameters, system units should be modified only during the installation of the product and before the commissioning of the functions.

The precision of the physical values is selected at the same time as the unit.

By default, values are signed.

Default range of values are:

16 bits values	32 bits values
-32,768...32,767	-2,147,483,648...2,147,483,648

[P sensor unit] SUPR

Default system application unit used for pressure.

Available pressure units:

Unit	Symbol	Conversion
Kilo Pascal	kPa	100 kPa = 1 bar
Millibar	mbar	
Bar	bar	
Pound / square inch (lb/in^2)	psi psig	14.5 psi = 1 bar
Inch H2O	inH2O inWG	1 inH2O 4°C = 0.0024908891 bar (0.036127292 psi)

Unit	Symbol	Conversion
Inch water gauge Inch water column	inWC	
Feet water gauge Feet water column Feet	ftWG ftWC ft	1 inH2O 4°C = 0.0298906692 bar (0.433527504 psi)
Meter water gauge Meter water column Meter	mWG mWC (mCE) m	1 mH2O(4°C) = 0.0980665 bar (1.42233433 psi)
Inch of mercury	inHg	1 inHg = 0.0338638864 bar (0.491154147 psi)
Percentage	%	–
w/o unit	–	–

Setting	Code / Value	Description
[1 Kpa]	1KPA	1 kpa
[1 mbar]	1MBAR	1 mbar
[1 Bar]	1BAR	1 bar
[0.1 Bar]	01BAR	0.1 bar **Factory setting**
[0.01 Bar]	001BAR	0.01 bar
[1 Psi]	1PSI	1 Psi
[0.1 Psi]	01PSI	0.1 psi
[1 Psig]	1PSIG	1 Psig
[0.1 Psig]	01PSIG	0.1 Psig
[1 inH2O]	1INH20	1 inH20
[1 inWg]	1INWG	1 inWg
[1 inWC]	1INWC	1 inWc
[1 ftWg]	1FTWG	1 FtWg
[1 ftWc]	1FTWC	1 FtWC
[1 ft]	1FT	1 Ft
[1 mWg]	1MWG	1 mWg
[0.1 mWg]	01MWG	0.1 mWg
[1 mWC]	1MWC	1 mWC
[0.1 mWc]	01MWC	0.1 mWC
[1 m]	1M	1 m
[0.1 m]	01M	0.1 m
[1 inHg]	1INHG	1 inHg
[0.1 %]	01PC	0.1%
[0.1]	01WO	0.1 w/o

[Flow rate unit] SUFR

Default system application unit used for flow rate.

Available flow units:

Unit	Symbol	Conversion
Liter / second	l/s	–
Liter / minute	l/min	–
Liter / hour	l/h	–
Cubic decimeter / minute	dm3/min	–
Cubic meter / second	m3/s	–
Cubic meter / minute	m3/min	–
Cubic meter / hour	m3/h	–
Gallon per second	gal/s	1 usgal = 3,785411784 l
Gallon per minute	gal/min; GPM	–
Gallon per hour	gal/h	–
Cubic feet / second	ft3/s	1 ft3 = 28.317 l
Cubic feet / minute	ft3/min; CFM, SCFM	–
Cubic feet / hour	ft3/h	–
Percentage	%	–
w/o unit	–	–

Setting	Code / Value	Description
[1 L/s]	1LS	L/s
[0.1 l/s]	01LS	0.1 L/s
[1 L/mn]	1LM	L/m
[1 L/h]	1LH	L/h
[1 dm3/mn]	1DM3M	d3/m
[1 m3/s]	1M3S	M3/s
[0.1 m3/s]	01M3S	0.1 M3/s
[1 m3/mn]	1M3MN	M3/min
[0.1 m3/mn]	01M3MN	0.1 M3/min
[1 m3/h]	1M3H	1 M3/h
[0.1 m3/h]	01M3H	0.1 M3/h **Factory setting**
[1 gal/s]	1GPS	1 Gal/s
[1 GPM]	1GPM	1 GPM
[1 gal/h]	1GPH	1 Gal/h
[1 ft3/s]	1CFS	1 ft3/s
[1 CFM]	1CFM	1 CFM
[1 SCFM]	1SCFM	1 SCFM
[1 ft3/h]	1CFH	1 ft3/h
[1 Kg/s]	1KGS	1 kg/s
[1 Kg/mn]	1KGM	1 kg/m
[1 Kg/h]	1KGH	1 kg/h

Setting	Code / Value	Description
[1 Lb/s]	1LBS	1 lb/s
[1 Lb/mn]	1LBM	1 lb/m
[1 Lb/h]	1LBH	1 lb/h
[0.1 %]	01PC	0.1%
[0.1]	01WO	0.1 w/o

[Temperature unit] SUTP

Default system application unit used for temperature.

Available temperature units:

Unit	Symbol	Conversion
Celsius Degree	°C	–
Fahrenheit Degree	°F	TF = 9/5*Tc+32
Percentage	%	–
w/o unit	–	–

Setting	Code / Value	Description
[0.1°C]	01C	0.1 °C **Factory setting**
[0.1°F]	01F	0.1 °F
[0.1 %]	01PC	0.1%
[0.1]	01WO	0.1 w/o

[Currency unit list] SUCU

Default system application unit used for currency.

Setting	Code / Value	Description
[Euro]	EURO	Euro **Factory setting**
[$]	DOLLAR	Dollar
[£]	POUND	Pound
[Krone]	KR	Krone
[Renminbi]	RMB	Renminbi
[Other]	OTHER	Other

[Liquid Density] RHO

Density of the fluid to be pumped.

This parameter can be accessed if **[Access Level]** LAC is not set to **[Expert]** EPR.

Setting	Description
100...10,000 kg/m3	Setting range **Factory setting**: 1000 kg/m3

[Sensors Assignment]

[Sensors Assignment] SSC– Menu

Access

[Complete settings] ➞ [Sensors Assignment]

About This Menu

This menu is used to set the sensors.

In case of mixing absolute and relative sensors, verify the consistency between all sensor data and adjust if necessary by using the process value scaling and the analog inputs operation functions.

[OutletPres Assign] PS2A

Outlet pressure sensor assignment.

Value range	Code / Value	Description
[Not Configured]	NO	Not assigned **Factory setting**
[AI1]...**[AI3]**	AI1...AI3	Analog input AI1...AI3
[AI4]...**[AI5]**	AI4...AI5	Analog input AI4...AI5 if VW3A3203 I/O extension module has been inserted
[AI Virtual 1]... **[AI Virtual 3]**	AIV1...AIV3	Virtual analogic input 1...3
NOTE: For sensor configuration, refer to the chapter **[Sensors Assignment]** , page 197.		

[AI1 sensor config.] Menu

About This Menu

Access of **[AI1 sensor config.]** menu depends of the sensor assigned to this input.

The following table shows the **[AI1 sensor config.]** menus displayed in relation with the sensor and the applicative function used.

If...	And...	Then following menu will be displayed:
[OutletPres Assign] PS2A is set to **[AI1]** AI1	-	**[AI1 Sensor Config.]** OCA1–
	[Sleep Detect Mode] SLPM is set to **[Pressure]** HP or **[Multiple]** OR. , page 263	**[AI1 Sensor Config.]** SOA1–
	[Wake Up Mode] WUPM is set to **[Pressure]** LP. , page 263	**[AI1 Sensor Config.]** WOA1–
	[OutPres Monitoring] OPPM is set to **[Sensor]** SNSR or **[Both]** BOTH. , page 294	**[AI1 Sensor config.]** OOA1–
NOTE: The list of parameters is the same for each **[AI1 sensor config.]** menu.		

[AI1 Type] AI1T

Configuration of AI1.

Setting	Code / Value	Description
[Voltage]	10U	0-10 Vdc **Factory setting**
[Current]	0A	0-20 mA

[AI1 Min. Value] UIL1 ★

AI1 voltage scaling parameter of 0%.

This parameter can be accessed if **[AI1 Type]** AI1T is set to **[Voltage]** 10U.

Setting	Description
0.0...10.0 Vdc	Setting range **Factory setting**: 0.0 Vdc

[AI1 Max Value] UIH1 ★

AI1 voltage scaling parameter of 100%.

This parameter can be accessed if **[AI1 Type]** AI1T is set to **[Voltage]** 10U.

Setting	Description
0.0...10.0 Vdc	Setting range **Factory setting**: 10.0 Vdc

[AI1 Min. Value] CRL1 ★

AI1 current scaling parameter of **0%**.

This parameter can be accessed if **[AI1 Type]** AI1T is set to **[Current]** 0A.

Setting	Description
0.0...20.0 mA	Setting range **Factory setting**: 0.0 mA

[AI1 Max Value] CRH1 ★

AI1 current scaling parameter of **100%**.

This parameter can be accessed if **[AI1 Type]** AI1T is set to **[Current]** 0A.

Setting	Description
0.0...20.0 mA	Setting range **Factory setting**: 20.0 mA

[AI1 Lowest Process] AI1J

AI1 lowest process.

Setting	Description
-32,767...32,767	Setting range. Value in application customer unit. **Factory setting**: 0

[AI1 Highest Process] AI1K

AI1 highest process.

Setting	Description
-32,767...32,767	Setting range. Value in application customer unit **Factory setting**: 0

[AI1 range] AI1L

This parameter can be accessed if **[AI1 Type]** AI1T is set to **[Current]** 0A.

This parameter is forced to **[0 - 100%]** POS if:

- **[AI1 Type]** AI1T is not set to **[Current]** 0A, or
- **[AI1 Min. Value]** CRL1 is lower than 3.0 mA.

Setting	Code / Value	Description
[0 - 100%]	POS	Unidirectional: AI1 current scaling is 0% up to 100%. **Factory setting**
[+/- 100%]	POSNEG	Bidirectional: AI1 current scaling is -100% up to 100%. **[AI1 Min. Value]** CRL1 corresponds to -100%. **[AI1 Max Value]** CRH1 corresponds to 100%.

[AI2 sensor config.] Menu

About This Menu

Access of **[AI2 sensor config.]** menu depends of the sensor assigned to this input.

The following table shows the **[AI2 sensor config.]** menus displayed in relation with the sensor and the applicative function used.

If...	And...	Then following menu is displayed:
[OutletPres Assign] PS2A is set to **[AI2]** AI2	-	**[AI2 Sensor Config.]** OCA2–
	[Sleep Detect Mode] SLPM is set to **[Pressure]** HP or **[Multiple]** OR , page 263.	**[AI2 Sensor Config.]** SOA2–
	[Wake Up Mode] WUPM is set to **[Pressure]** LP , page 263.	**[AI2 Sensor Config.]** WOA2–
	[OutPres Monitoring] OPPM is set to **[Sensor]** SNSR or **[Both]** BOTH , page 294.	**[AI2 Sensor config.]** OOA2–
NOTE: The list of parameters is the same for each **[AI2 sensor config.]** menu.		

[AI2 Type] AI2T

Configuration of AI2.

Setting	Code / Value	Description
[Voltage]	10U	0-10 Vdc **Factory setting**
[Current]	0A	0-20 mA
[PTC]	PTC	PTC
[KTY]	KTY	KTY
[PT1000]	1PT3	PT1000
[PT100]	1PT2	PT100
[Water Prob]	LEVEL	Water level

[AI2 Min. Value] UIL2 ★

AI2 voltage scaling parameter of **0%**.

This parameter can be accessed if **[AI2 Type]** AI2T is set to **[Voltage]** 10U.

Identical to **[AI1 Min. Value]** UIL1 , page 198.

[AI2 Max value] UIH2 ★

AI2 voltage scaling parameter of **100%**.

This parameter can be accessed if **[AI2 Type]** AI2T is set to **[Voltage]** 10U.

Identical to **[AI1 Max Value]** UIH1 , page 198.

[AI2 Min. Value] CRL2 ★

AI2 current scaling parameter of **0%**.

This parameter can be accessed if **[AI2 Type]** AI2T is set to **[Current]** 0A.

Identical to **[AI1 Min. Value]** CRL1 , page 199.

[AI2 Max Value] CRH2 ★

AI2 current scaling parameter of **100%**.

This parameter can be accessed if **[AI2 Type]** AI2T is set to **[Current]** 0A.

Identical to **[AI1 Max Value]** CRH1 , page 199.

[AI2 Lowest Process] AI2J

Identical to **[AI1 Lowest Process]** AI1J , page 199.

[AI2 Highest Process] AI2K

Identical to **[AI1 Highest Process]** AI1K , page 199.

[AI2 range] AI2L

This parameter can be accessed if **[AI2 Type]** AI2T is set to **[Current]** 0A.

Identical to **[AI1 range]** AI1L , page 199.

[AI3 sensor config.] Menu

About This Menu

Access of **[AI3 sensor config.]** menu depends of the sensor assigned to this input.

The following table shows the **[AI3 sensor config.]** menus displayed in relation with the sensor and the applicative function used.

If...	And...	Then following menu is displayed:
[OutletPres Assign] PS2A is set to **[AI3]** AI3	-	**[AI3 Sensor Config.]** OCA3–
	[Sleep Detect Mode] SLPM is set to **[Pressure]** HP or **[Multiple]** OR. , page 263	**[AI3 Sensor Config.]** SOA3–
	[Wake Up Mode] WUPM is set to **[Pressure]** LP. , page 263	**[AI3 Sensor Config.]** WOA3–
	[OutPres Monitoring] OPPM is set to **[Sensor]** SNSR or **[Both]** BOTH. , page 294	**[AI3 Sensor config.]** OOA3–
NOTE: The list of parameters is the same for each **[AI3 sensor config.]** menu.		

[AI3 Type] AI3T

Configuration of AI3.

Setting	Code / Value	Description
[Voltage]	10U	0-10 Vdc **Factory setting**
[Current]	0A	0-20 mA
[PTC]	PTC	PTC
[KTY]	KTY	KTY
[PT1000]	1PT3	PT1000
[PT100]	1PT2	PT100
[Water Prob]	LEVEL	Water level

[AI3 Min. Value] UIL3 ★

AI3 voltage scaling parameter of **0%**.

This parameter can be accessed if **[AI3 Type]** AI3T is set to **[Voltage]** 10U.

Identical to **[AI1 Min. Value]** UIL1 , page 198.

[AI3 Max Value] UIH3 ★

AI3 voltage scaling parameter of **100%**.

This parameter can be accessed if **[AI3 Type]** AI3T is set to **[Voltage]** 10U.

Identical to **[AI1 Max Value]** UIH1 , page 198.

[AI3 Min. Value] CRL3 ★

AI3 current scaling parameter of **0%**.

This parameter can be accessed if **[AI3 Type]** AI3T is set to **[Current]** 0A.

Identical to **[AI1 Min. Value]** CRL1 , page 199.

[AI3 Max Value] CRH3 ★

AI3 current scaling parameter of **100%**.

This parameter can be accessed if **[AI3 Type]** AI3T is set to **[Current]** 0A.

Identical to **[AI1 Max Value]** CRH1 , page 199.

[AI3 Lowest Process] AI3J

Identical to **[AI1 Lowest Process]** AI1J , page 199.

[AI3 Highest Process] AI3K

Identical to **[AI1 Highest Process]** AI1K , page 199.

[AI3 range] AI3L

This parameter can be accessed if **[AI3 Type]** AI3T is set to **[Current]** 0A.

Identical to **[AI1 range]** AI1L , page 199.

[AI4 sensor config.] Menu

About This Menu

Access of **[AI4 sensor config.]** menu depends of the sensor assigned to this input.

The following table shows the **[AI4 sensor config.]** menus displayed in relation with the sensor and the applicative function used.

If...	And...	Then following menu is displayed:
[OutletPres Assign] PS2A is set to **[AI4]** AI4	-	**[AI4 Sensor Config.]** OCA4–
	[Sleep Detect Mode] SLPM is set to **[Pressure]** HP or **[Multiple]** OR , page 263.	**[AI4 Sensor Config.]** SOA4–
	[Wake Up Mode] WUPM is set to **[Pressure]** LP , page 263.	**[AI4 Sensor Config.]** WOA4–
	[OutPres Monitoring] OPPM is set to **[Sensor]** SNSR or **[Both]** BOTH , page 294.	**[AI4 Sensor config.]** OOA4–
NOTE: The list of parameters is the same for each **[AI4 sensor config.]** menu.		

[AI4 Type] AI4T

Configuration of AI4.

Setting	Code / Value	Description
[Voltage]	10U	0-10 Vdc **Factory setting**
[Current]	0A	0-20 mA
[PTC]	PTC	PTC
[KTY]	KTY	KTY
[PT1000]	1PT3	PT1000
[PT100]	1PT2	PT100
[Water Prob]	LEVEL	Water level

[AI4 Min. Value] UIL4 ★

AI4 voltage scaling parameter of 0%.

This parameter can be accessed if **[AI4 Type]** AI4T is set to **[Voltage]** 10U.

Identical to **[AI1 Min. Value]** UIL1 , page 198.

[AI4 Max Value] UIH4 ★

AI4 voltage scaling parameter of 100%.

This parameter can be accessed if **[AI4 Type]** AI4T is set to **[Voltage]** 10U.

Identical to **[AI1 Max Value]** UIH1 , page 198.

[AI4 Min. Value] CRL4 ★

AI4 current scaling parameter of **0%**.

This parameter can be accessed if **[AI4 Type]** AI4T is set to **[Current]** 0A.

Identical to **[AI1 Min. Value]** CRL1 , page 199.

[AI4 Max Value] CRH4 ★

AI4 current scaling parameter of **100%**.

This parameter can be accessed if **[AI4 Type]** AI4T is set to **[Current]** 0A.

Identical to **[AI1 Max Value]** CRH1 , page 199.

[AI4 Lowest Process] AI4J

Identical to **[AI1 Lowest Process]** AI1J , page 199.

[AI4 Highest Process] AI4K

Identical to **[AI1 Highest Process]** AI1K , page 199.

[AI4 range] AI4L

This parameter can be accessed if **[AI4 Type]** AI4T is set to **[Current]** 0A.

Identical to **[AI1 range]** AI1L , page 199.

[AI5 sensor config.] Menu

About This Menu

Access of **[AI5 sensor config.]** menu depends of the sensor assigned to this input.

The following table shows the **[AI5 sensor config.]** menus displayed in relation with the sensor and the applicative function used.

If...	And...	Then following menu is displayed:
[OutletPres Assign] PS2A is set to **[AI5]** AI5	-	**[AI5 Sensor Config.]** OCA5–
	[Sleep Detect Mode] SLPM is set to **[Pressure]** HP or **[Multiple]** OR , page 263.	**[AI5 Sensor Config.]** SOA5–
	[Wake Up Mode] WUPM is set to **[Pressure]** LP , page 263.	**[AI5 Sensor Config.]** WOA5–
	[OutPres Monitoring] OPPM is set to **[Sensor]** SNSR or **[Both]** BOTH , page 294.	**[AI5 Sensor config.]** OOA5–
NOTE: The list of parameters is the same for each **[AI5 sensor config.]** menu.		

[AI5 Type] AI5T

Configuration of AI5.

Setting	Code / Value	Description
[Voltage]	10U	0-10 Vdc **Factory setting**
[Current]	0A	0-20 mA
[PTC]	PTC	PTC
[KTY]	KTY	KTY
[PT1000]	1PT3	PT1000
[PT100]	1PT2	PT100
[Water Prob]	LEVEL	Water level

[AI5 Min. Value] UIL5 ★

AI5 voltage scaling parameter of 0%.

This parameter can be accessed if **[AI5 Type]** AI5T is set to **[Voltage]** 10U.

Identical to **[AI1 Min. Value]** UIL1 , page 198.

[AI5 Max Value] UIH5 ★

AI5 voltage scaling parameter of 100%.

This parameter can be accessed if **[AI5 Type]** AI5T is set to **[Voltage]** 10U.

Identical to **[AI1 Max Value]** UIH1 , page 198.

[AI5 Min. Value] CRL5 ★

AI5 current scaling parameter of **0%**.

This parameter can be accessed if **[AI5 Type]** AI5T is set to **[Current]** 0A.

Identical to **[AI1 Min. Value]** CRL1 , page 199.

[AI5 Max Value] CRH5 ★

AI5 current scaling parameter of **100%**.

This parameter can be accessed if **[AI5 Type]** AI5T is set to **[Current]** 0A.

Identical to **[AI1 Max Value]** CRH1 , page 199.

[AI5 Lowest Process] AI5J

Identical to **[AI1 Lowest Process]** AI1J , page 199.

[AI5 Highest Process] AI5K

Identical to **[AI1 Highest Process]** AI1K , page 199.

[AI5 range] AI5L

This parameter can be accessed if **[AI5 Type]** AI5T is set to **[Current]** 0A.

Identical to **[AI1 range]** AI1L , page 199.

[AIV1 Configuration] Menu

About This Menu

Access of **[AIV1 Sensor Config.]** menu depends of the sensor assigned to this input.

The following table shows the **[AIV1 Sensor Config.]** menus displayed in relation with the sensor and the applicative function used.

If...	And...	Then following menu is displayed:
[OutletPres Assign] PS2A is set to **[AI Virtual 1]** AIV1	-	**[AIV1 Sensor Config.]** OCV1–
	[Sleep Detect Mode] SLPM is set to **[Pressure]** HP or **[Multiple]** OR , page 263.	**[AIV1 Sensor Config.]** SOV1–
	[Wake Up Mode] WUPM is set to **[Pressure]** LP , page 263.	**[AIV1 Sensor Config.]** WOV1–
	[OutPres Monitoring] OPPM is set to **[Sensor]** SNSR or **[Both]** BOTH , page 294.	**[AIV1 Sensor Config.]** OOV1–
NOTE: The list of parameters is the same for each **[AIV1 Sensor Config.]** menu.		

[AIV1 Channel Assign] AIC1

***Channel assignment for virtual Analog input AI*V1.**

Setting	Code / Value	Description
[Not Configured]	NO	Not assigned **Factory setting**
[Ref. Freq-Modbus]	MDB	Reference frequency via Modbus
[MS/TP Ref Freq]	EBM	Reference frequency via BACnet
[Ref. Freq-Com. Module]	NET	Reference frequency via fieldbus module if a fieldbus module has been inserted

[AIV1 Lowest Process] AV1J

***AI*V1 *lowest process*.**

Setting	Description
-32,767...32,767	Setting range. Value in application customer unitt **Factory setting**: 0

[AIV1 Highest Process] AV1K

***AI*V1 *highest process*.**

Setting	Description
-32,767...32,767	Setting range. Value in application customer unitt **Factory setting**: 0

[AIV2 Configuration] Menu

About This Menu

Access of **[AIV2 Sensor Config.]** menu depends of the sensor assigned to this input.

The following table shows the **[AIV2 Sensor Config.]** menus displayed in relation with the sensor and the applicative function used.

If...	And...	Then following menu is displayed:
[OutletPres Assign] PS2A is set to **[AI Virtual 2]** AIV2	-	**[AIV2 Sensor Config.]** OCV2–
	[Sleep Detect Mode] SLPM is set to **[Pressure]** HP or **[Multiple]** OR , page 263.	**[AIV2 Sensor Config.]** SOV2–
	[Wake Up Mode] WUPM is set to **[Pressure]** LP , page 263.	**[AIV2 Sensor Config.]** WOV2–
	[OutPres Monitoring] OPPM is set to **[Sensor]** SNSR or **[Both]** BOTH , page 294.	**[AIV2 Sensor Config.]** OOV2–
NOTE: The list of parameters is the same for each **[AIV2 Sensor Config.]** menu.		

[AIV2 Channel Assign] AIC2

Identical to **[AIV1 Channel Assign]** AIC1 , page 208.

[AIV2 Lowest Process] AV2J

Identical to **[AIV1 Lowest Process]** AV1J , page 208.

[AIV2 Highest Process] AV2K

Identical to **[AIV1 Highest Process]** AV1K , page 208.

[AIV3 Configuration] Menu

About This Menu

Access of **[AIV3 Sensor Config.]** menu depends of the sensor assigned to this input.

The following table shows the **[AIV3 Sensor Config.]** menus displayed in relation with the sensor and the applicative function used.

If...	And...	Then following menu is displayed:
[OutletPres Assign] PS2A is set to **[AI Virtual 3]** AIV3	-	**[AIV3 Sensor Config.]** OCV3–
	[Sleep Detect Mode] SLPM is set to **[Pressure]** HP or **[Multiple]** OR. , page 263	**[AIV3 Sensor Config.]** SOV3–
	[Wake Up Mode] WUPM is set to **[Pressure]** LP. , page 263	**[AIV3 Sensor Config.]** WOV3–
	[Activation Mode] PFM is set to **[Outlet Pressure]** PS2. , page 263	**[AIV3 Configuration]** PFV3–
	[OutPres Monitoring] OPPM is set to **[Sensor]** SNSR or **[Both]** BOTH. , page 294	**[AIV3 Sensor Config.]** OOV3–
NOTE: The list of parameters is the same for each **[AIV3 Sensor Config.]** menu.		

[AIV3 Channel Assign] AIC3

Identical to **[AIV1 Channel Assign]** AIC1 , page 208.

[AIV3 Lowest Process] AV3J

Identical to **[AIV1 Lowest Process]** AV1J , page 208.

[AIV3 Highest Process] AV3K

Identical to **[AIV1 Highest Process]** AV1K , page 208.

[Cmd and Reference] CRP– Menu

Access

[Complete settings] ➞ [Cmd and Reference]

Command and Reference Channels Parameter Can Be Accessed

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

Command	Reference
Terminals: Digital inputs DI	Terminals: Analog inputs AI, pulse input
Graphic Display Terminal	Graphic Display Terminal
Integrated Modbus	Integrated Modbus
Integrated BACnet	Integrated BACnet
Fieldbus module	Fieldbus module
–	+/– speed via the Graphic Display Terminal

NOTE: The OFF key on the Graphic Display Terminal can be programmed as non-priority key. An OFF key can only have priority if the **[Stop Key Enable]** PST parameter menu is set to **[Stop Key Priority]** YES or **[Stop Key Priority All]** ALL.

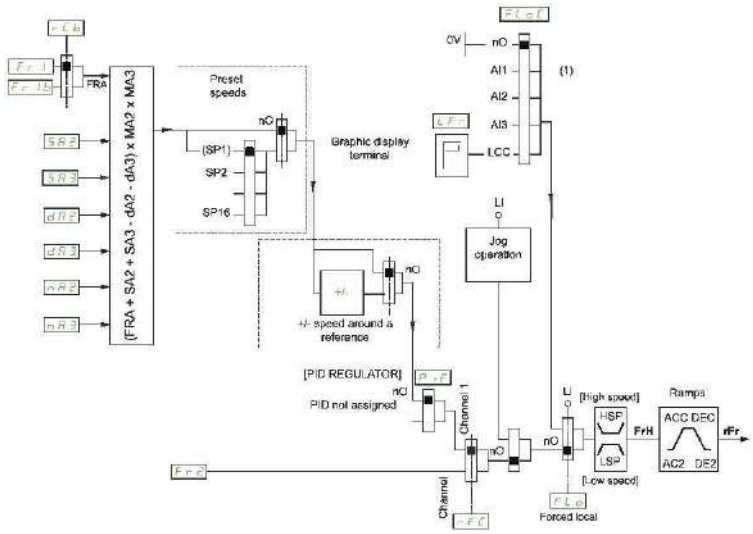
NOTE: When **[DC injection]** DCI is active RUN commands are ignored. **[DC injection]** has priority and keeps the motor stopped as long as DCI is active.

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

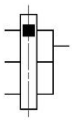
- **[Not separ.]** SIM: Command and reference are sent via the same channel.
- **[Separate]** SEP: Command and reference may be sent via different channels. In these configurations, control via the communication bus is performed in accordance with the DRIVECOM standard with only 5 freely assignable bits (see communication parameter 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 simplify and extends use via the communication interface. Commands may be sent via the digital 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 digital inputs. Application functions can be assigned to the bits in this word. More than one function can be assigned to the same bit.

  NOTE: OFF commands from the Graphic Display Terminal 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



(1) Note: Forced local is not active in IO.



The black square represents the factory setting assignment.

FR1: terminals (including I/O extension module), Graphic Display Terminal, integrated Modbus, Integrated BACnet and fieldbus module.

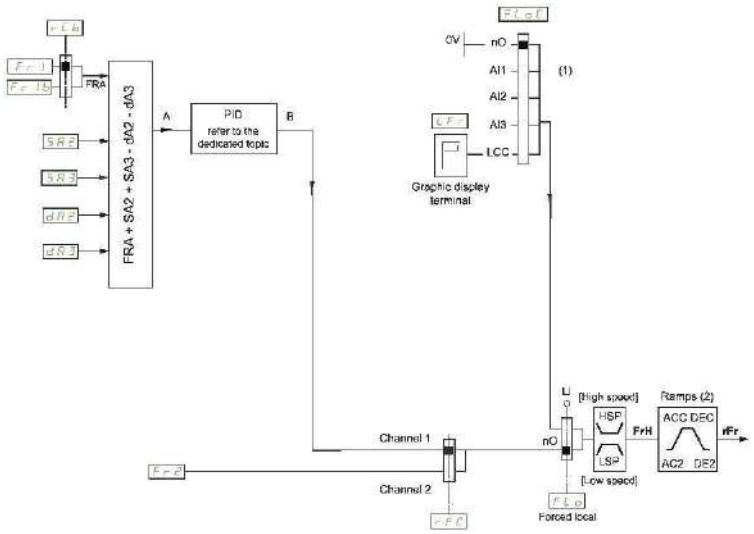
FR1B, for SEP and IO: terminals (including I/O extension module), Graphic Display Terminal, integrated Modbus, Integrated BACnet and fieldbus module.

FR1B, for SIM: Graphic Display Terminal, only accessible if FR1 = terminals.

SA2, SA3, DA2, DA3, MA2, MA3: terminals (including I/O extension module), Graphic Display Terminal, integrated Modbus, Embedded BACnet and fieldbus module.

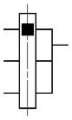
FR2: terminals (including I/O extension module), Graphic Display Terminal, integrated Modbus, Integrated BACnet +/– speed, and fieldbus module.

Reference Channel for [Not separ.] SIM, [Separate] SEP and [I/O profile] IO Configurations, PID Configured with PID References at the Terminals



(1) Note: Forced local is not active in **[I/O profile]**.

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



The black square represents the factory setting assignment.

FR1: terminals (including I/O extension module), Graphic Display Terminal, integrated Modbus, Integrated BACnet and fieldbus module.

FR1B, for SEP and IO: terminals (including I/O extension module), Graphic Display Terminal, integrated Modbus, Integrated BACnet and fieldbus module.

FR1B, for SIM: Graphic Display Terminal, only accessible if FR1 = terminals.

SA2, SA3, DA2, DA3: terminals (including I/O extension module), Graphic Display Terminal, integrated Modbus, Integrated BACnet and fieldbus module.

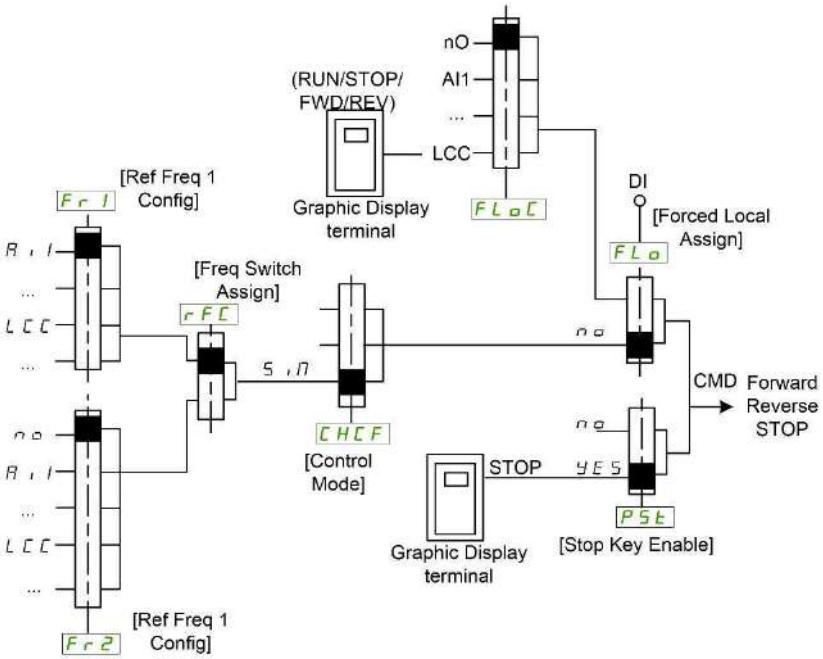
FR2: terminals (including I/O extension module), Graphic Display Terminal, integrated Modbus, Integrated BACnet, +/– speed, and fieldbus module.

Command Channel for [Not separ.] SIM configuration

Reference and command, not separate.

The command channel is determined by the reference channel. The parameters FR1, FR2, RFC, FLO and FLOC are common to reference and command.

Example: If the reference is FR1 = AI1 (analog input at the terminals), control is via DI (digital input at the terminals).



The black square represents the factory setting assignment.

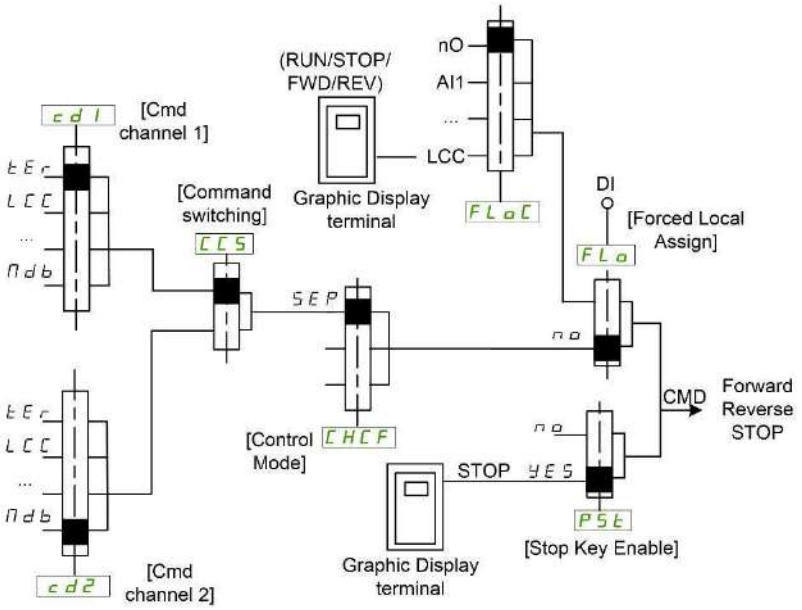
Command Channel for [Separate] SEP configuration

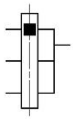
Separated Reference and command.

The parameters FLO and FLOC are common to reference and command.

Example: If the reference is in forced local mode via AI1 (analog input at the terminals), command in forced local mode is via DI (digital input at the terminals).

The command channels CD1 and CD2 are independent of the reference channels FR1, FR1B and FR2.





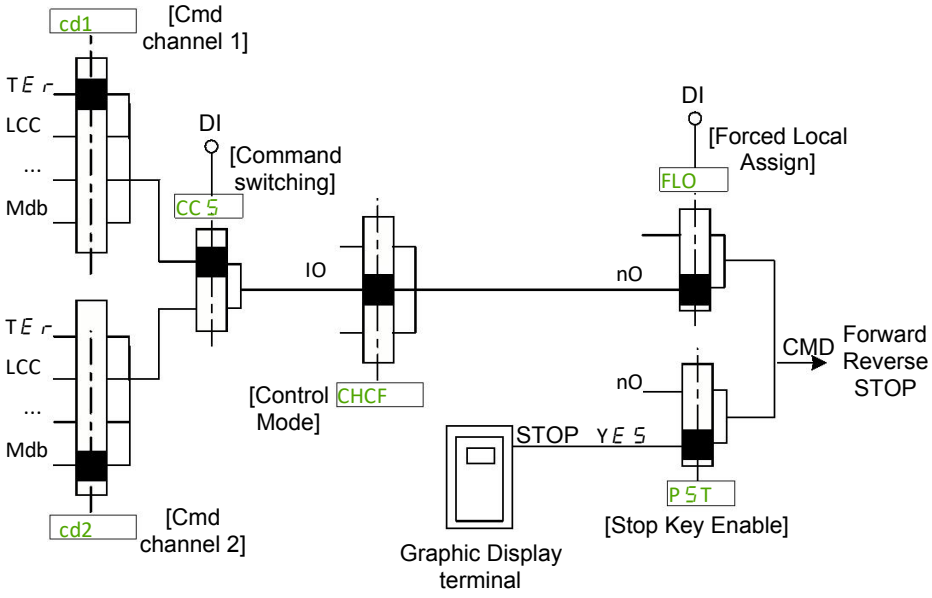
The black square represents the factory setting assignment, except for **[Control Mode]** CHCF.

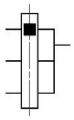
[Cmd channel 1] CD1 and **[Cmd channel 2]** CD2: Terminals, Graphic Display Terminal, integrated Modbus, Integrated BACnet, communication card

Command Channel for [I/O profile] IO configuration

Separated Reference and command, as in **[Separate]** SEP configuration.

The command channels CD1 and CD2 are independent of the reference channels FR1, FR1B and FR2.





The black square represents the factory setting assignment, except for **[Control Mode]** CHCF.

[Cmd channel 1] CD1 and **[Cmd channel 2]** CD2: Terminals, Graphic Display Terminal, integrated Modbus, Integrated BACnet, communication card

A command or an action can be assigned:

- To a fixed channel by selecting a Digital input (Dix) or a Cxxx bit:
  - By selecting, for example, LI3, this action is triggered by the digital input DI3 regardless of which command channel is switched.
  - By selecting, for example, C114, this action is triggered by integrated Modbus 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 is triggered by: LI12 if the terminals channel is active, C111 if the integrated Modbus channel is active, C311 if the communication card channel is active, C911 if the integrated BACnet MS/TP channel is active.

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

NOTE: Several CDxx does not have equivalent digital inputs and can only be used for switching between 2 networks.

[Ref Freq 1 Config] FR1

Configuration reference frequency 1.

Setting	Code / Value	Description
[Not Configured]	NO	Not assigned
[AI1]	AI1	Analog input AI1 **Factory Setting**
[AI2]...**[AI3]**	AI2...AI3	Analog input AI2...AI3
[AI Virtual 1]...**[AI Virtual 3]**	AIV1...AIV3	Virtual analogic input 1...3
[AI4]...**[AI5]**	AI4...AI5	Analog input AI4...AI5 if VW3A3203 I/O extension module has been inserted
[HMI]	LCC	Reference Frequency via remote terminal
[Ref. Freq-Modbus]	MDB	Reference frequency via Modbus
[MS/TP Ref Freq]	EBM	Reference frequency via BACnet
[Ref. Freq-Com. Module]	NET	Reference frequency via fieldbus module if a fieldbus module has been inserted

[Ref.1B channel] FR1B

Configuration ref. 1B.

Identical to **[Ref Freq 1 Config]** FR1 (see above) with factory setting: **[Not Configured]** NO.

[Ref 1B switching] RCB

⚠WARNING

UNANTICIPATED EQUIPMENT OPERATION

This parameter can cause unintended movements, for example, inversion of the direction of rotation of the motor, sudden acceleration or stops.

- Verify that the setting of this parameter does not cause unintended movements.
- Verify that the setting of this parameter does not result in unsafe conditions.

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

Select switching (1 to 1B).

- If the assigned input or bit is at 0, **[Ref Freq 1 Config]** FR1 is active.
- If the assigned input or bit is at 1, **[Ref.1B channel]** FR1B is active.

[Ref 1B switching] RCB is forced to **[Ref Freq 1 Config]** FR1 if **[Control Mode]** CHCF is set to **[Not separ.]** SIM with **[Ref Freq 1 Config]** FR1 assigned via the terminals (analog inputs, pulse input).

NOTE: Activating this function from an other active command channel also activates the monitoring of this new channel.

Setting	Code / Value	Description
[Ref Freq 1 Config]	FR1	Reference channel = channel 1 (for RCB)
[Ref.1B channel]	FR1B	Reference channel = channel 1b (for RCB)
[DI1]...**[DI6]**	LI1...LI6	Digital input DI1...DI6
[DI11]...**[DI16]**	LI11...LI16	Digital input DI11...DI16 if VW3A3203 I/O extension module has been inserted
[CD00]... **[CD10]**	CD00...CD10	Virtual digital input CMD.0...CMD.10 in **[I/O profile]** IO configuration
[CD11]... **[CD15]**	CD11...CD15	Virtual digital input CMD.11...CMD.15 regardless of configuration
[C101]... **[C110]**	C101...C110	Virtual digital input CMD1.01...CMD1.10 with integrated Modbus Serial in **[I/O profile]** IO configuration
[C111]... **[C115]**	C111...C115	Virtual digital input CMD1.11...CMD1.15 with integrated Modbus Serial regardless of configuration
[C301]... **[C310]**	C301...C310	Virtual digital input CMD3.01...CMD3.10 with a fieldbus module in **[I/O profile]** IO configuration
[C311]... **[C315]**	C311...C315	Virtual digital input CMD3.11...CMD3.15 with a fieldbus module regardless of configuration
[AI1 4-20 Warning]... **[AI3 4-20 Warning]**	AP1...AP3	4-20 mA loss warning on AI

[Reverse Disable] RIN

Lock of movement in reverse direction does not apply to direction requests sent by digital inputs.

Reverse direction requests sent by digital inputs are taken into account.

Reverse direction requests sent by the Graphic Display Terminal or sent by the line are not taken into account.

Any reverse speed reference originating from the PID, summing input, and so on, is interpreted as a zero reference (0 Hz).

Setting	Code / Value	Description
[No]	NO	Motor rotation direction is defined by the run command **[Forward]** FRD or **[Reverse Assign]** RRS and the sign of the reference frequency. When the reference frequency is positive and a: • **[Forward]** FRD run command is given: the motor starts in forward direction • **[Reverse Assign]** RRS run command is given: the motor starts in reverse direction When the reference frequency is negative and a: • **[Forward]** FRD run command is given: the motor starts in reverse direction • **[Reverse Assign]** RRS run command is given: the motor starts in forward direction
[Yes]	YES	Any reverse speed reference originating from the PID, summing input, and so on, is interpreted as a zero reference (0 Hz).
[Absolute]	ABS	Motor rotation direction is defined by the run command **[Forward]** FRD or **[Reverse Assign]** RRS regardless of the sign of the reference frequency (i.e only the absolute value of the reference frequency is considered).

[Control Mode] CHCF

⚠WARNING

UNANTICIPATED EQUIPMENT OPERATION

Disabling **[I/O profile]** IO resets the device 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.

Setting	Code / Value	Description
[Not separ.]	SIM	Reference and command, not separate **Factory Setting**
[Separate]	SEP	Separate reference and command. This assignment cannot be accessed in **[I/O profile]** IO
[I/O profile]	IO	I/O profile

[Command Switching] CCS ★

⚠WARNING

UNANTICIPATED EQUIPMENT OPERATION

This parameter can cause unintended movements, for example, inversion of the direction of rotation of the motor, sudden acceleration or stops.

- Verify that the setting of this parameter does not cause unintended movements.
- Verify that the setting of this parameter does not result in unsafe conditions.

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

This parameter can be accessed if **[Control Mode]** CHCF is set to **[Separate]** SEP or to **[I/O profile]** IO.

If the assigned input or bit is at 0, channel **[Cmd channel 1]** CD1 is active. If the assigned input or bit is at 1, channel **[Cmd channel 2]** CD2 is active.

NOTE: Activating this function from an other active command channel also activates the monitoring of this new channel.

Setting	Code / Value	Description
[Cmd channel 1]	CD1	Command channel = channel 1 (for CCS) **Factory setting**
[Cmd channel 2]	CD2	Command channel = channel 2 (for CCS)
[DI1]...**[DI6]**	LI1...LI6	Digital input DI1...DI6
[DI11]...**[DI16]**	LI11...LI16	Digital input DI11...DI16 if VW3A3203 I/O extension module has been inserted
[C101]... **[C110]**	C101...C110	Virtual digital input CMD1.01...CMD1.10 with integrated Modbus Serial in **[I/O profile]** IO configuration
[C111]... **[C115]**	C111...C115	Virtual digital input CMD1.11...CMD1.15 with integrated Modbus Serial regardless of configuration

Setting	Code / Value	Description
[C301]... **[C310]**	C301...C310	Virtual digital input CMD3.01...CMD3.10 with a fieldbus module in **[I/O profile]** IO configuration. If BACnet IP Option Module is plugged, and **[Control Mode]** CHCF is set to **[I/O profile]** IO, **[Invalid Config]** CFI is triggered.
[C311]... **[C315]**	C311...C315	Virtual digital input CMD3.11...CMD3.15 with a fieldbus module regardless of configuration
[C911] ... **[C915]**	C911...C915	Virtual digital input CMD9.11...CMD9.15 with BACnet MSTP regardless of configuration

[Cmd channel 1] CD1 ★

This parameter can be accessed if **[Control Mode]** CHCF is set to **[Separate]** SEP or **[I/O profile]** IO.

Setting	Code / Value	Description
[Terminal]	TER	Terminal block source **Factory Setting**
[HMI]	LCC	Command via Graphic Display Terminal
[Ref. Freq-Modbus]	MDB	Command via Modbus
[MS/TP Ref Freq]	EBM	Reference frequency via integrated BACnet
[Ref. Freq-Com. Module]	NET	Command via fieldbus module if a fieldbus module has been inserted

[Cmd channel 2] CD2 ★

This parameter can be accessed if **[Control Mode]** CHCF is set to **[Separate]** SEP or **[I/O profile]** IO.

Identical to **[Cmd channel 1]** CD1 with factory setting **[Ref. Freq-Modbus]** MDB.

[Freq Switch Assign] RFC

⚠WARNING

UNANTICIPATED EQUIPMENT OPERATION

This parameter can cause unintended movements, for example, inversion of the direction of rotation of the motor, sudden acceleration or stops.

- Verify that the setting of this parameter does not cause unintended movements.
- Verify that the setting of this parameter does not result in unsafe conditions.

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

frequency switching assignment.

If the assigned input or bit is at 0, channel **[Ref Freq 1 Config]** FR1 is active.

If the assigned input or bit is at 1, channel **[Ref Freq 2 Config]** FR2 is active.

NOTE: Activating this function from an other active command channel also activates the monitoring of this new channel.

Setting	Code / Value	Description
[Ref Freq 1 Config]	FR1	Reference channel = channel 1 (for RFC)
[Ref Freq 2 Config]	FR2	Reference channel = channel 2 (for RFC)
[DI1]...**[DI6]**	LI1...LI6	Digital input DI1...DI6
[DI11]...**[DI16]**	LI11...LI16	Digital input DI11...DI16 if VW3A3203 I/O extension module has been inserted
[CD00]... **[CD10]**	CD00...CD10	Virtual digital input CMD.0...CMD.10 in **[I/O profile]** IO configuration
[CD11]... **[CD15]**	CD11...CD15	Virtual digital input CMD.11...CMD.15 regardless of configuration
[C101]... **[C110]**	C101...C110	Virtual digital input CMD1.01...CMD1.10 with integrated Modbus Serial in **[I/O profile]** IO configuration
[C111]... **[C115]**	C111...C115	Virtual digital input CMD1.11...CMD1.15 with integrated Modbus Serial regardless of configuration
[C301]... **[C310]**	C301...C310	Virtual digital input CMD3.01...CMD3.10 with a fieldbus module **[I/O profile]** IO configuration
[C311]... **[C315]**	C311...C315	Virtual digital input CMD3.11...CMD3.15 with a fieldbus module regardless of configuration
[C901] ... **[C910]**	C901...C910	Virtual digital input CMD9.01...CMD9.10 with BACnet MSTP**[I/O profile]** IO configuration
[C911] ... **[C915]**	C911...C915	Virtual digital input CMD9.11...CMD9.15 with BACnet MSTP regardless of configuration

[Ref Freq 2 Config] FR2

Configuration reference frequency 2.

Setting	Code / Value	Description
[Not Configured]	NO	Not assigned. If **[Control Mode]** CHCF is set to **[Not separ.]** SIM, the command is at the terminals with a zero reference. If **[Control Mode]** CHCF is set to **[Separate]** SEP or **[I/O profile]** IO, the reference is zero. **Factory Setting**
[AI1]...**[AI3]**	AI1...AI3	Analog input AI1...AI3
[AI4]...**[AI5]**	AI4...AI5	Analog input AI4...AI5 if VW3A3203 I/O extension module has been inserted
[AI Virtual 1]... **[AI Virtual 3]**	AIV1...AIV3	Virtual analogic input 1...3
[Ref Freq via DI]	UPDT	+/– speed command assigned to DIx
[HMI]	LCC	Reference frequency via Graphic Display Terminal
[Ref. Freq-Modbus]	MDB	Reference frequency via Modbus
[MS/TP Ref Freq]	EBM	Reference frequency via integrated BACnet
[Ref. Freq-Com. Module]	NET	Reference frequency via fieldbus module if a fieldbus module has been inserted

[Copy Ch1-Ch2] COP

⚠WARNING

UNANTICIPATED EQUIPMENT OPERATION

This parameter can cause unintended movements, for example, inversion of the direction of rotation of the motor, sudden acceleration or stops.

- Verify that the setting of this parameter does not cause unintended movements.
- Verify that the setting of this parameter does not result in unsafe conditions.

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

Can be used to copy the current reference and/or the command with switching in order to avoid speed surges, for example.

If **[Control Mode]** CHCF is set to **[Not separ.]** SIM or **[Separate]** SEP, copying is possible only from channel 1 to channel 2. If **[Control Mode]** CHCF is set to **[I/O profile]** IO, copying is possible in both directions.

A reference or a command cannot be copied to a channel on the terminals. The reference copied is **[Pre-Ramp Ref Freq]** FRH (before ramp) unless the destination channel reference is set via +/– speed. In this case, the reference copied is **[Motor Frequency]** RFR (after ramp). When **[Reverse Disable]** RIN is set to **[Absolute]** ABS and **[HMI L/R cmd]** BMP is set to **[Bumpless]** BMP, the copied reference to the destination channel (**[HMI]** LCC) is **[Ref Frequency]** LFR.

Setting	Code / Value	Description
[No]	NO	No copy **Factory Setting**
[Reference Freq]	SP	Copy reference
[Command]	CD	Copy command In I/O profile, when switching back to normal operation using fieldbus after a communication interruption with the fallback channel set to **[HMI]** LCC (activated by pressing the Local/ Remote key on the graphic display terminal), the command cannot be copied from the graphic display terminal.
[Cmd + Ref Freq]	ALL	Copy reference and command In I/O profile, when switching back to normal operation using fieldbus after a communication interruption with the fallback channel set to **[HMI]** LCC (activated by pressing the Local/ Remote key on the graphic display terminal), the command cannot be copied from the graphic display terminal.

As the Graphic Display Terminal may be selected as the command and/or reference channel, its action modes can be configured.

Comments:

- The Graphic Display Terminal command/reference is only active if the command and/or reference channels from the terminal are active except for BM*P* with Hand (Local/ Remote) key (command via the Graphic Display Terminal), which takes priority over these channels. Press Auto (Local/ Remote key again) to revert control to the selected channel.
- Command and reference via the Graphic Display Terminal are impossible if the latter is connected to more than one drive.
- The preset PID reference functions can only be accessed if **[Control Mode]** CHCF is set to **[Not separ.]** SIM or **[Separate]** SEP.
- The command via the Graphic Display Terminal can be accessed regardless of the **[Control Mode]** CHCF.

[Forced Local Chan] FLOC

Forced Local channel assignment.

Setting	Code / Value	Description
[Not Configured]	NO	Not assigned (control via the terminals with zero reference) **Factory Setting**
[AI1]...**[AI3]**	AI1...AI3	Analog input AI1...AI3
[AI4]...**[AI5]**	AI4...AI5	Analog input AI4...AI5 if VW3A3203 I/O extension module has been inserted
[HMI]	LCC	Graphic Display Terminal

[Time-out forc. local] FLOT ★

Time for channel confirmation after forced local.

This parameter can be accessed if **[Forced Local Assign]** FLO is not set to **[Not Assigned]** NO.

Setting	Description
0.1...30.0 s	Setting range **Factory setting**: 10.0 s

[Forced Local Assign] FLO

Forced local mode is active when the input is at state 1. In this state, new values of parameters cannot be written remotely via communication channels.

[Forced Local Assign] FLO is forced to **[Not Assigned]** NO if **[Control Mode]** CHCF is set to **[I/O profile]** IO.

Setting	Code / Value	Description
[Not Assigned]	NO	Not assigned **Factory setting**
[DI1]...**[DI6]**	LI1...LI6	Digital input DI1...DI6
[DI11]...**[DI16]**	LI11...LI16	Digital input DI11...DI16 if VW3A3203 I/O extension module has been inserted

[Reverse Assign] RRS

Reverse assignment.

Value range	Code / Value	Description
[Not Assigned]	NO	Not assigned **Factory setting**
[DI1]...**[DI6]**	LI1...LI6	Digital input DI1...DI6
[DI11]...**[DI16]**	LI11...LI16	Digital input DI11...DI16 if VW3A3203 I/O extension module has been inserted

Value range	Code / Value	Description
[CD00]... **[CD10]**	CD00...CD10	Virtual digital input CMD.0...CMD.10 in **[I/O profile]** IO configuration
[CD11]... **[CD15]**	CD11...CD15	Virtual digital input CMD.11...CMD.15 regardless of configuration

[2/3-Wire Control] TCC

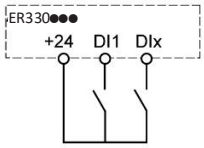
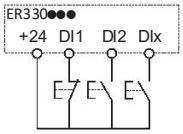
⚠WARNING

UNANTICIPATED EQUIPMENT OPERATION

If this parameter is changed, the parameters **[Auto Fault Reset]** ATR and **[2-wire type]** TCT and the assignments of the digital and virtual inputs are partially reset to the factory setting.

- Verify that this change is compatible with the type of wiring used.

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

Setting	Code / Value	Description
[2-Wire Control]	2C	**2-wire 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** wiring:  **DI1** Forward **DIx** Reverse **Factory setting**
[3-Wire Control]	3C	**3-wire control (pulse commands) [3 wire]:** A Stop level command is used to allow enabling a run command through DI2 or DIX or stopping. A **[Forward]** or **[Reverse Assign]** pulse is sufficient to command starting. Example of **source** wiring:  **DI1** Stop **DI2** Forward **DIx** Reverse

[2-wire type] TCT ★

This parameter can be accessed if **[2/3-Wire Control]** TCC is set to **[2-Wire Control]** 2C.

⚠WARNING

UNANTICIPATED EQUIPMENT OPERATION

Verify that the parameter setting is compatible with the type of wiring used.

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

Setting	Code / Value	Description
[Level]	LEL	State 0 or 1 is taken into account for run (1) or stop (0)
[Transition]	TRN	A change of state (transition or edge) is necessary to initiate operation in order to avoid accidental restarts after a break in the supply mains **Factory setting**
[Level With Fwd Priority]	PFO	State 0 or 1 is taken into account for run or stop, but the “forward” input takes priority over the “reverse” input

[Stop Key Enable] PST

Setting this function to No disables the Stop key of the Graphic Display Terminal if the setting of the parameter **[Command Channel]** CMDC is not **[HMI]** LCC.

⚠WARNING

LOSS OF CONTROL

Only set this parameter to **[Stop Key No Priority]** NO if you have implemented appropriate alternative stop functions.

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

If 2-wire control by level is active (parameter **[2/3-Wire Control]** TCC set to 2C and parameter **[2-wire type]** TCT set to LEL or PFO) and the parameter **[Stop Key Enable]** PST is set to ALL, the motor starts if the STOP/RESET key of the Graphic Display Terminal is pressed while a run command is active.

⚠WARNING

UNANTICIPATED EQUIPMENT OPERATION

Only set the parameter **[Stop Key Enable]** PST to **[ALL]** in 2-wire control by level after having verified that this setting cannot result in unsafe conditions.

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

Irrespective of the configuration of **[Stop Key Enable]** PST, if the active command channel is the Graphic Display Terminal, the OFF/RESET key performs:

- in run, a stop according to the **[Type of stop]** STT,
- in “Operating State Fault", a fault reset command.

The following table gives the behavior of the function when the Graphic Display Terminal is not the active command channel:

Setting	Code / Value	Description
[Stop Key No Priority]	NO	Disables the OFF/RESET key on the Graphic Display Terminal.
[Stop Key Priority]	YES	Gives priority to the OFF/RESET key on the Graphic Display Terminal.

Setting	Code / Value	Description
		Only the stop function is enabled. The stop is performed in freewheel. **Factory Setting**
[Stop Key Priority All]	ALL	Gives priority to the OFF/RESET key on the Graphic Display Terminal. The fault reset function and the stop function are enabled. The stop is performed depending on **[Type of stop]** STT setting value.
NOTE: The Fault Reset function is disabled in Multipoint mode, page 43.		

[HMI L/R cmd] BMP

HMI local/remote command.

Setting	Code / Value	Description
[Stop On Switching]	STOP	Stops the drive (although the controlled direction of operation and reference of the previous channel are copied (to be taken into account on the next RUN command)) **Factory Setting**
[Bumpless]	BUMP	**From remote to local**: Does not stop the drive (the controlled direction of operation and the reference of the previous channel are copied) **From local to remote**: The operating state of the device after a transition from local command to remote command depends on the configuration of the device. **⚠WARNING** **UNANTICIPATED EQUIPMENT OPERATION** Verify that the transition from local command to remote command does not result in unsafe conditions. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**
[Disabled]	DIS	Disables the AUTO / HAND mode.

[Pump functions]

[Pump functions] - [Booster Control]

Introduction

The aim of the booster control function is to maintain the desired pressure or flow at the outlet of the pumps according to the demand by:

- Managing the velocity of the variable speed pump connected to the drive.
- Staging/De-staging the auxiliary fixed speed pumps.

This menu can be accessed if **[Application Selection]** APPT is set to **[Pump Booster Ctrl]** BOOST.

[System Architecture] MPQ– Menu

Access

[Complete settings] ➞ **[Pump functions]** ➞ **[Booster Control]** ➞ **[System Architecture]**

About This Menu

This menu is used to define the equipment architecture.

The architecture is chosen by setting **[Pump System Archi]** MPSA to:

- **[Single Drive]** VNDOL: one variable speed pump and up to five fixed speed pumps

In the single drive architecture, the total number of pumps is set with **[Nb Of Pumps]** MPPN:

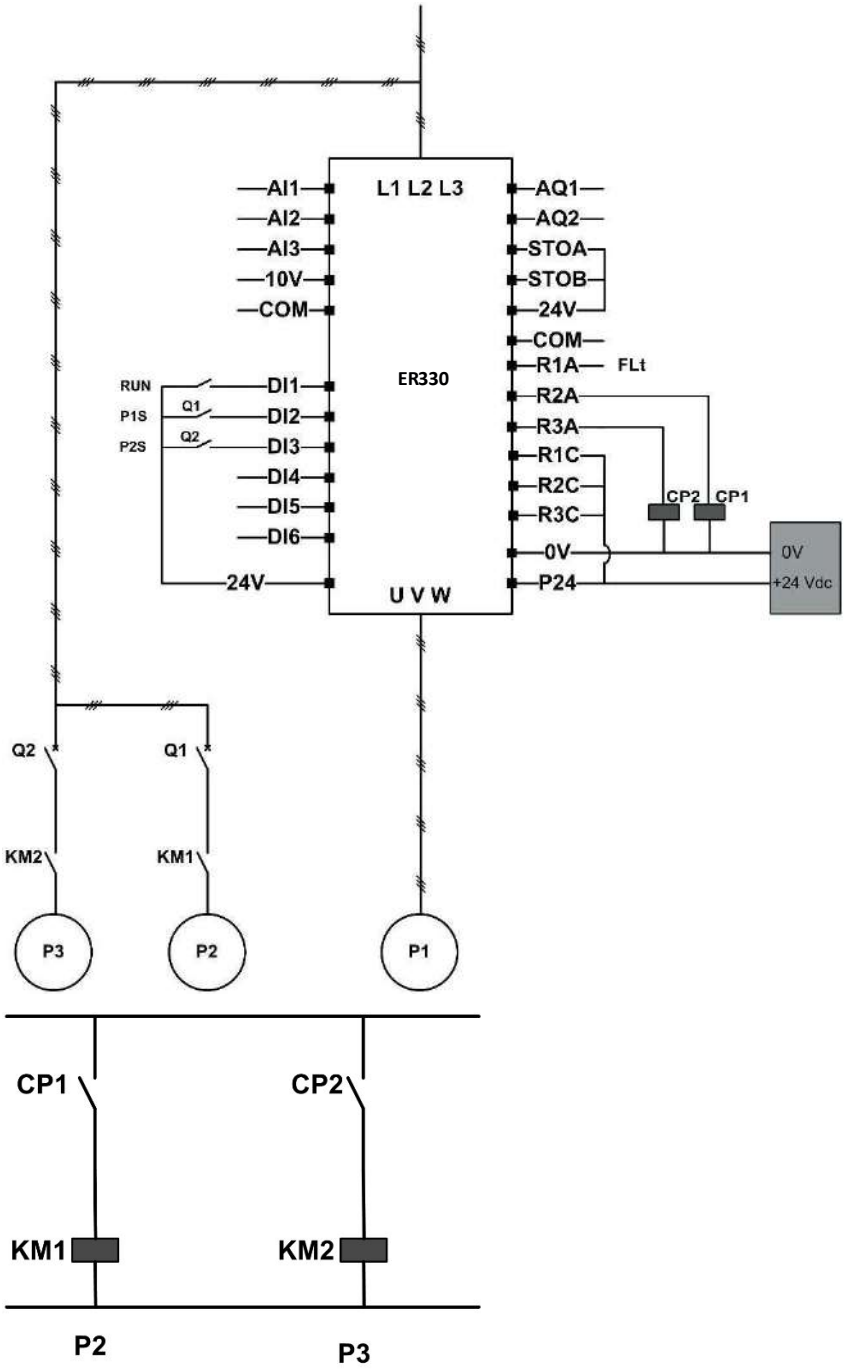
- With lead pump alternation, using interlocked switching relays for all pumps to connect them on mains or on the drive.
- Without lead pump alternation, using digital outputs to command the auxiliary pumps (with soft starters for example). The lead pump is always connected to the drive.

Display Parameters

A set of parameters to display the system is available in **[Display]** MON– ➞ **[Pump parameters]** PPR– ➞ **[Multipump System]** MPS–:

- The state of the system **[MultiPump State]** MPS.
- The quantity of pumps available **[Available Pumps]** MPAN and the quantity of pump already staged **[Nb of Staged Pumps]** MPSN.
- The number of the pump selected to be the lead pump **[Lead Pump]** PLID.
- The number of the next pump to be staged **[Next Staged Pump]** PNTS and de-staged **[Next Destaged Pump]** PNTD.
- For each pump (pump 1 in the example):
  - The state **[Pump 1 State]** P1S
  - The type **[Pump 1 Type]** P1T
  - The cumulated run time **[Pump 1 Runtime]** P1OT
  - The cumulated number of starts **[Pump 1 Nb Starts]** P1NS

Example of Architecture Without Lead Pump Alternation and Two Fixed Speed Pumps



Pump 2 and pump 3 are controlled by relay outputs R2 and R3.

The state of each pump is provided to the drive via digital inputs DI2 and DI3:

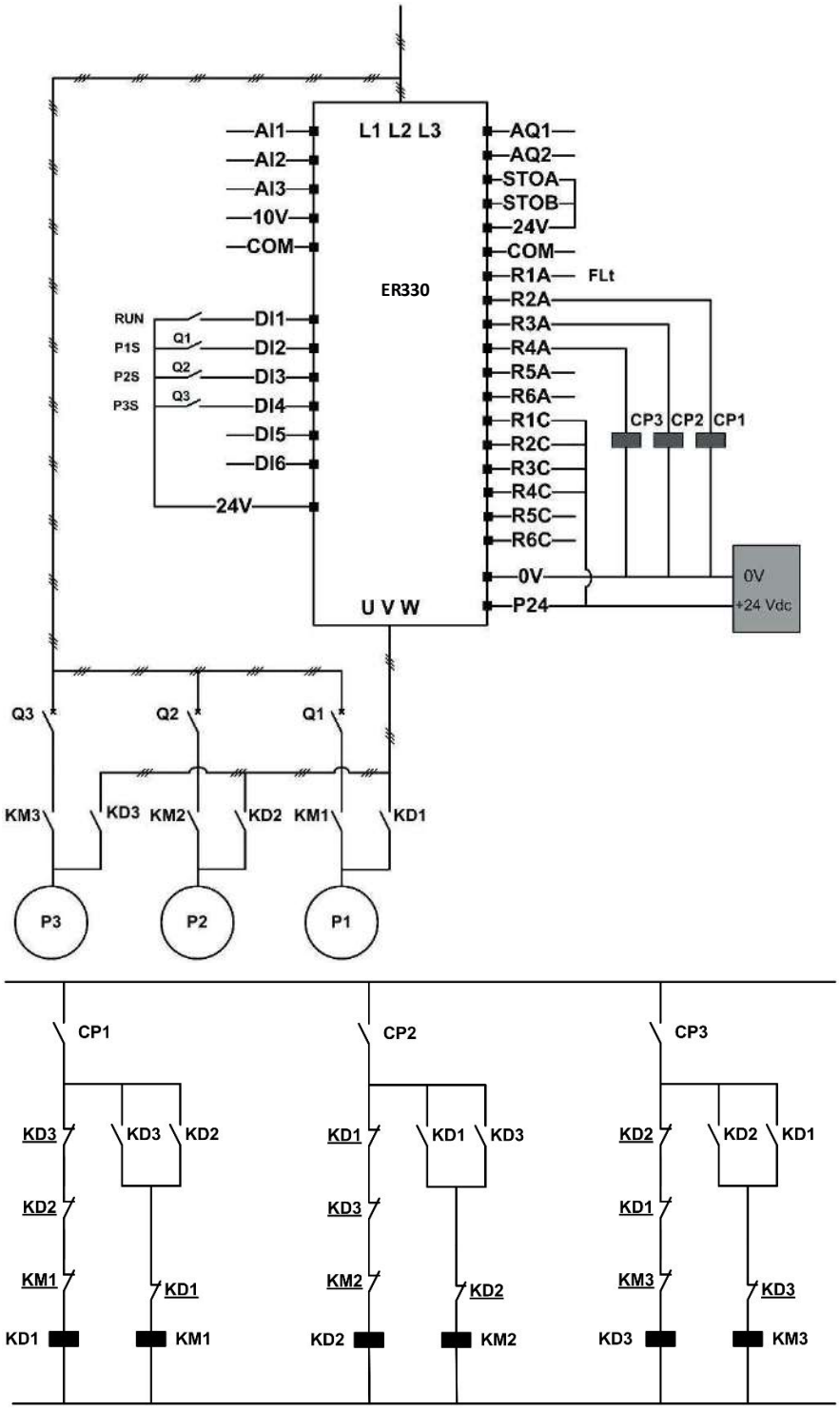
- 1 = the pump is ready to operate.
- 0 = the pump is not available.

KM1 is switched ON when CP1 is activated. CP1 is controlled via the relay output R2.

KM2 is switched ON when CP2 is activated. CP2 is controlled via the relay output R3.

Q1 and Q2 must be switched ON to have both pump 2 and pump 3 ready to operate.

Example of Architecture with Lead Pump Alternation on Three Pumps



Each pump is controlled by a relay output:

- Pump 1 control via relay output R2.
- Pump 2 control via relay output R3.
- Pump 3 control via relay output R4.

The state of each pump is provided to the drive via digital inputs DI2, DI3, and DI4:

- 1 = the pump is ready to operate.
- 0 = the pump is not available.

If the relay output R2 is the first activated, the pump 1 becomes the lead pump. CP1 is switched ON via relay output R2, KD1 is switched ON and the pump 1 is connected to the drive.

The other pumps cannot be connected to the drive thanks to KD1 (switched OFF) which prevent KD2 and KD3 to be activated when CP2 and CP3 are switched ON. The other pumps become auxiliary pumps and they are connected to the supply mains trough KM2 and KM3 which are activated when, respectively, CP2 and CP3 are switched ON, that is, when R3 and R4 are activated.

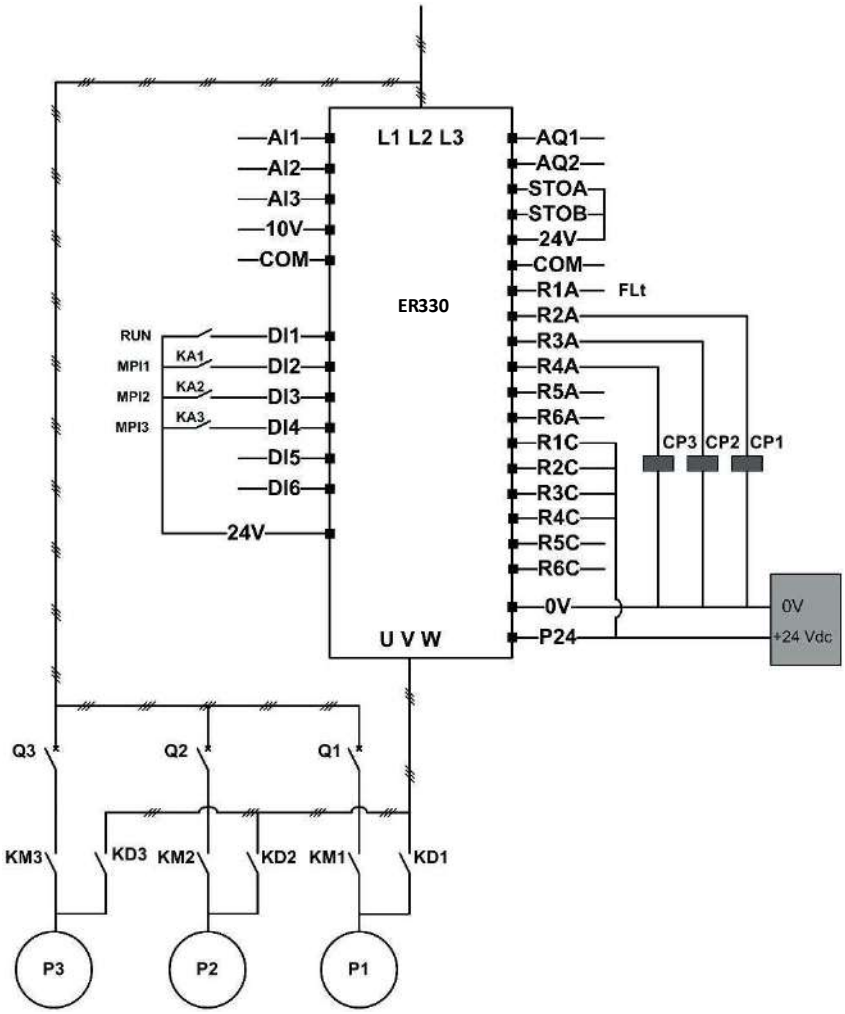
When relay output R3 is the first activated, the pump 2 becomes the lead pump. The other pumps become auxiliary pumps which are connected to the supply mains via KM1 and KM3.

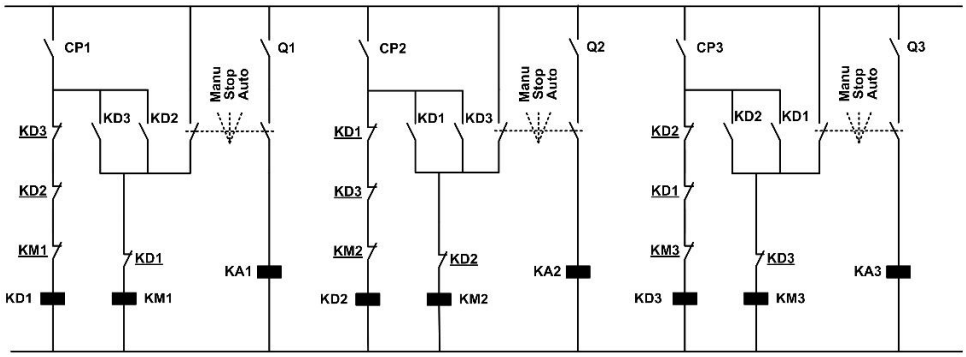
When relay output R4 is the first activated, the pump 3 becomes the lead pump. The other pumps become auxiliary pumps which are connected to the supply mains via KM1 and KM2.

Q1, Q2, and Q3 must be switched ON to have all pumps ready to operate.

To change the lead pump, it is necessary to deactivate all relay outputs which means that all pumps must be already stopped. It is then possible to decide which relay output to be activated first and so defining the new lead pump.

Example of Architecture with Lead Pump Alternation on Three Pumps and Auto/Manu Switch





Each pump is controlled by a relay output:

- Pump 1 control via relay output R2.
- Pump 2 control via relay output R3.
- Pump 3 control via relay output R4 (available if the VW3A3204 relay output option module is inserted).

The state of each pump is provided to the drive via digital inputs DI2, DI3, and DI4:

- 1 = the pump is ready to operate.
- 0 = the pump is not available (stopped or in manual mode).

In automatic mode: Same principle as previous architecture with lead pump alternation.

In manual mode: All pumps are connected to the supply mains through KM1, KM2, and KM3.

Warnings and Errors Handling

MultiPump Capacity Warning

If the available capacity of the system is exceeded:

- **[MP Capacity Warn]** MPCA warning is active if the number of pumps to be started is higher than the number of available pumps.

  NOTE: If the number of available pump is equal to 0, the warning is active.

Lead Pump Error/Warning

NOTE: The following handling is done if **[Pump System Archi]** MPSA is set to **[Single Drive]** VNDOL.

If the selected lead pump is not available:

- A **[Lead Pump Warn]** MPLA warning is active if the lead pump becomes not available while in run or if there is no lead pump available at run command.
- A **[Lead Pump Error]** MPLF error is active if the lead pump becomes not available while in run.If configured, the delay **[Pump Ready Delay]** MPID is applied on the error triggering if there is no lead pump available at run command.

  This error is handled whatever the active command channel if booster control or level control function is configured.

The drive response to a **[Lead Pump Error]** MPLF is set with **[MultiPump ErrorResp]** MPFB parameter.

[Pump System Archi] MPSA

Pump System architecture selection.

Setting	Code / Value	Description
[Mono-Pump]	NO	Multi-pump control deactivated **Factory setting**
[Single Drive]	VNDOL	Single drive with or without auxiliary pumps

[Nb Of Pumps] MPPN ★

This parameter can be accessed if **[Pump System Archi]** MPSA is set to **[Single Drive]** VNDOL.

Setting	Description
1...6	Setting range **Factory setting**: 1

[Pumps Configuration] PUMP– Menu

Access

[Complete settings] ➜ **[Pump functions]** ➜ **[Booster Control]** ➜ **[System Architecture]** ➜ **[Pumps Configuration]**

Input and Output Configuration for Each Pump

For each pump (pump 1 in the example), it is possible to set:

- The drive digital output for the command: **[Pump 1 Cmd Assign]** MPO1 if **[Lead Pump Warn]** MPLA is not set to **[No]** NO.
- The drive digital input for the pump availability information: **[Pump 1 Ready Assign]** MPI1. If not configured, the pump is considered as always available.

An internal configurable delay **[Pump Ready Delay]** MPID is available. When the digital input assigned to **[Pump 1 Ready Assign]** MPI1 switches to the active state or after de-staging, the related pump is considered as not available during **[Pump Ready Delay]** MPID.

This is used to wait that the auxiliary pumps are stopped and that all contactors between the drive and the motor (if existing) are closed before staging.

[Pump 1 Cmd Assign] MPO1 ★

This parameter can be accessed if:

- **[Pump System Archi]** MPSA is set to **[Single Drive]** VNDOL and **[Nb Of Pumps]** MPPN is set to **[1]** or above.

This parameter can be accessed if **[Nb Of Pumps]** MPPN is set to **[1]** or above.

Setting	Code / Value	Description
[No]	NO	Not assigned **Factory setting**
[R2]...**[R3]**	R2...R3	Relay output R2...R3
[R4]...**[R6]**	R4...R6	Relay output R4...R6 if VW3A3204 relay output option module has been inserted
[DQ11]... **[DQ12]**	DO11...DO12	Digital output DQ11...DQ12 if VW3A3203 I/O extension module has been inserted

[Pump 1 Ready Assign] MPI1 ★

This parameter can be accessed if **[Nb Of Pumps]** MPPN is set to **[1]** or above.

Setting	Code / Value	Description
[Not Assigned]	NO	Not assigned **Factory setting**
[DI1]...**[DI6]**	LI1...LI6	Digital input DI1...DI6
[DI11]...**[DI16]**	LI11...LI16	Digital input DI11...DI16 if VW3A3203 I/O extension module has been inserted
[CD00]... **[CD10]**	CD00...CD10	Virtual digital input CMD.0...CMD.10 in **[I/O profile]** IO configuration
[CD11]... **[CD15]**	CD11...CD15	Virtual digital input CMD.11...CMD.15 regardless of configuration
[DI1 (Low level)]...**[DI6 (Low level)]**	L1L...L6L	Digital input DI1...DI6 used at low level

[DI11 (Low level)]...[DI16 (Low level)]	L11L...L16L	Digital input DI11...DI16 used at low level if VW3A3203 I/O extension module has been inserted

[Pump 2 Cmd Assign] MPO2 ★

This parameter can be accessed if **[Nb Of Pumps]** MPPN is set to **[2]** or above.

Identical to **[Pump 1 Cmd Assign]** MPO1 , page 232.

[Pump 2 Ready Assign] MPI2 ★

This parameter can be accessed if **[Nb Of Pumps]** MPPN is set to **[2]** or above.

Identical to **[Pump 1 Ready Assign]** MPI1 , page 232.

[Pump 3 Cmd Assign] MPO3 ★

This parameter can be accessed if **[Nb Of Pumps]** MPPN is set to **[3]** or above.

Identical to **[Pump 1 Cmd Assign]** MPO1 , page 232.

[Pump 3 Ready Assign] MPI3 ★

This parameter can be accessed if **[Nb Of Pumps]** MPPN is set to **[3]** or above.

Identical to **[Pump 1 Ready Assign]** MPI1 , page 232.

[Pump 4 Cmd Assign] MPO4 ★

This parameter can be accessed if **[Nb Of Pumps]** MPPN is set to **[4]** or above.

Identical to **[Pump 1 Cmd Assign]** MPO1 , page 232.

[Pump 4 Ready Assign] MPI4 ★

This parameter can be accessed if **[Nb Of Pumps]** MPPN is set to **[4]** or above.

Identical to **[Pump 1 Ready Assign]** MPI1 , page 232.

[Pump 5 Cmd Assign] MPO5 ★

This parameter can be accessed if **[Nb Of Pumps]** MPPN is set to **[5]** or above.

Identical to **[Pump 1 Cmd Assign]** MPO1 , page 232.

[Pump 5 Ready Assign] MPI5 ★

This parameter can be accessed if **[Nb Of Pumps]** MPPN is set to **[5]** or above.

Identical to **[Pump 1 Ready Assign]** MPI1 , page 232.

[Pump 6 Cmd Assign] MPO6 ★

This parameter can be accessed if **[Nb Of Pumps]** MPPN is set to **[6]** or above.

Identical to **[Pump 1 Cmd Assign]** MPO1 , page 232.

[Pump 6 Ready Assign] MPI6 ★

This parameter can be accessed if **[Nb Of Pumps]** MPPN is set to **[6]** or above.

Identical to **[Pump 1 Ready Assign]** MPI1 , page 232.

[System Architecture] MPQ– Menu

Access

[Complete settings] ➜ [Pump functions] ➜ [Booster Control] ➜ [System Architecture]

[Pump Cycling Mode] MPPC

Pump cycling mode.

Setting	Code / Value	Description
[FIFO]	FIFO	First in first out
[LIFO]	LIFO	Last in first out
[Runtime]	RTIME	Pump runtime **Factory setting**
[Runtime&LIFO]	RTLF	Runtime and Last in first out **NOTE:** This choice is not available if **[Pump System Archi]** MPSA is set to **[Multi Drives]** NVSD or **[Multi Masters]** NVSDR.

[Lead Pump Altern.] MPLA

This parameter can be accessed if **[Pump System Archi]** MPSA is set to **[Single Drive]** VNDOL

NOTE: If **[Lead Pump Altern.]** MPLA is not set to **[No]** NO, the **[Pump 1 Cmd Assign]** MPO1 and **[Pump 1 Ready Assign]** MPI1 have to be configured.

Setting	Code / Value	Description
[No]	NO	Deactivated **Factory setting**
[Standard]	YES	Standard alternation
[Redundancy]	RED	Redundancy mode

[Pump Ready Delay] MPID

It corresponds to the stop time of the pumps. The pumps are considered as in running state and can not be staged during this delay, whatever the active command channel.

Setting	Description
0...3600 s	Setting range **Factory setting**: 0 s

[MultiPump ErrorResp] MPFB

This parameter can be accessed if **[Pump System Archi]** MPSA is set to **[Single Drive]** VNDOL

Setting	Code / Value	Description
[Ignore]	NO	Detected error ignored
[Freewheel Stop]	YES	Freewheel stop **Factory setting**

Setting	Code / Value	Description
[Configured Stop]	STT	Stop according to **[Type of stop]** STT parameter but without an error triggered after stop
[Ramp stop]	RMP	Stop on ramp

[Booster Control] BSC– Menu

Access

[Complete settings] ➜ [Pump functions] ➜ [Booster Control] ➜ [Booster Control]

NOTE: This menu is only visible when **[Application Selection]** is set to **[Pump Booster Ctrl]**.

About This Menu

This menu is used to set the booster control parameters.

[Booster Control] BCM

B***ooster Control***.

Setting	Code / Value	Description
[No]	NO	Booster control function disabled **Factory setting**
[Yes]	YES	Booster control function enabled

[Booster Nb Of Pumps] BCPN ★

Maximum number of pumps that can operate in the same time.

NOTE: If set to 0, there is no maximum defined. All the pumps of the architecture can be used.

This parameter can be accessed if **[Booster Control]** BCM is set to **[Yes]** YES.

Setting	Description
0	Setting range **Factory setting**: 0

[Stage/Destage Cond.] SDCM– Menu

Access

[Complete settings] ➞ **[Pump functions]** ➞ **[Booster Control]** ➞ **[Booster Control]** ➞ **[Stage/Destage Cond.]**

NOTE: This menu is only visible if **[Booster Control]** BCM is set to **[Yes]**

About This Menu

It is necessary to specify how the stage and de-stage conditions are managed by setting the **[Stage/Destage Cond.]** SDCM– menu:

- **[Speed]** SPD: staging/de-staging occurs according to conditions on the drive output frequency (Lead pump velocity).
- **[Feedback]** FBK: staging/de-staging occurs according to conditions on the outlet pressure feedback.
- **[Speed+Flow]** SPFL: staging occurs according to conditions on the drive output frequency (pump velocity), de-staging occurs according to flow conditions.
- **[Feedback+Flow]** FBFL: staging occurs according to conditions on the outlet pressure feedback, de-staging occurs according to flow conditions.
- **[Energy Optimized]** OPT: staging/de-staging occurs automatically to optimize the energy consumption of the system.

After a staging or de-staging condition is taken into account, no new staging or de-staging can occur during **[Booster S/D Interval]** BSDT delay. This is applied in any case, regardless of the settings of the function.

Staging/Destaging on Speed Condition

- Staging occurs if the reference frequency stays above **[Booster Stg Speed]** BSS for longer than **[Booster Stg Delay]** BSD.
- De-staging occurs if the reference frequency stays below **[Booster Dstg Spd]** BDS for longer than **[Booster Dstg Delay]** BDD.

Staging/Destaging on Pressure Feedback Condition

- The working area **[Boost Working range]** BCWA is expressed in a % of the reference value for the pressure.
- Staging occurs if PID error (taking into account **[PID Inversion]** PIC) stays below the working area while PID controller is at high limit speed for longer than **[Booster Stg Delay]** BSD.

  High limit speed corresponds to limitation speed of PID (minimum between **[High Speed]** HSP & **[PID Max Output]** POH).
- De-staging occurs if PID error (taking into account **[PID Inversion]** PIC) stays above working area while PID controller is at low limit speed, for longer than **[Booster Dstg Delay]** BDD.

  Low limit speed corresponds to speed at which PID controller has no effect (maximum between **[Low Speed]** LSP & **[PID Min Output]** POL).

Destaging on Flow Condition

- If **[Boost S/D Condition]** BSDC is set to **[Speed+Flow]** SPFL: staging occurs according to Speed condition (see Staging/Destaging on Speed Condition description).
- If **[Boost S/D Condition]** BSDC is set to **[Feedback+Flow]** FBFL: staging occurs according to Pressure Feedback condition (see Staging/Destaging on Pressure Feedback Condition description).

- De-staging occurs according to flow level **[Booster Dstg Flow]** BDF. Flow sensor or estimated system flow needs to be configured.
- If the **[Booster Dstg Flow]** BDF level is not reached and if pump is running at its low speed, de-staging occurs.

Staging/Destaging on Energy Optimized

If **[Boost S/D Condition]** BSDC is set to **[Energy Optimized]** OPT, staging/de-staging occurs automatically according to the pump characteristics to optimize the energy consumption of the system.

- This method can be selected if the pump curve characteristics are configured with **[Mode]** PCM = **[PHQ]** PHQ.
- The flow sensor or estimated system flow needs to be configured.
- **[Booster S/D Flow Hyst]** BSDH can be used to avoid many stage/de-stage of pumps.
- **[Head Static Offset]** HEO and **[Head Dynamic Gain]** HEG needs to be configured to have a good estimation of the required head according to the pressure setpoint.
- **[Pump Op Point Filter]** WPXF can be used to filter the pump operating point.

Staging/Destaging on Override

The override area is used whatever the configuration of the system and the strategy used.If the pressure feedback is out of the **[Boost Override range]** BCOA range, expressed in % of the reference value for the pressure, a staging/de-staging is immediate. This increases the reactivity of the system in case of an important and rapid variation of the demand. It allows suppressing the staging/de-staging delay.

[Boost S/D Condition] BSDC

This parameter can be accessed if:

- **[Application Selection]** APPT is set to **[Pump Booster Ctrl]** BOOST.
- **[Booster Control]** BCM is set to **[Yes]** YES.

Setting	Code / Value	Description
[Speed]	SPD	Staging/De-staging on speed condition
[Feedback]	FBK	Staging/De-staging on pressure feedback condition **Factory setting**

[Boost Working range] BCWA ★

Booster working area in % of the reference value for the pressure.

This parameter can be accessed if **[Boost S/D Condition]** BSDC is set to **[Feedback]** FBK.

Setting	Description
1.0...100.0%	Setting range in % of the reference value for the pressure **Factory setting**: 2.0%

[Booster Stg Speed] BSS ★

This parameter can be accessed if **[Boost S/D Condition]** BSDC is set to **[Speed]** SPD.

Setting	Description
0.0...500.0 Hz	Setting range **Factory setting**: 50.0 Hz

[Booster Dstg Spd] BDS ★

This parameter can be accessed if **[Boost S/D Condition]** BSDC is set to **[Speed]** SPD.

Setting	Description
0.0...500.0 Hz	Setting range **Factory setting**: 40.0 Hz

[Booster Stg Delay] BSD

Setting	Description
0.0...999.9 s	Setting range **Factory setting**: 10.0 s

[Booster Dstg Delay] BDD

Setting	Description
0.0...999.9 s	Setting range **Factory setting**: 10.0 s

[Boost Override range] BCOA

Booster Control Override Area.

Setting	Code / Value	Description
[No]	NO	Booster override range disabled **Factory setting**: 0.0%
0.0...100.0%		Setting range

[Stage/Destage Meth.] SDMM– Menu

Access

[Complete settings] ➞ [Pump functions] ➞ [Booster Control] ➞ [Booster Control] ➞ [Stage/Destage Meth.]

About This Menu

The stage/de-stage method is set by **[Booster S/D Control]** BSDM parameter:

- **[Feedback]** BFBK: outlet pressure remains regulated by the PID controller during stage/de-stage.

  NOTE: When **[Pump System Archi]** MPSA is not set to **[Single Drive]** VNDOL, only **[Feedback]** BFBK method is available.

[Booster S/D Control] BSDM

Booster stage/de-stage control.

Setting	Code / Value	Description
[Feedback]	BFBK	Basic feedback **Factory setting**

[Booster Control] BSC– Menu

Access

[Complete settings] ➞ **[Pump functions]** ➞ **[Booster Control]** ➞ **[Booster Control]**

[Booster S/D Interval] BSDT

This parameter can be accessed if:

- **[Booster Control]** BCM is set to **[Yes]** YES and

Setting	Description
0.0...999.9 s	Setting range **Factory setting**: 15.0 s

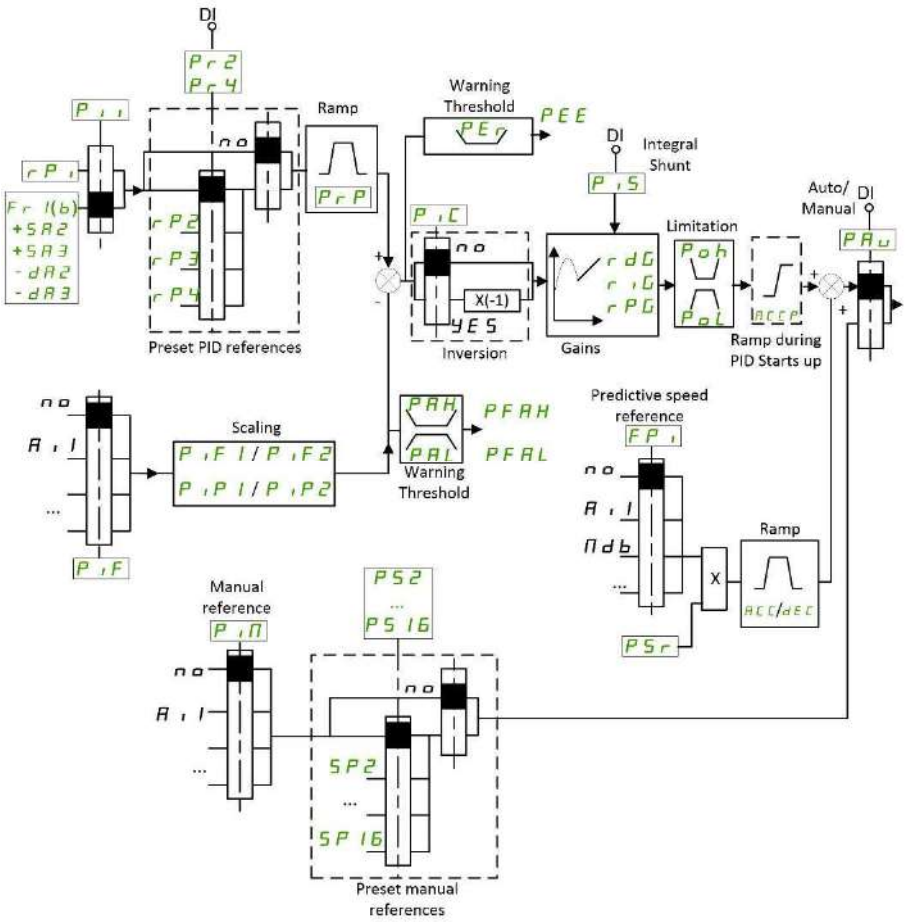
[Pump functions] – [PID controller]

[PID controller] PID– Overview

About This Menu

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

Block Diagram



The PID feedback needs to be assigned to one of the analog inputs AI1 to AI5 or a pulse input, according to whether any I/O extension module has been inserted.

The PID reference needs to be assigned to the following parameters:

- Preset references via digital inputs (**[Ref PID Preset 2]** RP2, **[Ref PID Preset 3]** RP3, **[Ref PID Preset 4]** RP4).
- In accordance with the configuration of **[Intern PID Ref]** PII:
  - **[Internal PID ref]** RPI, or
  - Reference A **[Ref Freq 1 Config]** FR1 or **[Ref.1B channel]** FR1B.

Combination Table for Preset PID References:

DI (Pr 4)	DI (Pr 2)	Pr 2 = nO	Reference
			RPI or FR1 (b)
0	0		RPI or FR1 (b)
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:

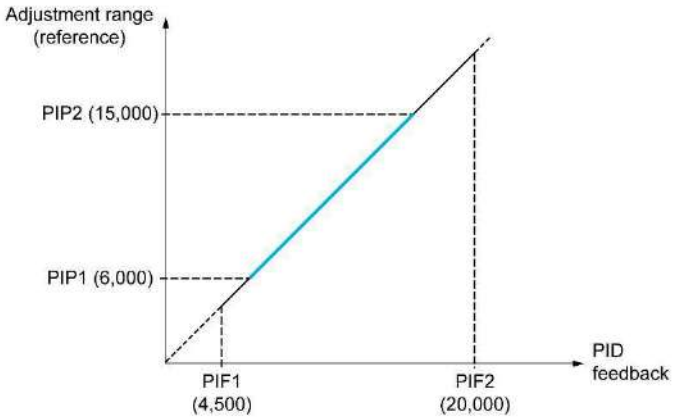
- **[Min PID feedback]** PIF1, **[Max PID feedback]** PIF2 parameters can be used to scale the PID feedback (sensor range). This scale must be maintained for all other parameters.
- **[Min PID Process]** PIP1, **[Max PID Process]** PIP2 parameters can be used to scale the adjustment range, for example the reference. **Check that the adjustment range remains within the sensor range.**

The maximum value of the scaling parameters is 32,767. To facilitate the installation, it is recommended to use values as close as possible to this maximum level, while retaining powers of 10 in relation to the actual values. The scaling is without unit if **[Type of control]** TOCT is set to **[Not Available]** NA, in % if set to **[OTHER]** OTHER, in process unit if set to **[PRESSURE]** PRESS or **[FLOW]** FLOW.

Example

Adjustment of the volume in a tank, 6...15 m^3.

- Probe used 4-20 mA, 4.5 m^3 for 4 mA and 20 m^3 for 20 mA, with the result that PIF1 = 4,500 and PIF2 = 20,000.
- Adjustment range 6 to 15 m^3, with the result that PIP1 = 6,000 (min. reference) and PIP2 = 15,000 (max. reference).
- Example references:
  - **[Internal PID ref]** RPI (internal reference) = 9,500
  - RP2 (preset reference) = 6,500
  - RP3 (preset reference) = 8,000
  - RP4 (preset reference) = 11,200



Other parameters:

- Reversal of the direction of correction **[PID Inversion]** PIC. If **[PID Inversion]** PIC is set to **[No]** NO, the speed of the motor increases when the detected error is positive (for example pressure control with a compressor). If **[PID Inversion]** PIC is set to **[Yes]** YES, the speed of the motor decreases when the detected error is positive (for example temperature control using a cooling fan).
- The integral gain may be short-circuited by a digital input.
- A warning on the **[PID feedback Assign]** PIF may be configured.
- A warning on the **[PID Error]** RPE may be configured.

"Manual - Automatic" Operation with PID

This function combines the PID controller, the preset speeds, and a manual reference. Depending on the state of the digital input, the speed reference is given by the preset speeds or by a manual reference input via the PID function.

Manual PID reference **[Manual PID reference]** PIM:

- Analog inputs AI1 to AI5
- Pulse inputs

Predictive speed reference **[Predictive Speed Ref]** FPI:

- **[AI1]** AI1: analog input
- **[AI2]** AI2: analog input
- **[AI3]** AI3: analog input
- **[AI4]** AI4: analog input if VW3A3203 I/O extension module has been inserted
- **[AI5]** AI5: analog input if VW3A3203 I/O extension module has been inserted
- **[HMI]** LCC: Graphic Display Terminal
- **[Ref. Freq-Modbus]** MDB: integrated Modbus
- **[MS/TP Ref Freq]** EBM: Integrated BACnet
- **[Ref. Freq-Com. Module]** NET: fieldbus option module (if inserted)

Setting Up the PID Controller

1. Configuration in PID mode.

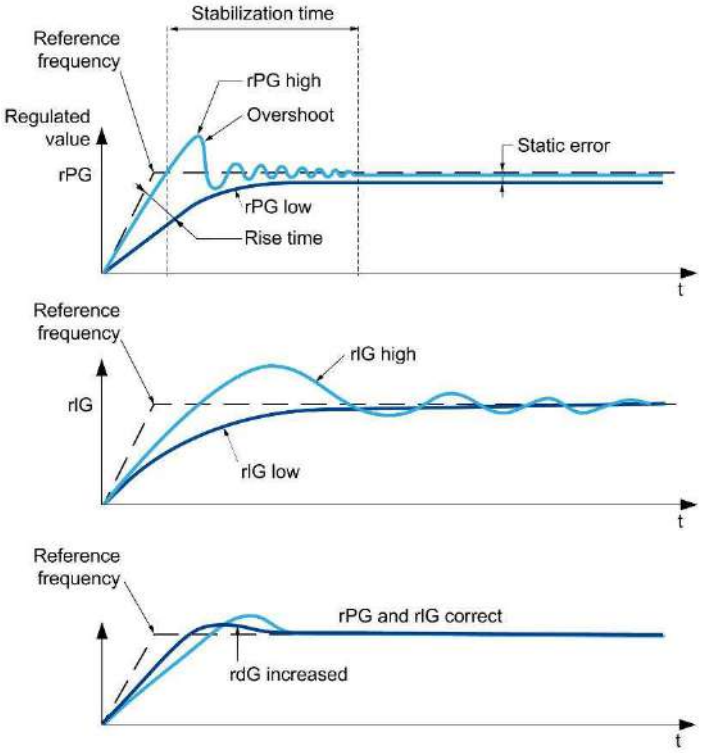
Refer to the Block Diagram, page 242.

2. Perform a test in factory settings mode.

To optimize the drive, adjust **[PID Prop.Gain]** RPG or **[PID Intgl.Gain]** RIG gradually and 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.

Step	Action
1	Perform a test with a speed reference in Manual mode (without PID controller) and with the drive on load for the speed range of the system: • In steady state, the speed must be stable and comply with the reference, and the PID feedback signal must be stable. • In transient state, the speed must follow the ramp and stabilize quickly, and the PID feedback must follow the speed. If not, see the settings for the drive and/or sensor signal and wiring.
2	Switch to PID mode.
3	Set **[PID ramp]** PRP to the minimum permitted by the mechanism without triggering an **[DC Bus OverV]** OBF.
4	Set the integral gain **[PID Intgl.Gain]** RIG to minimum.
5	Leave the derivative gain **[PID derivative gain]** RDG at 0.
6	Observe the PID feedback and the reference.
7	Switch the drive ON/OFF a number of times or vary the load or reference rapidly a number of times.
8	Set the proportional gain **[PID Prop.Gain]** RPG in order to ascertain the compromise between response time and stability in transient phases (slight overshoot and 1 to 2 oscillations before stabilizing).
9	If the reference varies from the preset value in steady state, gradually increase the integral gain **[PID Intgl.Gain]** RIG, reduce the proportional gain **[PID Prop.Gain]** RPG in the event of instability (pump applications), find a compromise between response time and static precision (see diagram).
10	Lastly, the derivative gain may permit the overshoot to be reduced and the response time to be improved, although this is more difficult to obtain a compromise in terms of stability, as it depends on 3 gains.
11	Perform in-production tests over the whole reference range.



The oscillation frequency depends on the system kinematics:

Parameter	Rise time	Overshoot	Stabilization time	Static error
rPG +	- -	+	=	-
rIG +	-	+ +	+	- -
rdG +	=	-	-	=

[PID Feedback] FDB– Menu

Access

[Complete settings] ➞ **[Pump functions]** ➞ **[PID controller]** ➞ **[PID Feedback]**

About This Menu

NOTE: This function cannot be used with some other functions.

[Type of control] TOCT

Type of control for the PID = unit choice.

Setting	Code / Value	Description
[Not Available]	NA	(without unit) **Factory setting**
[PRESSURE]	PRESS	Pressure control and unit
[FLOW]	FLOW	Flow control and unit
[OTHER]	OTHER	Other control and unit (%)

[PID feedback Assign] PIF

PID controller feedback.

Setting	Code / Value	Description
[Not Configured]	NO	Not assigned **Factory setting**
[AI1]...**[AI3]**	AI1...AI3	Analog input AI1...AI3
[AI4]...**[AI5]**	AI4...AI5	Analog input AI4...AI5 if VW3A3203 I/O extension module has been inserted
[AI Virtual 1]... **[AI Virtual 3]**	AIV1...AIV3	Virtual analogic input 1...3

[AI1 Type] AI1T ★

This parameter can be accessed if **[PID feedback Assign]** PIF is set to **[AI1]** AI1.

Setting	Code / Value	Description
[Voltage]	10U	0-10 Vdc **Factory setting**
[Current]	0A	0-20 mA

[AI1 Min. Value] UIL1 ★

AI1 voltage scaling parameter of **0%**.

This parameter can be accessed if:

- **[PID feedback Assign]** PIF is set to **[AI1]** AI1, and
- **[AI1 Type]** AI1T is set to **[Voltage]** 10U.

Setting	Description
0.0...10.0 Vdc	Setting range **Factory setting**: 0.0 Vdc

[AI1 Max Value] UIH1 ★

***AI1 voltage scaling parameter of* 100%.**

This parameter can be accessed if:

- **[PID feedback Assign]** PIF is set to **[AI1]** AI1, and
- **[AI1 Type]** AI1T is set to **[Voltage]** 10U.

Setting	Description
0.0...10.0 Vdc	Setting range **Factory setting**: 10.0 Vdc

[AI1 Min. Value] CRL1 ★

***AI1 current scaling parameter of* 0%.**

This parameter can be accessed if:

- **[PID feedback Assign]** PIF is set to **[AI1]** AI1, and
- **[AI1 Type]** AI1T is set to **[Current]** 0A.

Setting	Description
0.0...20.0 mA	Setting range **Factory setting**: 0.0 mA

[AI1 Max Value] CRH1 ★

***AI1 current scaling parameter of* 100%.**

This parameter can be accessed if:

- **[PID feedback Assign]** PIF is set to **[AI1]** AI1, and
- **[AI1 Type]** AI1T is set to **[Current]** 0A.

Setting	Description
0.0...20.0 mA	Setting range **Factory setting**: 20.0 mA

[AI1 range] AI1L ★

This parameter can be accessed if:

- **[PID feedback Assign]** PIF is set to **[AI1]** AI1, and
- **[AI1 Type]** AI1T is set to **[Current]** 0A.

This parameter is forced to **[0 - 100%]** POS if:

- **[AI1 Type]** AI1T is not set to **[Current]** 0A, or
- **[AI1 Min. Value]** CRL1 is lower than 3.0 mA.

Setting	Code / Value	Description
[0 - 100%]	POS	Unidirectional: AI1 current scaling is 0% up to 100%. **Factory setting**
[+/- 100%]	POSNEG	Bidirectional: AI1 current scaling is -100% up to 100%. **[AI1 Min. Value]** CRL1 corresponds to -100%. **[AI1 Max Value]** CRH1 corresponds to 100%.

[AI2 Type] AI2T ★

This parameter can be accessed if **[PID feedback Assign]** PIF is set to **[AI2]** AI2.

Setting	Code / Value	Description
[Voltage]	10U	0-10 Vdc **Factory setting**
[Current]	0A	0-20 mA
[PTC]	PTC	1 to 6 PTC (in serial)
[KTY]	KTY	1 KTY84
[PT1000]	1PT3	1 PT1000 connected with 2 wires
[PT100]	1PT2	1 PT100 connected with 2 wires
[Water Prob]	LEVEL	Water level

[AI2 Min. Value] UIL2 ★

AI2 voltage scaling parameter of **0%**.

This parameter can be accessed if:

- **[PID feedback Assign]** PIF is set to **[AI2]** AI2, and
- **[AI2 Type]** AI2T is set to **[Voltage]** 10U.

Identical to **[AI1 Min. Value]** UIL1 , page 246.

[AI2 Max value] UIH2 ★

AI2 voltage scaling parameter of **100%**.

This parameter can be accessed if:

- **[PID feedback Assign]** PIF is set to **[AI2]** AI2, and
- **[AI2 Type]** AI2T is set to **[Voltage]** 10U.

Identical to **[AI1 Max Value]** UIH1 , page 247.

[AI2 Min. Value] CRL2 ★

AI2 current scaling parameter of **0%**.

This parameter can be accessed if:

- **[PID feedback Assign]** PIF is set to **[AI2]** AI2, and
- **[AI2 Type]** AI2T is not set to **[Current]** 0A.

Identical to **[AI1 Min. Value]** CRL1 , page 247.

[AI2 Max Value] CRH2 ★

AI2 current scaling parameter of **100%**.

This parameter can be accessed if:

- **[PID feedback Assign]** PIF is set to **[AI2]** AI2, and
- **[AI2 Type]** AI2T is not set to **[Current]** 0A.

Identical to **[AI1 Max Value]** CRH1 , page 247.

[AI2 range] AI2L

This parameter can be accessed if :

- **[PID feedback Assign]** PIF is set to **[AI2]** AI2, and
- **[AI2 Type]** AI2T is set to **[Current]** 0A.

Identical to **[AI1 range]** AI1L , page 199.

[AI3 Type] AI3T ★

This parameter can be accessed if **[PID feedback Assign]** PIF is set to **[AI3]** AI3.

Identical to **[AI2 Type]** AI2T with factory setting: **[Current]** 0A , page 248.

[AI3 Min. Value] UIL3 ★

AI3 voltage scaling parameter of **0%**.

This parameter can be accessed if:

- **[PID feedback Assign]** PIF is set to **[AI3]** AI3, and
- **[AI3 Type]** AI3T is set to **[Voltage]** 10U.

Identical to **[AI1 Min. Value]** UIL1 , page 246.

[AI3 Max Value] UIH3 ★

AI3 voltage scaling parameter of **100%**.

This parameter can be accessed if:

- **[PID feedback Assign]** PIF is set to **[AI3]** AI3, and
- **[AI3 Type]** AI3T is set to **[Voltage]** 10U.

Identical to **[AI1 Max Value]** UIH1 , page 247.

[AI3 Min. Value] CRL3 ★

AI3 current scaling parameter of **0%**.

This parameter can be accessed if:

- **[PID feedback Assign]** PIF is set to **[AI3]** AI3, and
- **[AI3 Type]** AI3T is set to **[Current]** 0A.

Identical to **[AI1 Min. Value]** CRL1 , page 247.

[AI3 Max Value] CRH3 ★

AI3 current scaling parameter of **100%**.

This parameter can be accessed if:

- **[PID feedback Assign]** PIF is set to **[AI3]** AI3, and
- **[AI3 Type]** AI3T is set to **[Current]** 0A.

Identical to **[AI1 Max Value]** CRH1 , page 247.

[AI3 range] AI3L

This parameter can be accessed if :

- **[PID feedback Assign]** PIF is set to **[AI3]** AI3, and
- **[AI3 Type]** AI3T is set to **[Current]** 0A.

Identical to **[AI1 range]** AI1L , page 199.

[AI4 Type] AI4T ★

This parameter can be accessed if:

- VW3A3203 I/O extension module has been inserted, and
- **[PID feedback Assign]** PIF is set to **[AI4]** AI4.

A very low level of voltage on bipolar analog input can create a wrong sign on the reference frequency if **[Low Speed]** LSP is different from 0.

⚠WARNING

UNANTICIPATED EQUIPMENT OPERATION DUE TO WRONG DIRECTION

If the analog input type is set to **[Voltage +/-]** N10U and **[Low Speed]** LSP is not set to zero, then **[Ref Freq template]** BSP must be set to **[Deadband at 0%]** BNS0.

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

Setting	Code / Value	Description
[Voltage]	10U	0-10 Vdc
[Current]	0A	0-20 mA **Factory setting**
[Voltage +/-]	N10U	-10/+10 Vdc
[PTC]	PTC	1 to 6 PTC (in serial)
[KTY]	KTY	1 KTY84
[PT1000]	1PT3	1 PT1000 connected with 2 wires
[PT100]	1PT2	1 PT100 connected with 2 wires

[AI4 Min. Value] UIL4 ★

***AI4 voltage scaling parameter of* 0%.**

This parameter can be accessed if:

- **[PID feedback Assign]** PIF is set to **[AI4]** AI4, and
- **[AI4 Type]** AI4T is set to **[Voltage]** 10U.

Identical to **[AI1 Min. Value]** UIL1 , page 246.

[AI4 Max Value] UIH4 ★

***AI4 voltage scaling parameter of* 100%.**

This parameter can be accessed if:

- **[PID feedback Assign]** PIF is set to **[AI4]** AI4, and
- **[AI4 Type]** AI4T is set to **[Voltage]** 10U.

Identical to **[AI1 Max Value]** UIH1 , page 247.

[AI4 Min. Value] CRL4 ★

AI4 current scaling parameter of **0%**.

This parameter can be accessed if:

- **[PID feedback Assign]** PIF is set to **[AI4]** AI4, and
- **[AI4 Type]** AI4T is set to **[Current]** 0A.

Identical to **[AI1 Min. Value]** CRL1 , page 247.

[AI4 Max Value] CRH4 ★

AI4 current scaling parameter of **100%**.

This parameter can be accessed if:

- **[PID feedback Assign]** PIF is set to **[AI4]** AI4, and
- **[AI4 Type]** AI4T is not set to **[Current]** 0A.

Identical to **[AI1 Max Value]** CRH1 , page 247.

[AI4 range] AI4L

This parameter can be accessed if :

- **[PID feedback Assign]** PIF is set to **[AI4]** AI4, and
- **[AI4 Type]** AI4T is set to **[Current]** 0A.

Identical to **[AI1 range]** AI1L , page 199.

[AI5 Type] AI5T ★

This parameter can be accessed if:

- VW3A3203 I/O extension module has been inserted, and
- **[PID feedback Assign]** PIF is set to **[AI5]** AI5.

Identical to **[AI4 Type]** AI4T , page 250.

A very low level of voltage on bipolar analog input can create a wrong sign on the reference frequency if **[Low Speed]** LSP is different from 0.

⚠WARNING

UNANTICIPATED EQUIPMENT OPERATION DUE TO WRONG DIRECTION

If the analog input type is set to **[Voltage +/-]** N10U and **[Low Speed]** LSP is not set to zero, then **[Ref Freq template]** BSP must be set to **[Deadband at 0%]** BNS0.

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

[AI5 Min. Value] UIL5 ★

AI5 voltage scaling parameter of **0%**.

This parameter can be accessed if:

- **[PID feedback Assign]** PIF is set to **[AI5]** AI5, and
- **[AI5 Type]** AI5T is set to **[Voltage]** 10U.

Identical to **[AI1 Min. Value]** UIL1 , page 246.

[AI5 Max Value] UIH5 ★

AI5 voltage scaling parameter of **100%**.

This parameter can be accessed if:

- **[PID feedback Assign]** PIF is set to **[AI5]** AI5, and
- **[AI5 Type]** AI5T is set to **[Voltage]** 10U.

Identical to **[AI1 Max Value]** UIH1 , page 247.

[AI5 Min. Value] CRL5 ★

AI5 current scaling parameter of **0%**.

This parameter can be accessed if:

- **[PID feedback Assign]** PIF is set to **[AI5]** AI5, and
- **[AI5 Type]** AI5T is set to **[Current]** 0A.

Identical to **[AI1 Min. Value]** CRL1 , page 247.

[AI5 Max Value] CRH5 ★

AI5 current scaling parameter of **100%**.

This parameter can be accessed if:

- **[PID feedback Assign]** PIF is set to **[AI5]** AI5, and
- **[AI5 Type]** AI5T is set to **[Current]** 0A.

Identical to **[AI1 Max Value]** CRH1 , page 247.

[AI5 range] AI5L

This parameter can be accessed if :

- **[PID feedback Assign]** PIF is set to **[AI5]** AI5, and
- **[AI5 Type]** AI5T is set to **[Current]** 0A.

Identical to **[AI1 range]** AI1L , page 199.

[Min PID feedback] PIF1 ★

This parameter can be accessed if **[PID feedback Assign]** PIF is not set to **[Not Configured]** NO.

Setting	Description
0...**[Max PID feedback]** PIF2	Setting range **Factory setting**: 100

[Max PID feedback] PIF2 ★

This parameter can be accessed if **[PID feedback Assign]** PIF is not set to **[Not Configured]** NO.

Setting	Description
[Min PID feedback] PIF1...32,767	Setting range **Factory setting**: 1,000

[PID feedback] RPF ★

Value for PID feedback, display only.

This parameter can be accessed if **[PID feedback Assign]** PIF is not set to **[Not Configured]** NO.

Setting	Description
0...65,535	Setting range **Factory setting**: _

[Min fbk Warning] PAL ★

Minimum feedback level warning.

This parameter can be accessed if **[PID feedback Assign]** PIF is not set to **[Not Configured]** NO. **[PID Low Fdbck Warn]** PFAL warning is active if the value of the PID feedback is lower than the value configured in **[Min fbk Warning]** PAL.

Setting	Description
0...65,535	Setting range **Factory setting**: 100

[Max fbk Warning] PAH ★

Maximum feedback level warning.

This parameter can be accessed if **[PID feedback Assign]** PIF is not set to **[Not Configured]** NO. **[PID High Fdbck Warn]** PFAH warning is active if the value of the PID feedback is greater than the value configured in **[Max fbk Warning]** PAH.

Setting	Description
0...65,535	Setting range **Factory setting**: 1,000

[PID Reference] RF – Menu

Access

[Complete settings] ➞ **[Pump functions]** ➞ **[PID controller]** ➞ **[PID Reference]**

About This Menu

NOTE: This function cannot be used with some other functions.

[Intern PID Ref] PII ★

This parameter can be accessed if **[PID feedback Assign]** PIF is not set to **[Not Configured]** NO.

Setting	Code / Value	Description
[No]	NO	The PID controller reference is given by **[Ref Freq 1 Config]** FR1 or **[Ref.1B channel]** FR1B with summing/subtraction/ multiplication functions. Refer to the block diagram, page 242. **Factory setting**
[Yes]	YES	The PID controller reference is internal via **[Internal PID ref]** RPI.

[Ref Freq 1 Config] FR1 ★

This parameter can be accessed if:

- **[PID feedback Assign]** PIF is not set to **[Not Configured]** NO, and
- **[Intern PID Ref]** PII is set to **[No]** NO.

Setting	Code / Value	Description
[Not Configured]	NO	Not assigned
[AI1]	AI1	Analog input AI1 **Factory Setting**
[AI2]...**[AI3]**	AI2...AI3	Analog input AI2...AI3
[AI Virtual 1]...**[AI Virtual 3]**	AIV1...AIV3	Virtual analogic input 1...3
[AI4]...**[AI5]**	AI4...AI5	Analog input AI4...AI5 if VW3A3203 I/O extension module has been inserted
[HMI]	LCC	Reference Frequency via remote terminal
[Ref. Freq-Modbus]	MDB	Reference frequency via Modbus
[MS/TP Ref Freq]	EBM	Reference frequency via BACnet
[Ref. Freq-Com. Module]	NET	Reference frequency via fieldbus module if a fieldbus module has been inserted

[Min PID Process] PIP1 ★

This parameter can be accessed if **[PID feedback Assign]** PIF is not set to **[Not Configured]** NO.

Setting	Description
[Min PID feedback] PIF1...**[Max PID Process]** PIP2	Setting range **Factory setting**: 150

[Max PID Process] PIP2 ★

This parameter can be accessed if **[PID feedback Assign]** PIF is not set to **[Not Configured]** NO.

Setting	Description
[Min PID Process] PIP1...**[Max PID feedback]** PIF2	Setting range **Factory setting**: 900

[Internal PID ref] RPI ★

This parameter can be accessed if:

- **[PID feedback Assign]** PIF is not set to **[Not Configured]** NO, and
- **[Intern PID Ref]** PII is set to **[Yes]** YES.

Setting	Description
[Min PID Process] PIP1...**[Max PID Process]** PIP2	Setting range **Factory setting**: 150

[Auto/Manual assign.] PAU ★

This parameter can be accessed if **[PID feedback Assign]** PIF is not set to **[Not Configured]** NO.

Value range	Code / Value	Description
[Not Assigned]	NO	Not assigned **Factory setting**
[DI1]...**[DI6]**	LI1...LI6	Digital input DI1...DI6
[DI11]...**[DI16]**	LI11...LI16	Digital input DI11...DI16 if VW3A3203 I/O extension module has been inserted
[CD00]... **[CD10]**	CD00...CD10	Virtual digital input CMD.0...CMD.10 in **[I/O profile]** IO configuration
[CD11]... **[CD15]**	CD11...CD15	Virtual digital input CMD.11...CMD.15 regardless of configuration

[Manual PID reference] PIM ★

Reference input in manual mode.

This parameter can be accessed if:

- **[PID feedback Assign]** PIF is not set to **[Not Configured]** NO, and
- **[Auto/Manual assign.]** PAU is not set to **[Not Assigned]** NO.

The preset speeds are active on the manual reference if they have been configured.

Setting	Code / Value	Description
[Not Configured]	NO	Not assigned **Factory setting**
[AI1]...**[AI3]**	AI1...AI3	Analog input AI1...AI3
[AI4]...**[AI5]**	AI4...AI5	Analog input AI4...AI5 if VW3A3203 I/O extension module has been inserted

[PID preset references] PRI– Menu

Access

[Complete settings] ➞ [Pump functions] ➞ [PID controller] ➞ [PID Reference] ➞ [PID preset references]

About This Menu

The function can be accessed if **[PID feedback Assign]** PIF is assigned.

[2 PID Preset Assign] PR2

If the assigned input or bit is at 0, the function is inactive.

If the assigned input or bit is at 1, the function is active.

Value range	Code / Value	Description
[Not Assigned]	NO	Not assigned **Factory setting**
[DI1]...**[DI6]**	LI1...LI6	Digital input DI1...DI6
[DI11]...**[DI16]**	LI11...LI16	Digital input DI11...DI16 if VW3A3203 I/O extension module has been inserted
[CD00]... **[CD10]**	CD00...CD10	Virtual digital input CMD.0...CMD.10 in **[I/O profile]** IO configuration
[CD11]... **[CD15]**	CD11...CD15	Virtual digital input CMD.11...CMD.15 regardless of configuration

[4 PID Preset Assign] PR4

Identical to **[2 PID Preset Assign]** PR2 , page 257.

Verify that **[2 PID Preset Assign]** PR2 has been assigned before assigning this function.

[Ref PID Preset 2] RP2 ★

Second PID preset reference.

This parameter can be accessed only if **[2 PID Preset Assign]** PR2 is assigned.

Setting	Description
[Min PID Process] PIP1...**[Max PID Process]** PIP2	Setting range **Factory setting**: 300

[Ref PID Preset 3] RP3 ★

Third PID preset reference.

This parameter can be accessed only if **[4 PID Preset Assign]** PR4 is assigned.

Setting	Description
[Min PID Process] PIP1...**[Max PID Process]** PIP2	Setting range **Factory setting**: 600

[Ref PID Preset 4] RP4 ★

Fourth PID preset reference.

This parameter can be accessed only if **[2 PID Preset Assign]** PR2 and **[4 PID Preset Assign]** PR4 are assigned.

Setting	Description
[Min PID Process] PIP1...**[Max PID Process]** PIP2	Setting range **Factory setting**: 900

[PID Reference] RF – Menu

Access

[Complete settings] ➞ [Pump functions] ➞ [PID controller] ➞ [PID Reference]

[Predictive Speed Ref] FPI ★

This parameter can be accessed if:

- **[Access Level]** LAC is set to **[Expert]** EPR.
- **[PID feedback Assign]** PIF is not set to **[Not Configured]** NO

Setting	Code / Value	Description
[Not Configured]	NO	Not assigned **Factory setting**
[AI1]...[AI3]	AI1...AI3	Analog input AI1...AI3
[AI4]...[AI5]	AI4...AI5	Analog input AI4...AI5 if VW3A3203 I/O extension module has been inserted
[HMI]	LCC	Reference frequency via remote terminal
[Ref. Freq-Modbus]	MDB	Reference frequency via Modbus
[MS/TP Ref Freq]	EBM	Reference frequency via the embedded BACnet MS/TP.
[Ref. Freq-Com. Module]	NET	Reference frequency via communication module

[Speed input %] PSR ★

PID speed input % reference.

- This parameter can be accessed if **[Access Level]** LAC is set to **[Expert]** EPR, and
- **[Predictive Speed Ref]** FPI is not set to **[Not Configured]** NO.

Setting	Description
1...100%	Setting range **Factory setting**: 100%

[Settings] ST – Menu

Access

[Complete settings] ➞ **[Pump functions]** ➞ **[PID controller]** ➞ **[Settings]**

About This Menu

Following parameters can be accessed if **[PID feedback Assign]** PIF is not set to **[Not Configured]** NO.

NOTE: This function cannot be used with some other functions.

[PID Prop.Gain] RPG ★

PID Proportional gain.

Setting	Description
0.01...100.00	Setting range **Factory setting**: 1.00

[PID Intgl.Gain] RIG ★

PID controller integral gain.

Setting	Description
0.01...100.00	Setting range **Factory setting**: 1.00

[PID derivative gain] RDG ★

PID derivative gain.

Setting	Description
0.00...100.00	Setting range **Factory setting**: 0.00

[PID ramp] PRP ★

PID acceleration/deceleration ramp, defined to go from **[Min PID Process]** PIP1 to **[Max PID Process]** PIP2 and conversely.

Setting	Description
0.0...99.9 s	Setting range **Factory setting**: 0.0 s

[PID Inversion] PIC ★

PID inversion.

Setting	Code / Value	Description
[No]	NO	No **Factory setting**
[Yes]	YES	Yes

[PID Min Output] POL ★

PID controller min. output in Hz.

Setting	Description
-500.0...500.0 Hz	Setting range **Factory setting**: 0.0 Hz

[PID Max Output] POH ★

PID controller max. output in Hz.

Setting	Description
0.0...500.0 Hz	Setting range **Factory setting**: 60.0 Hz

[PID error Warning] PER ★

PID error warning. **[PID error Warn]** PEE is active if the value of PID error is greater than the value configured in **[PID error Warning]** PER.

Setting	Description
0...65,535	Setting range **Factory setting**: 100

[PID Integral OFF] PIS ★

If the assigned input or bit is at 0, the function is inactive (the PID integral is enabled).

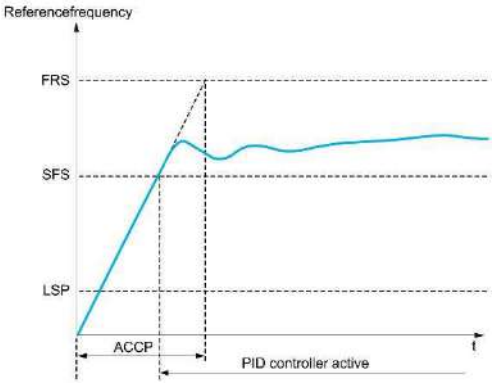
If the assigned input or bit is at 1, the function is active (the PID integral is disabled).

Value range	Code / Value	Description
[Not Assigned]	NO	Not assigned **Factory setting**
[DI1]...**[DI6]**	LI1...LI6	Digital input DI1...DI6
[DI11]...**[DI16]**	LI11...LI16	Digital input DI11...DI16 if VW3A3203 I/O extension module has been inserted
[CD00]... **[CD10]**	CD00...CD10	Virtual digital input CMD.0...CMD.10 in **[I/O profile]** IO configuration
[CD11]... **[CD15]**	CD11...CD15	Virtual digital input CMD.11...CMD.15 regardless of configuration

[PID acceleration time] ACCP ★

PID: acceleration during start-up.

PID start ramp can be applied before starting the PID controller to allow reaching quickly the PID reference without increasing PID gains. If configured, the **[Start Accel Ramp]** ACCS is applied up to **[Low Speed]** LSP instead of **[PID acceleration time]** ACCP.



Setting	Description
0.01...99,99 s (1)	Setting range **Factory setting**: 5.00 s
1 Range 0.01 to 99.99 s or 0.1 to 999.9 s or 1...6,000 s according to **[Ramp Increment]** INR.	

[PID Start Ref Freq] SFS ★

PID: speed reference for start-up.

Setting	Description
0.0...500.0 Hz	Setting range If **[PID Start Ref Freq]** SFS is lower than **[Low Speed]** LSP, this function has no effect. **Factory setting**: 0.0 Hz

[Pump functions] - [Sleep/wakeup]

[Sleep/wakeup] SPW– Overview

About This Menu

Following parameters can be accessed if **[PID feedback Assign]** PIF is not set to **[Not Configured]** NO.

⚠WARNING

UNANTICIPATED EQUIPMENT OPERATION

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.

The purpose of the "Sleep / Wake-Up" function is to stop the motor in process standstill situations.

It allows you to save energy and helps to prevent premature aging of some equipment that cannot run for a long time at low speed because the greasing or cooling depends on the machine speed.

In a pressure-controlled pumping application:

- The purpose of the Sleep / Wake-Up function is to manage periods of the application where the water demand is low and where it is not needed to keep the main pumps running.
- It allows you to save energy in low demand periods. Then, when the demand is increasing, the application needs to wake up in order to meet the demand.

Depending on user-defined wakeup conditions, the motor is restarted automatically.

Sleep/Wake-Up in PID Control Mode

When the drive is used in PID control, one of the following conditions is used to switch the application to the sleep state:

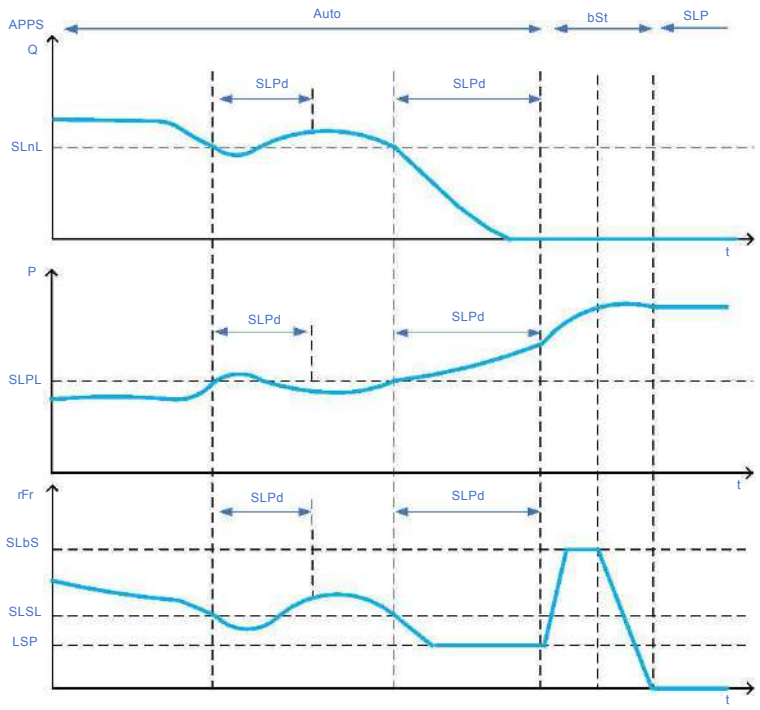
- Sleep on low speed (when all fixed pumps are Off in case of a multi-pump application).
- Sleep on low sleep sensor value (using flow and pressure sensor for monitoring).
- Sleep on low motor power (when all fixed pumps are Off in case of a multi-pump application).
- Sleep on external condition (using drive input).

The drive is in "PID control mode" when PID is active. Typically when:

- PID is configured, and
- Channel 1 is selected, and
- PID is in automatic mode.

When the drive is in a sleep state, a wake-up condition is used to restart the application:

- Wake-up on PID Feedback level
- Wake-up on PID Error level
- Wake-up on low-pressure condition



NOTE: If there is no request, the pressure will stay in the same level after **[Sleep Boost Time]** SLBT time.

Sleep Conditions in PID Control Mode

If there is no valid wake-up condition, then the system switches to the sleep mode after one of the configured sleep conditions remains longer than **[Sleep Delay]** SLPD.

Additionally, in case of multi pump system, if the **[Type of control]** TOCT is different from **[FLOW]** FLOW , the system requires all auxiliary pumps to be stopped to switch to the sleep mode.

The sleep detection mode is selected by configuring **[Sleep Detect Mode]** SLPM. Then the system switches to sleep mode if the selected condition is met:

Configuration	Condition
LF sleep on flow sensor value	Sensor value is below the sleep level
SW sleep on switch or external condition	The switch input becomes active
SPD sleep on speed	The output frequency is below the sleep speed
PWR sleep on power level	The output power is below the sleep power
HP sleep on pressure sensor value	Sensor value is higher than the sleep level
OR multiple conditions	At least 1 of the configured condition to enter in sleep mode is met

Wake-Up Conditions in PID Control Mode

The system wakes up according to **[Wake Up Mode]** WUPM configuration:

- On PID Feedback level
- On PID Error level.
- On low-pressure condition.

The system wakes up if the wake up conditions are valid for a time longer than the **[Wake Up Delay]** WUPD.

If **[Feedback]** FBK is selected, then the system wakes up and goes back in PID control mode:

- When PID feedback drops below configured **[Wake Up Proc level]** WUPF if PID is configured in Direct mode, (**[PID Inversion]** PIC is set to **[No]** NO).
- When PID feedback raises above configured **[Wake Up Proc level]** WUPF, if PID is configured in Reverse mode (**[PID Inversion]** PIC is set to **[Yes]** YES).

If **[Error]** ERR is selected, then the system wakes up and goes back in PID control mode:

- When PID feedback drops below (**[PID reference]** RPC - **[Wake Up Proc Error]** WUPE), if PID is configured in Direct mode (**[PID Inversion]** PIC is set to **[No]** NO).
- When PID feedback raises above (**[PID reference]** RPC + **[Wake Up Proc Error]** WUPE), if PID is configured in Reverse mode (**[PID Inversion]** PIC is set to **[Yes]** YES).

If **[Pressure]** LP is selected, then the system wakes up and goes back in PID control mode when the pressure feedback drops below **[Wake Up Proc level]** WUPF.

Boosting Phase in PID Control Mode

When entering the sleep mode, the motor accelerates to **[Sleep Boost Speed]** SLBS during **[Sleep Boost Time]** SLBT and then stops.

If **[Sleep Boost Time]** SLBT is set to 0, then the boost phase is ignored.

Initial State in PID Control Mode

Just after the system starts in automatic mode (a run order appears while in automatic mode - channel 1 already selected and PID auto):

- If a wake-up condition is met, the drive goes in PID control mode (PID started).
- If a wake-up condition is not met, the drive goes in sleep mode (PID stays stopped and motor is kept halted), and Boosting phase is ignored.

When the control is switched to automatic mode while the motor is running (switch to channel 1 or switch to PID auto mode for example), the drive stays in running state and switches to PID automatic mode.

Configuration of Sleep External Condition (Usage of a No Flow Switch for Example)

Sleep switch allows you to select the source of sleep external condition:

- NO: no input selected for the sleep external condition.
- LIx: the sleep external condition (switch for example) is connected to DIx (the assignment is also possible on a control bit in I/O profile).

Configuration of Sleep Sensor (Flow or Pressure Sensor)

The assignment of a sleep sensor, the configuration of the selected physical input and the configuration of scaling to process value are performed.

A sleep sensor source is selected by **[OutletPres Assign]** PS2A which allows to select the analog or pulse input on which the sensor is connected:

- NO: no input selected for sleep sensor value.
- AIx: sleep sensor is connected to AIx.
- AIVx: sleep sensor is connected to virtual AIUx.
- PIx: sleep sensor is connected to pulse input PIx.

The configuration of an analog input is performed.

The configuration of a pulse input is performed.

Depending on the selected source, the process range of the sensor is configured by:

- **[AIx Lowest Process]** AIxJ, **[AIx Highest Process]** (without unit), when connected on an analog input.
- **[AIV1 Lowest Process]** AV1J, **[AIV1 Highest Process]** AV1K (without unit), when using the virtual analog input.
- **[DIx PulseInput Low Freq] [DIx PulseInput High Freq]** PIHx (without unit), when connected on a pulse input configured in frequency.

[Sleep menu] SLP– Menu

Access

[Complete settings] ➜ [Pump functions] ➜ [Sleep/wakeup] ➜ [Sleep menu]

About This Menu

[Sleep Detect Mode] SLPM

Sleep Detection mode.

⚠WARNING

UNANTICIPATED EQUIPMENT OPERATION

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.

Setting	Code / Value	Description
[No]	NO	Not configured **Factory setting**
[Switch]	SW	System enters in sleep mode on switch condition
[Speed]	SPD	System enters in sleep mode on speed condition
[Power]	PWR	System enters in sleep mode on power condition
[Pressure]	HP	System enters in sleep mode on high-pressure condition
[Multiple]	OR	System enters in sleep mode on multiple-OR condition

[Sleep Switch Assign] SLPW

This parameter can be accessed if **[Sleep Detect Mode]** SLPM is set to **[Switch]** SW or **[Multiple]** OR.

Select an external condition to enter in sleep mode (for example, flow switch).

Setting	Code / Value	Description
[Not Assigned]	NO	Not assigned **Factory setting**
[DI1]...**[DI6]**	LI1...LI6	Digital input DI1...DI6
[DI11]...**[DI16]**	LI11...LI16	Digital input DI11...DI16 if VW3A3203 I/O extension module has been inserted
[CD00]... **[CD10]**	CD00...CD10	Virtual digital input CMD.0...CMD.10 in **[I/O profile]** IO configuration
[CD11]... **[CD15]**	CD11...CD15	Virtual digital input CMD.11...CMD.15 regardless of configuration
[DI1 (Low level)]...**[DI6 (Low level)]**	L1L...L6L	Digital input DI1...DI6 used at low level

[Sleep menu] SLP– Menu

Access

[Complete settings] ➞ **[Pump functions]** ➞ **[Sleep/wakeup]** ➞ **[Sleep menu]**

[OutletPres Assign] PS2A ★

Outlet pressure sensor assignment.

This parameter can be accessed if:

- **[Sleep Detect Mode]** SLPM is set to **[Pressure]** HP, or
- **[Sleep Detect Mode]** SLPM is set to **[Multiple]** OR.

Value range	Code / Value	Description
[Not Configured]	NO	Not assigned **Factory setting**
[AI1]...**[AI3]**	AI1...AI3	Analog input AI1...AI3
[AI4]...**[AI5]**	AI4...AI5	Analog input AI4...AI5 if VW3A3203 I/O extension module has been inserted
[AI Virtual 1]... **[AI Virtual 3]**	AIV1...AIV3	Virtual analogic input 1...3

NOTE: For sensor configuration, refer to section **[Sensors Assignment]** , page 197.

[Sleep menu] SLP– Menu

Access

[Complete settings] ➜ [Pump functions] ➜ [Sleep/wakeup] ➜ [Sleep menu]

[Sleep Pressure Level] SLPL

This parameter can be accessed if:

- **[OutletPres Assign]** PS2A is not set to **[Not Configured]** NO, and
- **[Sleep Detect Mode]** SLPM is set to
  - **[Pressure]** HP, or
  - **[Multiple]** OR.

Setting	Description
[No] NO to 32,767	Setting range Unit: **[Flow rate unit]** SUFR (for example, Pa, Bar, PSI, %) **Factory setting**: **[No]** NO

[Sleep Min Speed] SLSL ★

Sleep flow level.

Speed level under which the system should enter the sleep mode.

This parameter can be accessed if:

- **[Sleep Detect Mode]** SLPM is set to **[Speed]** SPD, or
- **[Sleep Detect Mode]** SLPM is set to **[Multiple]** OR.

NOTE: To set this parameter, each **[Low Speed]** LSP values of all drives of a multipump architecture needs to be taken into account.

Setting	Description
0...500.0 Hz	Setting range **Factory setting**: **[No]** NO

[Sleep Power Level] SLPR ★

Power level under which the system should enter the sleep mode.

This parameter can be accessed if:

- **[Sleep Detect Mode]** SLPM is set to **[Power]** PWR, or
- **[Sleep Detect Mode]** SLPM is set to **[Multiple]** OR.

Setting	Description
0...**[Nominal Motor Power]** NPR	Setting range **Factory setting**: **[No]** NO

[Sleep Delay] SLPD ★

This parameter can be accessed if **[Sleep Detect Mode]** SLPM is not set to **[No]** NO.

Setting	**Description**
0...3,600 s	Setting range **Factory setting**: 20 s

[Boost] SBT– Menu

Access

[Complete settings] ➜ **[Pump functions]** ➜ **[Sleep/wakeup]** ➜ **[Sleep menu]** ➜ **[Boost]**

About This Menu

Following parameters can be accessed if **[Sleep Detect Mode]** SLPM is not set to **[No]** NO.

[Sleep Boost Speed] SLBS ★

Sleep boost speed.

Setting	Description
0...HSP	Setting range **Factory setting**: NO

[Sleep Boost Time] SLBT ★

Sleep boost time.

Setting	Description
0...3,600 s	Setting range **Factory setting**: NO

[Wake up menu] WKP– Menu

Access

[Complete settings] ➞ **[Pump functions]** ➞ **[Sleep/wakeup]** ➞ **[Wake up menu]**

About This Menu

This menu can be accessed if **[Sleep Detect Mode]** SLPM is not set to **[No]** NO.

[Wake Up Mode] WUPM ★

Wake Up mode.

Value range	Code / Value	Description
[Feedback]	FBK	Wake-up on PID feedback level **Factory setting**
[Error]	ERR	Wake-up on PID error level
[Pressure]	LP	Wake-up on low-pressure condition

[Wake Up Proc level] WUPF ★

This parameter can be accessed if **[Wake Up Mode]** WUPM is set to **[Feedback]** FBK.

Value range ( )	Description
[Min PID feedback] PIF1...**[Max PID feedback]** PIF2	**Factory setting**: NO

[Wake Up Proc Error] WUPE ★

This parameter can be accessed if **[Wake Up Mode]** WUPM is set to **[Error]** ERR.

Value range ( )	Description
0...**[Max PID feedback]** PIF2	**Factory setting: 0 %**

[OutletPres Assign] PS2A ★

Outlet pressure sensor assignment.

This parameter can be accessed if **[Wake Up Mode]** WUPM is set to **[Pressure]** LP.

Value range	Code / Value	Description
[Not Configured]	NO	Not assigned **Factory setting**
[AI1]...**[AI3]**	AI1...AI3	Analog input AI1...AI3
[AI4]...**[AI5]**	AI4...AI5	Analog input AI4...AI5 if VW3A3203 I/O extension module has been inserted
[AI Virtual 1]... **[AI Virtual 3]**	AIV1...AIV3	Virtual analogic input 1...3
NOTE: For sensor configuration, refer to section **[Sensors Assignment]** , page 197.		

[Wake up menu] WKP– Menu

Access

[Complete settings] ➜ **[Pump functions]** ➜ **[Sleep/wakeup]** ➜ **[Wake up menu]**

About This Menu

This menu can be accessed if **[Sleep Detect Mode]** SLPM is not set to **[No]** NO.

[Wake Up Press level] WUPL ★

Pressure level over which the system should leave the sleep mode.

This parameter can be accessed if **[Wake Up Mode]** WUPM is set to **[Pressure]** LP.

Setting	Description
[No] NO to 32,767	Setting range Unit: **[P sensor unit]** SUPR (for example, Pa, Bar, PSI, %) **Factory setting**: **[No]** NO

[Wake Up Delay] WUPD ★

Wake Up delay.

Setting	Description
0...3,600 s	Setting range **Factory setting**: 0 s

[Pump functions] - [Feedback Monitoring] FKM– Menu

Access

[Complete settings] ➞ **[Pump functions]** ➞ **[Feedback Monitoring]**

About This Menu

The function is typically used to detect cases where the installation capability is exceeded or where the installation is not operating properly:

- Fire hydrant opened.
- Pump start-up with open discharge valve.
- Mechanical breakdown of pipes.
- Water leakage.

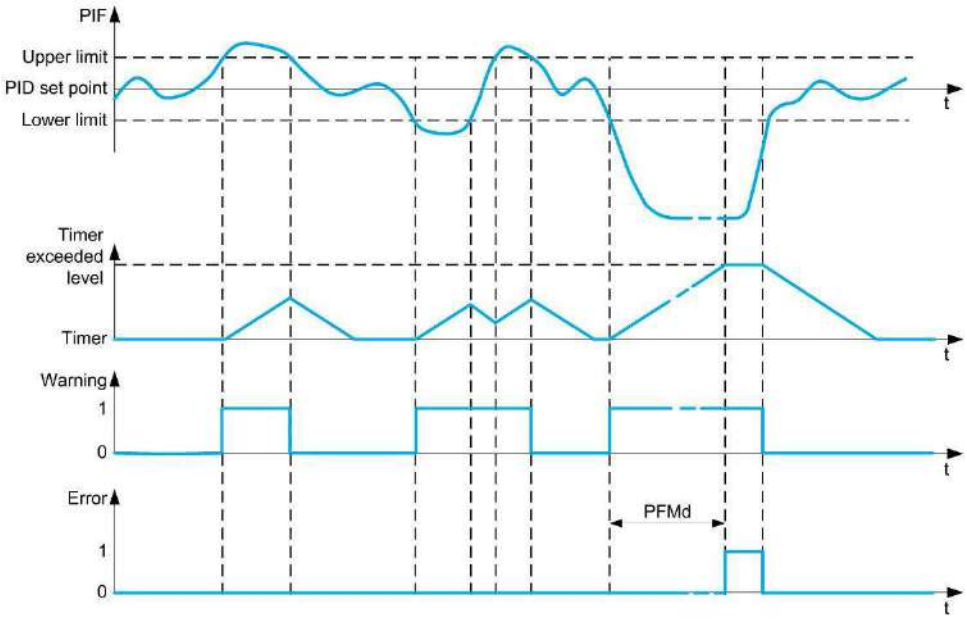
When the drive is running at high speed, this function monitors the PID feedback in order to detect if it is out of a given range around the setpoint during a configurable time.

By using a warning or a detected error, this function also indicates that:

- The capability of the installation is exceeded
- The proper control could not be ensured
- Something is wrong on the installation.

This menu can be accessed if **[PID feedback Assign]** PIF is not set to **[Not Configured]** NO.

This graphic presents the PID feedback monitoring:



[PID Fdbk Monitoring] PFMM

PID feedback monitoring activation.

Setting	Code / Value	Description
[No]	NO	No **Factory setting**
[Yes]	YES	Yes

[PID Fdbk Range] PFMR ★

PID feedback monitoring range.

Range within which the PID feedback value is supposed to stay in normal situation.

This parameter can be accessed if **[PID Fdbk Monitoring]** PFMM is not set to **[No]** NO.

Setting	Description
0...100%	Setting range **Factory setting**: 3%

[PID Fdbk Error Delay] PFMD ★

PID feedback monitoring delay.

Delay to trig an error after detection of an anomaly.

This parameter can be accessed if **[PID Fdbk Monitoring]** PFMM is not set to **[No]** NO.

Setting	Description
0...3,600 s	Setting range **Factory setting**: 10 s

[PID Fdbk Error Resp] PFMB ★

PID feedback monitoring response to a detected error.

Define how the drive reacts when a feedback monitoring error occurs.

This parameter can be accessed if **[PID Fdbk Monitoring]** PFMM is not set to **[No]** NO.

Setting	Code / Value	Description
[Ignore]	NO	Detected error ignored
[Freewheel Stop]	YES	Freewheel stop
[Configured Stop]	STT	Stop according to **[Type of stop]** STT parameter but without an error triggered after stop
[Ramp stop]	RMP	Stop on ramp **Factory setting**

[Pump functions] - [Pump start stop] PST– Menu

Access

[Complete settings] ➞ **[Pump functions]** ➞ **[Pump start stop]**

About This Menu

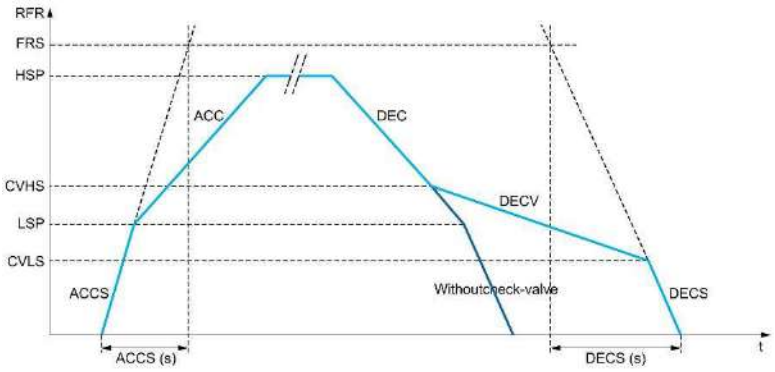
This function defines how the acceleration and deceleration are controlled during start and stop of the pump.

The pump working area is within the speed range **[Low Speed]** LSP - **[High Speed]** HSP.

The minimum speed is provided by the pump manufacturer according to the application.

Running below the minimum speed and/or starting the pump with a long acceleration ramp time has an impact on the lubrication of the seal, on the cooling of the impeller and the bearings.

A specific check-valve deceleration ramp is available to reduce any large variation of pressure that can generate an instability of the valve.



When the pump starts, the pump accelerates up to **[Low Speed]** LSP according to **[Start Accel Ramp]** ACCS.When the pump speed is above **[Low Speed]** LSP, the pump acceleration and deceleration are managed according to **[Acceleration]** ACC and **[Deceleration]** DEC if no other function is activated.

When the pump stops:

- The pump decelerates down to **[Check Valve Spd 2]** CVHS according to **[Deceleration]** DEC
- The pump decelerates from **[Check Valve Spd 2]** CVHS to **[Check Valve Spd 1]** CVLS according to **[Dec. Check Valve]** DECV
- The pump decelerates from **[Check Valve Spd 1]** CVLS to zero speed according to **[Final Dec. Ramp]** DECS

If **[Start Accel Ramp]** ACCS = 0, the start ramp is ignored and **[Acceleration]** ACC is used to start the pump.

If **[Dec. Check Valve]** DECV = 0, the check-valve ramp is ignored and is used to decelerate up to **[Low Speed]** LSP, then **[Final Dec. Ramp]** DECS is used (see below).

If **[Final Dec. Ramp]** DECS = 0, the normal deceleration **[Deceleration]** DEC is used to stop the pump.

[Low Speed] LSP

Low speed.

Setting	Description
0...**[High Speed]** HSP	Setting range **Factory setting**: 0 Hz

[High Speed] HSP

To help prevent **[Motor Overspeed]** SOF error, it is recommended to have **[Max Frequency]** TFR equal to or higher than 110% of **[High Speed]** HSP.

Setting	Description
[Low Speed] LSP...**[Max Frequency]** TFR	Setting range **Factory setting**: 50.0 Hz

[Acceleration] ACC

Time to accelerate:

- from 0 to the **[Nominal Motor Freq]** FRS for asynchronous motors.
- from 0 to the **[Sync Nominal Freq]** FRSS for synchronous motors.

If this parameter is set to **[AUTO]** AUTO, the drive will monitor its own loading level and optimize the acceleration ramp. The acceleration rate will be automatically adjusted between 1/8 to 8 times the default value of the ramp acceleration time, depending on the drive's current rating and the load level on the motor. This parameter should be appropriately set for an average load in the application. If the load on the motor increases rapidly during ramp up, the auto ramp adaptation feature may not help prevent the drive from experiencing an overcurrent or overvoltage.

To have repeatability in ramps, the value of this parameter must be set according to the possibility of the application (for example, the inertia must be considered).

Setting	Description
[Auto] ...6,000.00 s (1)	Setting range **Factory setting**: **[Auto]**
(1) Range 0.01 to 99.99 s or 0.1 to 999.9 s or 1 to 6,000 according to **[Ramp increment]** INR	

[Deceleration] DEC

Time to decelerate:

- from the **[Nominal Motor Freq]** FRS to 0 for asynchronous motors.
- from the **[Sync Nominal Freq]** FRSS to 0 for synchronous motors.

If this parameter is set to **[AUTO]** AUTO, the drive will monitor its own loading level and optimize the deceleration ramp. The deceleration rate will be automatically adjusted between 1/8 to 8 times the default value of the ramp deceleration time, depending on the drive's current rating and the load level on the motor. This parameter should be appropriately set for an average load in the application. If the load on the motor increases rapidly during ramp up, the auto ramp adaptation feature may not help prevent the drive from experiencing an overcurrent or overvoltage.

To have repeatability in ramps, the value of this parameter must be set according to the possibility of the application (for example, the inertia must be considered).

Setting	Description
[Auto]...6,000.00 s (1)	Setting range **Factory setting**: **[Auto]**
(1) Range 0.01 to 99.99 s or 0.1 to 999.9 s or 1 to 6,000 according to **[Ramp increment]** INR	

[Start Accel Ramp] ACCS

Acceleration on Start.

Setting	Description
[No] NO...6,000 s (1)	Setting range **Factory setting**: **[No]** NO
(1) Range 0.00 to 99.99 s or 0.0 to 999.9 s or 0 to 6,000 according to **[Ramp increment]** INR	

[Final Dec. Ramp] DECS

Deceleration on Stop.

Setting	Description
[No] NO...6,000 s (1)	Setting range **Factory setting**: **[No]** NO
(1) Range 0.00 to 99.99 s or 0.0 to 999.9 s or 0 to 6,000 according to **[Ramp increment]** INR	

[Dec. Check Valve] DECV

Deceleration while check valve is closing (Smooth).

Setting	Description
[No] NO...6,000 s (1)	Setting range **Factory setting**: **[No]** NO
(1) Range 0.00 to 99.99 s or 0.0 to 999.9 s or 0 to 6,000 according to **[Ramp increment]** INR	

[Check Valve Spd 1] CVLS ★

Speed level up to which check valve ramp is used.

This parameter can be accessed if **[Dec. Check Valve]** DECV is not set to 0.

Setting	Description
0...**[Check Valve Spd 2]** CVHS	Setting range **Factory setting**: 0 Hz

[Check Valve Spd 2] CVHS ★

Speed level from which check valve ramp is used.

This parameter can be accessed if **[Dec. Check Valve]** DECV is not set to 0.

Setting	Description
[Check Valve Spd 1] CVLS... **[High Speed]** HSP	Setting range **Factory setting**: 0 Hz

[Ref Freq template] BSP

Low speed management (template).

This parameter defines how the speed reference is taken into account, for analog inputs and pulse input only. In the case of the PID controller, this is the PID output reference.

A very low level of voltage on bipolar analog input can create a wrong sign on the reference frequency if **[Low Speed]** LSP is different from 0.

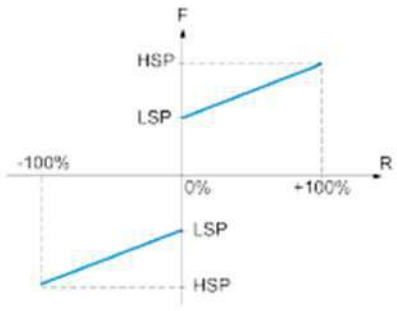
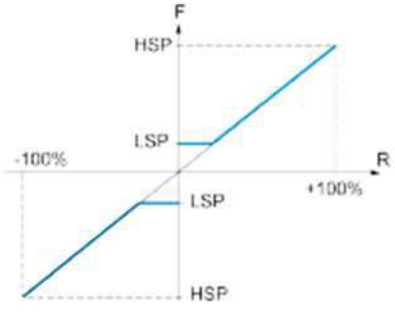
WARNING

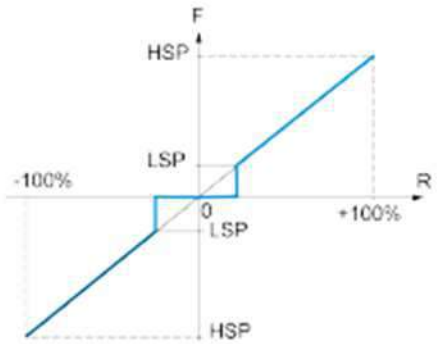
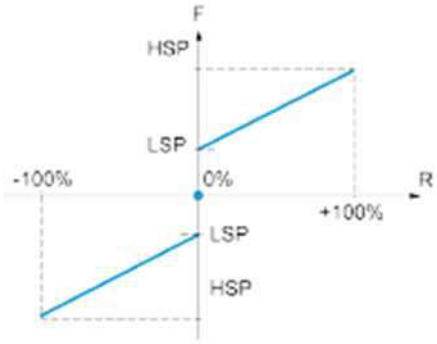
UNANTICIPATED EQUIPMENT OPERATION DUE TO WRONG DIRECTION

If the analog input type is set to **[Voltage +/-]** N10U and **[Low Speed]** LSP is not set to zero, then **[Ref Freq template]** BSP must be set to **[Deadband at 0%]** BNS0.

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

The limits are set by the **[Low Speed]** LSP and **[High Speed]** HSP parameters

Setting	Code / Value	Description
[Standard]	BSD	 F Frequency R Reference At zero reference the frequency = LSP Factory setting
[Pedestal]	BLS	

Setting ( )	Code / Value	Description
		F Frequency **R** Reference At reference = 0 to LSP the frequency = LSP
[Deadband]	BNS	 **F** Frequency **R** Reference At reference = 0 to LSP the frequency = 0
[Deadband at 0%]	BNS0	 **F** Frequency **R** Reference This operation is the same as **[Standard]** BSD, except that in the following cases at zero reference, the frequency = 0: The signal is less than **[Min nvalue]**, which is greater than 0 (example: 1 Vdc on a 2–10 Vdc input) The signal is greater than **[Min nvalue]**, which is greater than **[Max value]** (example: 11 Vdc on a 10–0 Vdc input). If the input range is configured as "bidirectional", operation remains identical to **[Standard]** BSD.

[Pump monitoring]

[Pump monitoring] - [Pumpcycle monitoring] CSP– Menu

Access

[Complete settings] → **[Pump monitoring]** → **[Pumpcycle monitoring]**

About This Menu

The purpose of this function is to monitor the number of start sequences during a configured time window in order to prevent from an unwanted aging of the system and to detect any abnormal operation.

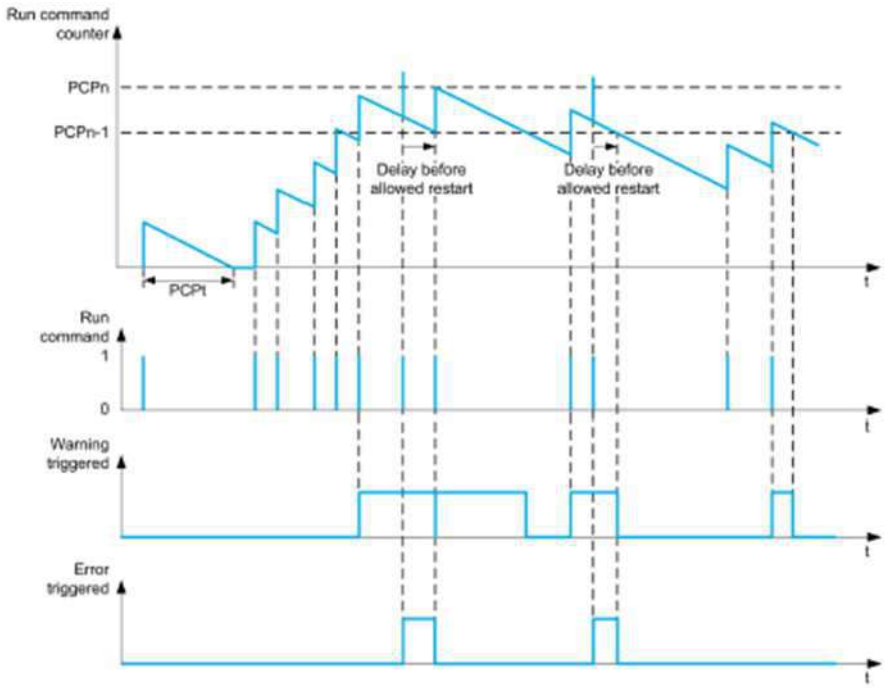
An internal counter counts the number of pump start sequences. Each time the pump is started, the counter is incremented. It is decreased by one every time window corresponding to one start.

If the counter reaches the maximum number allowed **[PumpCycle MaxStarts]** PCPN, a warning **[PumpCycle warning]** PCPA is triggered.

If a start command occurs while the detected warning is active, an error **[PumpCycle start Error]** PCPF is triggered. The application follows the **[PumpCycleError Resp]** PCPB defined behavior.

Restarting the pump is allowed as soon as the counter decreases under the maximum number of starts allowed, if the detected error has been cleared.

The function is based on the sliding time window in which the pump start commands are counted.



If **[PumpCycle Monitor]** PCPM is set to **[Mode 1]** NORM, the function is activated without power Off time management.

If **[PumpCycle Monitor]** PCPM is set to **[Mode 2]** RTC, the function is activated with power Off time management. This requires a time clock source such as the Graphic Display Terminal plugged at power On of the drive.

NOTE: At power-off, the system stores the current counter value. Upon powering on, it restores the value while accounting for the time elapsed during the power-off state.

[PumpCycle Monitor] PCPM

Pump cycle monitoring mode.

Setting	Code / Value	Description
[No]	NO	Cyclic monitoring disabled **Factory setting**
[Mode 1]	NORM	Cyclic monitoring without power off time management
[Mode 2]	RTC	Cyclic monitoring with power off time management

[PumpCycle MaxStarts] PCPN

Maximum number of events to trip.

This parameter can be accessed if **[PumpCycle Monitor]** PCPM is not set to **[No]** NO.

Setting ( )	Description
1...99	Setting range **Factory setting**: 6

[PumpCycle timeframe] PCPT

Window time.

This parameter can be accessed if **[PumpCycle Monitor]** PCPM is not set to **[No]** NO.

Setting ( )	Description
0...3,600 min	Setting range **Factory setting**: 60 min

[PumpCycleError Resp] PCPB

Pumpcycle monitoring response to a detected error.

This parameter can be accessed if **[PumpCycle Monitor]** PCPM is not set to **[No]** NO.

Setting	Code / Value	Description
[Ignore]	NO	Detected error ignored
[Freewheel Stop]	YES	Freewheel stop
[Configured Stop]	STT	Stop according to **[Type of stop]** STT parameter but without an error triggered after stop
[Fallback Speed]	LFF	Change to fallback speed, maintained as long as the detected error persists and the command has not been removed (1)

Setting	Code / Value	Description
[Ramp stop]	RMP	Ramp stop **Factory setting**
1 Because, in this case, the detected error does not trigger a stop, it is recommended to assign a relay or logic output to its indication.		

[FallbackSpeed] LFF

This parameter can be accessed if **[PumpCycleError Resp]** PCPB is set to **[Fallback Speed]** LFF.

Setting	Description
0.0...500.0 Hz	Setting range **Factory setting**: 0.0 Hz

[Pump monitoring] - [Dry run Monit] DYR– Menu

Access

[Complete settings] ➞ **[Pump monitoring]** ➞ **[Dry run Monit]**

Dry-Run Condition

A dry-run condition occurs when the pump impeller is not totally submerged. Working in dry running during a long time can cause premature wear of the pump impeller.

Dry run occurs when there is excessive air in the suction pipe:

- Because the pump is not primed, or
- Due to excessive air leak in the suction line.

This significantly may reduce the bearings and seal service life due to high temperature raise and poor lubrication.

About This Menu

This function prevents the pump from operating in dry condition.

The dry-run function monitors the flow using:

- a flow switch, or
- a set of 2 points (speed; power) for a flow estimation.

When using a flow switch, the dry-run condition occurs when the switch is at a high level.

NOTE: It is recommended to use a flow switch that is open in case of a low flow and to use a digital input active at low level (DIxL). This allows you to stop the pump in case of a broken wire of the flow switch.

During the function setup, it is necessary to perform measurements at no-flow but with water in the system.

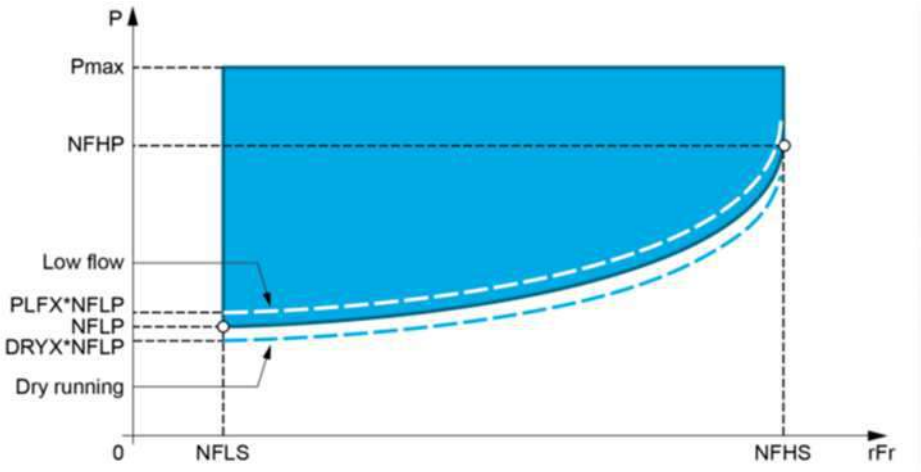
When using the flow estimation, the dry-run condition occurs if the estimated flow is lower than the no-flow power curve by **[Dry Run Factor]** DRYX.

The no-flow power curve is defined by a set of 2 points:

- Minimum speed **[Low Speed]** NFLS ; Power at minimum speed **[Low Power]** NFLP
- Maximum speed **[High Speed]** NFHS; Power at maximum speed **[High Power]** NFHP

This no-flow power curve is also used by the pump low flow monitoring function.

NOTE: The no-flow power curve characterization shall be done after setting the motor control type.



In case of dry-run conditions, this function will:

- Trigger a warning **[Dry Run Warn]** DRYA if the dry-run condition is present.
- Trigger an error **[Dry Run Error]** DRYF if the dry-run condition is present for a time longer than **[DryRun Error Delay]** DRYD. After the error has been triggered, even if the detected error has been cleared, it is not possible to restart the pump before the end of the **[DryRun Restart Delay]** DRYR.

NOTE: The detected error is not saved in case of a drive power OFF.

[DryRun Mode] DRYM

Dry Run mode.

Setting	Code / Value	Description
[No]	NO	Not activated **Factory setting**
[Switch]	SWT	Using sensor switch
[Power]	PWR	Using the sensorless estimation

[Switch Select] DRYW

Dry-run switches select.

This parameter can be accessed if **[DryRun Mode]** DRYM is set to **[Switch]** SWT.

Setting	Code / Value	Description
[Not Assigned]	NO	Not assigned **Factory setting**
[DI1]...**[DI6]**	LI1...LI6	Digital input DI1...DI6
[DI11]...**[DI16]**	LI11...LI16	Digital input DI11...DI16, if VW3A3203 I/O extension module has been inserted
[DI1 (Low level)]...**[DI6 (Low level)]**	L1L...L6L	Digital input DI1...DI6 used at low level
[DI11 (Low level)]...**[DI16 (Low level)]**	L11L...L16L	Digital input DI11...DI16 used at low level if VW3A3203 I/O extension module has been inserted

[Power Estim Value] OPRW

Motor mechanical power estimation

This parameter can be accessed if **[DryRun Mode]** DRYM is set to **[Power]** PWR.

Setting	Description
-327.67...327.67 kW	Setting range **Factory setting**: _

[Low Power] NFLP

No-flow low power.

This parameter can be accessed if **[DryRun Mode]** DRYM is set to **[Power]** PWR.

Setting	Description
0.00...**[Nominal Motor Power]** NPR	Setting range **Factory setting**: 0.00 kW

[Low Speed] NFLS

No-flow low speed.

This parameter can be accessed if **[DryRun Mode]** DRYM is set to **[Power]** PWR.

Setting	Description
0.0...**[High Speed]** HSP	Setting range **Factory setting**: 0.0 Hz

[High Power] NFHP

No-flow high power.

This parameter can be accessed if **[DryRun Mode]** DRYM is set to **[Power]** PWR.

Setting	Description
0.00...**[Nominal Motor Power]** NPR	Setting range **Factory setting**: 0.00 kW

[High Speed] NFHS

No-flow high speed.

This parameter can be accessed if **[DryRun Mode]** DRYM is set to **[Power]** PWR.

Setting	Description
0.0...**[High Speed]** HSP	Setting range **Factory setting**: 0.0 Hz

[Dry Run Factor] DRYX

This parameter can be accessed if **[DryRun Mode]** DRYM is set to **[Power]** PWR.

Setting	Description
0...100%	Setting range **Factory setting**: 70%

[DryRun Error Delay] DRYD

Dry run detected error delay.

This parameter can be accessed if **[DryRun Mode]** DRYM is not set to **[No]** NO.

Setting	Description
0...3,600 s	Setting range **Factory setting**: 5 s

[DryRun Restart Delay] DRYR

Dry run detected error restart.

This parameter can be accessed if **[DryRun Mode]** DRYM is not set to **[No]** NO.

Setting	Description
10...3,600 s	Setting range **Factory setting**: 60 s

[Pump monitoring] - [Pump low flow Monit] PLF– Menu

Access

[Complete settings] ➞ [Pump monitoring] ➞ [Pump low flow Monit]

About This Menu

The main consequence of running in low flow pump area is an increase of pump temperature as the pump is cooled by the liquid flow.

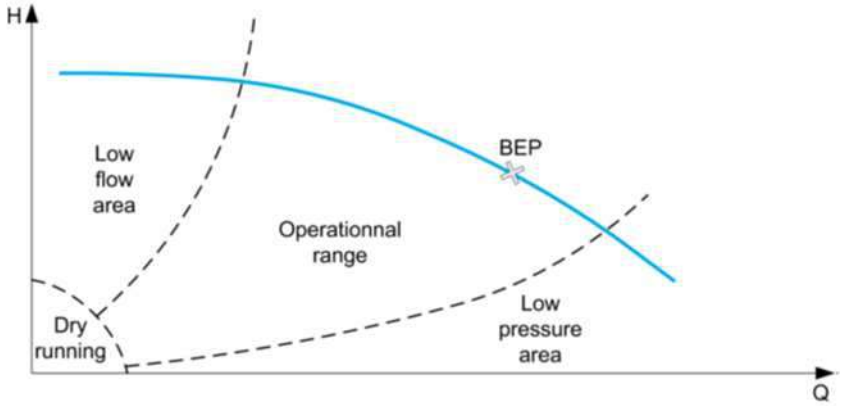
In addition, the low flow area is not a good working area from energy efficiency point of view.

No flow or low flow could be caused by:

- The verify valve at the discharge is closed.
- Issue on the pipe at the discharge (blocked pipes, …).

This function helps to prevent the pump from being damaged by working at no or low flow.

The monitoring can be carried out with different methods using or not sensors and whether the system is mono or multi-pump.



This function helps to detect probable no or low flow situation with different methods:

- Using a flow switch that indicates directly low flow condition: this method can be used only in mono-pump system or if the flow switch is connected on protected pump.

  NOTE: It is recommended to use a flow switch that is open in case of a low flow and to use a digital input active at low level (DIxL) et high level (DIxH). This allows you to stop the pump in case of a broken wire of the flow switch.

- Using a flow sensor and comparing the actual flow value to a given threshold:
  - This method can be used only in mono-pump system or if the flow sensor is connected on protected pump.
  - All data related to the selected input shall be configured according to the Sensor (Type, minimum, and maximum process value, scaling, …).
- Using a flow sensor and comparing the actual flow value to "Low flow system curve" QN characteristic:
  - This method can be used only in mono-pump system or if the flow sensor is connected on protected pump.
  - All data related to the selected input shall be configured according to the Sensor (Type, minimum, and maximum process value, scaling, …).

- Using Power/Speed estimation and comparing pump working point to "No Flow" Power characteristic:
  - Entering two [Speed; Power] points is required, first point in No Flow area (at Low speed point LSP), second point in high-speed area (At high-speed point HSP).
  - This method is not recommended in case of flat PQ curve.

Low flow monitoring is activated only after **[PumpLF ActivDelay]** PLFA after the pump has been started in order to disable the monitoring function during start operation.

Once a low flow condition is detected, a warning **[Low Flow Warn]** LFA is raised. Warning is automatically cleared when drive is stopped.

If the condition continues for longer than the configured **[PumpLF Error Delay]** PLFD delay, a detected error is raised and the drive reacts according to the configured **[PumpLF Error Resp]** PLFB error response. The monitoring is active even during the deceleration phase. It is recommended to set a greater delay than the complete deceleration sequence.

After error has been detected, it is maintained during **[PumpLF Restart Delay]** PLFR even if the warning has been reset.

NOTE: the drive restarts without delay if it is powered-off and on (restart delay is not saved). During the setup of the function, it is necessary to perform measurements at no flow but with water in the system.

[PumpLF Monitoring] PLFM

Pump low flow monitoring mode.

This parameter can be accessed if **[Application Selection]** APPT is set to **[Generic Pump Ctrl]** PUMP.

Setting	Code / Value	Description
[No]	NO	Not configured **Factory setting**
[Switch]	SW	Using flow switch
[No Flow Power]	NF	Low flow is detected using no flow power characteristic

[PumpLF DI Assign] PLFW

Pump low flow no flow switch selection.

This parameter can be accessed if **[PumpLF Monitoring]** PLFM is set to **[Switch]** SW.

Setting	Code / Value	Description
[Not Assigned]	NO	Not assigned **Factory setting**
[DI1]...**[DI6]**	LI1...LI6	Digital input DI1...DI6
[DI11]...**[DI16]**	LI11...LI16	Digital input DI11...DI16 if VW3A3203 I/O extension module has been inserted
[DI1 (Low level)]...**[DI6 (Low level)]**	L1L...L6L	Digital input DI1...DI6 used at low level if VW3A3203 I/O extension module has been inserted.
[DI11 (Low level)]...**[DI16 (Low level)]**	L11L...L16L	Digital input DI11...DI16 used at low level if VW3A3203 I/O extension module has been inserted.

[Power Estim Value] OPRW ★

Motor mechanical power estimation. It can be used to set **[Low Power]** NFLP and **[High Power]** NFHP values.

This parameter can be accessed if **[PumpLF Monitoring]** PLFM is set to **[No Flow Power]** NF.

Setting	Description
According to drive rating	Setting range **Factory setting**: _

[Low Speed] NFLS ★

No flow low speed.

This parameter can be accessed if **[PumpLF Monitoring]** PLFM is set to **[No Flow Power]** NF.

Setting	Description
0.0...HSP	Setting range **Factory setting**: 0.0 Hz

[High Speed] NFHS ★

No flow high speed.

This parameter can be accessed if **[PumpLF Monitoring]** PLFM is set to **[No Flow Power]** NF.

Setting	Description
0.0...HSP	Setting range **Factory setting**: 0.0 Hz

[Low Power] NFLP ★

No flow low power.

This parameter can be accessed if **[PumpLF Monitoring]** PLFM is set to **[No Flow Power]** NF.

Setting	Description
0...NPR	Setting range **Factory setting**: 0

[High Power] NFHP ★

No flow high power.

This parameter can be accessed if **[PumpLF Monitoring]** PLFM is set to **[No Flow Power]** NF.

Setting	Description
0...NPR	Setting range **Factory setting**: 0

[PumpLF Pwr Factor] PLFX ★

Pump low flow power factor.

This parameter can be accessed if **[PumpLF Monitoring]** PLFM is set to **[No Flow Power]** NF.

Setting	Description
100...500%	Setting range **Factory setting**: 110%

[PumpLF ActivDelay] PLFA ★

Pump low flow monitoring activation delay after the pump has been started.

This parameter can be accessed if **[PumpLF Monitoring]** PLFM is not set to **[No]** NO.

Setting	Description
0...3,600 s	Setting range **Factory setting**: 10 s

[PumpLF Error Delay] PLFD ★

Pump low flow detected error delay.

This parameter can be accessed if **[PumpLF Monitoring]** PLFM is not set to **[No]** NO.

Setting	Description
0...3,600 s	Setting range **Factory setting**: 10 s

[PumpLF Error Resp] PLFB ★

Pump low flow monitoring function response to a detected error.

This parameter can be accessed if **[PumpLF Monitoring]** PLFM is not set to **[No]** NO.

Setting	Code / Value	Description
[Ignore]	NO	Detected error ignored
[Freewheel Stop]	YES	Freewheel stop **Factory setting**
[Configured Stop]	STT	Stop according to **[Type of stop]** STT parameter but without an error triggered after stop
[Fallback Speed]	LFF	Change to fallback speed, maintained as long as the detected error persists and the run command has not been removed (1)

Setting	Code / Value	Description
[Ramp stop]	RMP	Stop on ramp
1 Because, in this case, the detected error does not trigger a stop, it is recommended to assign a relay or logic output to its indication.		

[FallbackSpeed] LFF ★

Fall back speed.

This parameter can be accessed if **[PumpLF Error Resp]** PLFB is set to **[FallbackSpeed]** LFF.

Setting	Description
0.0...500.0 Hz	Setting range **Factory setting**: 0.0 Hz

[PumpLF Restart Delay] PLFR ★

Pump low flow restart delay.

This parameter can be accessed if **[PumpLF Monitoring]** PLFM is not set to **[No]** NO.

Setting	Description
0...3,600 s	Setting range **Factory setting**: 0 s

[Pump monitoring] - [Thermal monitoring] TPP– Menu

Access

[Complete settings] ➞ **[Pump monitoring]** ➞ **[Thermal monitoring]**

About This Menu

Identical to **[Thermal monitoring]** TPP– Menu , page 169.

[Pump monitoring] - [Outlet pressure mon]

[Outlet pressure mon] OPP– Menu

Access

[Complete settings] ➡ **[Pump monitoring]** ➡ **[Outlet pressure mon]**

About This Menu

This function detects an outlet high and low-pressure situation.

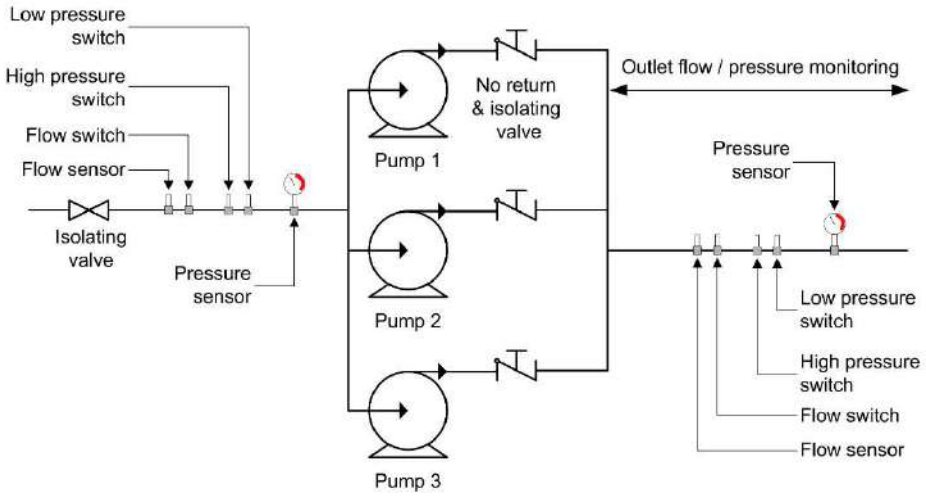
- It helps to prevent from high outlet pressure situations that can damage the hydraulic network (for example, pipe burst)
- It monitors low outlet pressure situations that can reflect damage on the hydraulic network (for example, pipe break)

This monitoring function is at the outlet station level.

The outlet pressure monitoring function requires a pressure sensor and/or a pressure switch to monitor the outlet pressure of the system.

- A high-pressure switch allows the activation of the high outlet pressure monitoring, according to the pressure switch specification.
- A pressure sensor allows the activation of both high and low outlet pressure monitoring, according to the **[OutPres Min Level]** OPPL and **[OutPres Max Level]** OPPH values.

Example of the station architecture:



The outlet pressure monitoring function monitors the outlet pressure of the system.

- When a low-Pressure condition is present, a **[Low OutPres Warn]** OPLA warning is triggered.
- When a high-Pressure condition is present, coming from the sensor, a **[High OutPres Warn]** OPHA warning is triggered.
- When a high-Pressure condition is present, coming from the switch, a **[Switch OutPres Warn]** OPSA warning is triggered.
- If the high-pressure condition remains for longer than **[OutPresError Delay]** OPPD time, a detected **[Out Pressure High]** OPHF error is triggered. The application follows the **[OutPresError Resp]** OPPB defined behavior.
- If the low-pressure condition remains for longer than **[OutPresError Delay]** OPPD time, a detected **[Out Pressure Low]** OPLF error is triggered. The application follows the **[OutPresError Resp]** OPPB defined behavior.

NOTE:

- It is recommended to use a pressure switch that is open in case of high pressure and to use a digital input active at low level (DIxL). This allows stopping the pump in case of broken wire of the pressure switch.
- It is recommended to use a 4-20 mA pressure sensor and to enable the 4-20 mA loss function. This allows stopping the pump in case of broken wire of the pressure sensor.

[OutPres Monitoring] OPPM

Outlet pressure monitoring mode.

Setting	Code / Value	Description
[No]	NO	Inactive **Factory setting**
[Switch]	SW	Activated on switch
[Sensor]	SNSR	Activated on sensor
[Both]	BOTH	Activated on sensor and switch

[OutPres DI Assign] OPPW ★

High outlet pressure switch source.

This parameter can be accessed if:

- **[OutPres Monitoring]** OPPM is set to **[Switch]** SW, or
- **[OutPres Monitoring]** OPPM is set to **[Both]** BOTH.

Setting	Code / Value	Description
[Not Assigned]	NO	Not assigned **Factory setting**
[DI1]...**[DI6]**	LI1...LI6	Digital input DI1...DI6
[DI11]...**[DI16]**	LI11...LI16	Digital input DI11...DI16 if VW3A3203 I/O extension module has been inserted
[DI1 (Low level)]...**[DI6 (Low level)]**	L1L...L6L	Digital input DI1...DI6 used at low level if VW3A3203 I/O extension module has been inserted.
[DI11 (Low level)]...**[DI16 (Low level)]**	L11L...L16L	Digital input DI11...DI16 used at low level if VW3A3203 I/O extension module has been inserted.

[OutletPres Assign] PS2A ★

Outlet pressure sensor assignment.

This parameter can be accessed if:

- **[OutPres Monitoring]** OPPM is set to **[Sensor]** SNSR, or
- **[OutPres Monitoring]** OPPM is set to **[Both]** BOTH.

Value range	Code / Value	Description
[Not Configured]	NO	Not assigned **Factory setting**
[AI1]...**[AI3]**	AI1...AI3	Analog input AI1...AI3
[AI4]...**[AI5]**	AI4...AI5	Analog input AI4...AI5 if VW3A3203 I/O extension module has been inserted

Value range	Code / Value	Description
[AI Virtual 1]... **[AI Virtual 3]**	AIV1...AIV3	Virtual analogic input 1...3

NOTE: For sensor configuration, refer to section **[Sensors Assignment]** , page 197.

[Outlet pressure mon] OPP– Menu

Access

[Complete settings] ➡ **[Pump monitoring]** ➡ **[Outlet pressure mon]**

[OutPres Min Level] OPPL ★

Outlet pressure minimum level.

This parameter can be accessed if:

- **[OutPres Monitoring]** OPPM is set to **[Sensor]** SNSR, or
- **[OutPres Monitoring]** OPPM is set to **[Both]** BOTH.

Setting	Description
0...32,767	Setting range, according to **[P sensor unit]** SUPR. **Factory setting**: 0

[OutPres Max Level] OPPH ★

Outlet pressure maximum level.

This parameter can be accessed if:

- **[OutPres Monitoring]** OPPM is set to **[Sensor]** SNSR, or
- **[OutPres Monitoring]** OPPM is set to **[Both]** BOTH.

Setting	Description
0...32,767	Setting range, according to **[P sensor unit]** SUPR. **Factory setting**: 0

[OutPresError Delay] OPPD ★

Outlet pressure monitoring time.

This parameter can be accessed if **[OutPres Monitoring]** OPPM is not set to **[No]** NO.

Setting	Description
0...3,600 s	Setting range **Factory setting**: 0 s

[OutPresError Resp] OPPB ★

Outlet pressure fault config.

This parameter can be accessed if **[OutPres Monitoring]** OPPM is not set to **[No]** NO.

Setting	Code / Value	Description
[Ignore]	NO	Detected error ignored
[Freewheel Stop]	YES	Freewheel stop
[Configured Stop]	STT	Stop according to **[Type of stop]** STT parameter but without an error triggered after stop

Setting	Code / Value	Description
[Fallback Speed]	LFF	Change to fallback speed, maintained as long as the detected error persists and the command has not been removed (1)
[Ramp stop]	RMP	Stop on ramp **Factory setting**

[FallbackSpeed] LFF ★

This parameter can be accessed if **[OutPresError Resp]** OPPB is set to **[Fallback Speed]** LFF.

Setting	Description
0.0...500.0 Hz	Setting range **Factory setting**: 0.0 Hz

[Fan]

[Fan] - [PID controller] PID– Menu

Access

[Complete settings] ➡ [Fan] ➡ [PID controller]

About This Menu

Identical to **[PID controller]** PID– Menu , page 242.

[Fan] - [Feedback Monitoring] FKM– Menu

Access

[Complete settings] ➞ **[Fan]** ➞ **[Feedback Monitoring]**

About This Menu

Identical to **[Feedback Monitoring]** FKM– Menu , page 274.

[Fan] - [Jump frequency] JUF– Menu

Access

[Complete settings] ➡ **[Fan]** ➡ **[Jump frequency]**

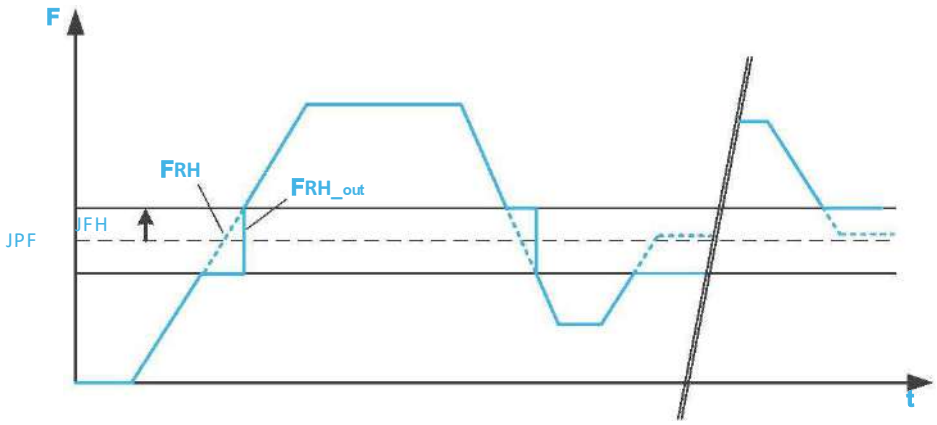
About This Menu

This function helps to prevent prolonged operation within an adjustable range around the regulated frequency.

NOTE: The function must be enabled even with **[Jog]** JOG function.

This function can be used to help prevent reaching a frequency, which could cause resonance. Setting the parameter to 0 disables the function.

The following figure is an example of the jump frequency function with one skip frequency defined by **[Skip Frequency]** JPF:



F : Frequency

t : time

JPF : ***Skip frequency***

JFH : ***Skip Freq. hysteresis***

FRH : ***Reference frequency before ramp***

FRH_out : ***Reference frequency before ramp***, after the jump frequency function

[Skip Frequency] JPF

Skip frequency.

Setting	Description
0.0...500.0 Hz	Setting range **Factory setting**: 0.0 Hz

[Skip Frequency 2] JF2

Skip frequency 2.

Setting	Description
0.0...500.0 Hz	Setting range **Factory setting**: 0.0 Hz

[3rd Skip Frequency] JF3

3***rd Skip frequency***.

Setting	Description
0.0...500.0 Hz	Setting range **Factory setting**: 0.0 Hz

[Skip Freq.Hysteresis] JFH ★

Jump frequency bandwidth.

This parameter can be accessed if at least one skip frequency JPF, JF2, or JF3 is different from 0.

Skip frequency range: between JPF – JFH and JPF + JFH for example.

This adjustment is common to the 3 frequencies JPF, JF2, JF3.

Setting	Description
0.1...10.0 Hz	Setting range **Factory setting**: 1.0 Hz

[Fan] CSFA– Menu

Access

[Complete settings] ➞ **[Fan]**

NOTE: This menu is only visible if **[Application Selection]** is set to **[Generic Fan Ctrl]**.

[Disable Error Detect] INH ★

Disable error detection.

In rare cases, the monitoring functions of the device may be unwanted because they impede the purpose of the application. A typical example is a smoke extractor fan operating as a part of a fire protection system. If a fire occurs, the smoke extractor fan should operate as long as possible, even if, for example, the permissible ambient temperature of the device is exceeded. In such applications, damage to or destruction of the device may be acceptable as collateral damage, for example, to keep other damage from occurring whose hazard potential is assessed to be more severe.

A parameter is provided to disable certain monitoring functions in such applications so that automatic error detection and automatic error responses of the device are no longer active. You must implement alternative monitoring functions for disabled monitoring functions that allow operators and/or master control systems to adequately respond to conditions which correspond to detected errors. For example, if overtemperature monitoring of the device is disabled, the device of a smoke extractor fan may itself cause a fire if errors go undetected. An overtemperature condition can be, for example, signaled in a control room without the device being stopped immediately and automatically by its internal monitoring functions.

⚠DANGER

ERROR DETECTION FUNCTIONS DISABLED, NO ERROR DETECTION

- Only use this parameter after a thorough risk assessment in compliance with all regulations and standards that apply to the device and to the application.
- Implement alternative monitoring functions for disabled monitoring functions that do not trigger automatic error responses of the device, but allow for adequate, equivalent responses by other means in compliance with all applicable regulations and standards as well as the risk assessment.
- Commission and test the system with the monitoring functions enabled.
- During commissioning, verify that the device and the system operate as intended by performing tests and simulations in a controlled environment under controlled conditions.

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

This parameter can be accessed if **[Access Level]** LAC is set to **[Expert]** EPR.

If the assigned input or bit state is:

If the assigned input or bit is at 0, detected error monitoring is active. If the assigned input or bit is at 1, detected error monitoring is inactive. If an error is already active, it will be cleared when a rising edge (change from 0 to 1) occurs on the assigned input or bit.

It can result in immediate start if the Run command is active on level (**[2/3-Wire Control]** TCC is set to **[2-Wire Control]** 2C and **[2-wire type]** TCT is set to **[Level]** LEL)

NOTE:

- The Safe Torque Off function and any detected errors that help to prevent any form of operation are not affected by this function.
- If you want the activation to be done on low level, prefer to set **[Mode Selection]** FMM in **[Fire modes]** FMOR to **[Not Forced]** FIRE.

Detection of following errors can be disabled: NOF, CFI, SLF1, CNF, EPF1, LFF2, OHF, OLF, OBF, OSF, OPF1, PHF, USF, SOF, TNF, OPF2, EPF2, SLF2, SLF3, INF9, INFB, TJF, INFC, LCF, INF6, LFF3, LFF4, HCF, LFF5, CSF, ULF, OLC, LFF1, TH2F, T2CF, TH3F, T3CF, PCPF, OPLF, HFPF, PLFF, TH4F, T4CF, TH5F, T5CF, OPHF, DRYF, PFMF, PGLF, MPLF, LCLF, LCHF, INFG, INFH, STF, INFL, FWER, FDR2, DCRE, IDLF, SPFC, FWPF, INFZ, SPTF, FWMC, HPF, BELF, OIMF, DUCF, PSMF, BRBF, SPOF, ATDF, DGOF.

Value range	Code / Value	Description
[Not Assigned]	NO	Not assigned **Factory setting**
[DI1]...**[DI6]**	LI1...LI6	Digital input DI1...DI6
[DI11]...**[DI16]**	LI11...LI16	Digital input DI11...DI16 if VW3A3203 I/O extension module has been inserted
[CD00]... **[CD10]**	CD00...CD10	Virtual digital input CMD.0...CMD.10 in **[I/O profile]** IO configuration
[CD11]... **[CD15]**	CD11...CD15	Virtual digital input CMD.11...CMD.15 regardless of configuration

[Auto Fault Reset] ATR

This function can be used to automatically perform individual or multiple Fault Resets. If the cause of the error that has triggered the transition to the operating state Fault disappears while this function is active, the device resumes normal operation. While the Fault Reset attempts are performed automatically, the output signal "Operating state Fault" is not available. If the attempts to perform the Fault Reset are not successful, the device remains in the operating state Fault and the output signal "Operating state Fault" becomes active.

⚠ WARNING

UNANTICIPATED EQUIPMENT OPERATION

- Verify that activating this function does not result in unsafe conditions.
- Verify that the fact that the output signal "Operating state Fault" is not available while this function is active does not result in unsafe conditions.

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

The drive error relay remains activated if this function is active. The speed reference and the operating direction must be maintained.

It is recommended to use 2-wire control (**[2/3-Wire Control]** TCC is set to **[2-Wire Control]** 2C and **[2-wire type]** TCT is set to **[Level]** LEL).

If the restart has not taken place once the configurable time **[Fault Reset Time]** TAR has elapsed, the procedure is aborted and the drive remains locked until it is turned off and then on again.

The detected error codes, which permit this function, are listed.

Setting	Code / Value	Description
[No]	NO	Function inactive **Factory setting**
[Yes]	YES	After locking in error state, if the detected error has disappeared and the other operating conditions permit the motor automatic restart. **The automatic restart** is performed by a series of automatic attempts separated by increasingly longer waiting periods: 1 s, 5 s, 10 s, then 1 minute for the following attempts. **NOTE:** If the automatic restart is in progress **(less than the max time)**, the error management **doesn't** see the error(s) present(s) and the error relay is always closed.

[Catch On Fly] FLR

Catch on the fly function assignment.

Used to enable a smooth restart if the run command is maintained after the following events:

- Loss of line supply or disconnection.
- Clearance of current detected error or automatic restart.
- Freewheel stop (a delay of 5 time the **[Rotor Time Const]** TRA is applied before taking the next run command into account).

The speed given by the drive resumes from the estimated speed of the motor at the time of the restart, then follows the ramp to the reference speed.

This function requires 2-wire level control.

When the function is operational, it activates at each run command, resulting in a slight delay of the current (0.5 s max).

[Catch On Fly] FLR is forced to **[Not Configured]** NO if **[Auto DC Injection]** ADC is set to **[Continuous]** CT.

Setting	Code / Value	Description
[Not Configured]	NO	Function inactive. **Factory setting**
[Yes On Freewheel]	YES	Function active only after freewheel stop.
[Yes Always]	ALL	Function active after all stop type

[Generic functions]

[Generic functions] - [Speed Limits] SLM– Menu

Access

[Complete settings] ➞**[Generic functions]** ➞ **[Speed Limits]**

About This Menu

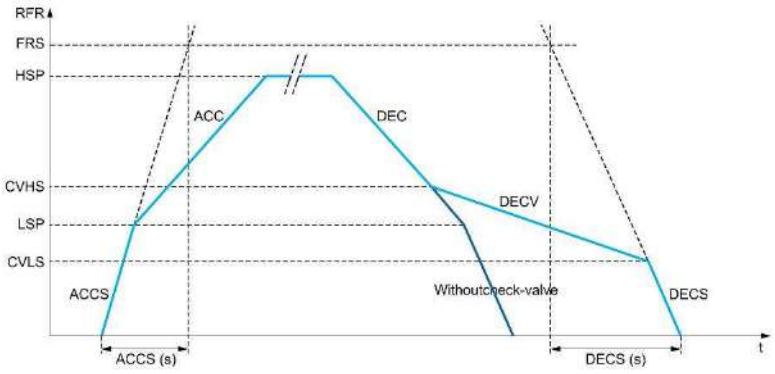
This function defines how the acceleration and deceleration are controlled during start and stop of the pump.

The pump working area is within the speed range **[Low Speed]** LSP - **[High Speed]** HSP.

The minimum speed is provided by the pump manufacturer according to the application.

Running below the minimum speed and/or starting the pump with a long acceleration ramp time has an impact on the lubrication of the seal, on the cooling of the impeller and the bearings.

A specific check-valve deceleration ramp is available to reduce any large variation of pressure that can generate an instability of the valve.



When the pump starts, the pump accelerates up to **[Low Speed]** LSP according to **[Start Accel Ramp]** ACCS.When the pump speed is above **[Low Speed]** LSP, the pump acceleration and deceleration are managed according to **[Acceleration]** ACC and **[Deceleration]** DEC if no other function is activated.

When the pump stops:

- The pump decelerates down to **[Check Valve Spd 2]** CVHS according to **[Deceleration]** DEC
- The pump decelerates from **[Check Valve Spd 2]** CVHS to **[Check Valve Spd 1]** CVLS according to **[Dec. Check Valve]** DECV
- The pump decelerates from **[Check Valve Spd 1]** CVLS to zero speed according to **[Final Dec. Ramp]** DECS

If **[Start Accel Ramp]** ACCS = 0, the start ramp is ignored and **[Acceleration]** ACC is used to start the pump.

If **[Dec. Check Valve]** DECV = 0, the check-valve ramp is ignored and is used to decelerate down to **[Low Speed]** LSP, then **[Final Dec. Ramp]** DECS is used (see below).

If **[Final Dec. Ramp]** DECS = 0, the normal deceleration **[Deceleration]** DEC is used to stop the pump.

[Low Speed] LSP

Motor frequency at low speed.

Setting ( )	Description
0.0...500.0 Hz	Setting range **Factory setting**: 0 Hz

[High Speed] HSP

Motor frequency at high speed.

To help prevent **[Motor Overspeed]** SOF error, it is recommended to have **[Max Frequency]** TFR equal to or higher than 110% of **[High Speed]** HSP.

Setting ( )	Description
0.0...500.0 Hz	Setting range **Factory setting**: 50.0 Hz

[Ref Freq template] BSP

Low speed management (template).

This parameter defines how the speed reference is taken into account, for analog inputs and pulse input only. In the case of the PID controller, this is the PID output reference.

The limits are set by the **[Low Speed]** LSP and **[High Speed]** HSP parameters.

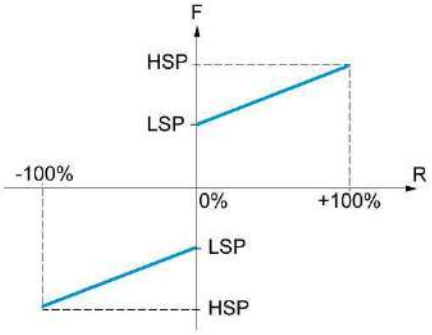
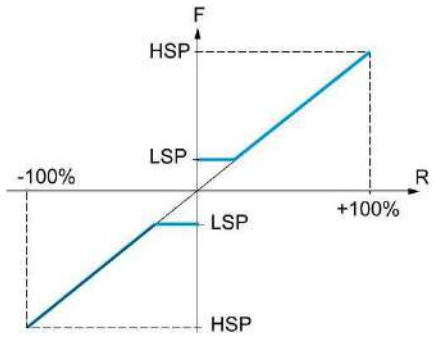
A very low level of voltage on bipolar analog input can create a wrong sign on the reference frequency if **[Low Speed]** LSP is different from 0.

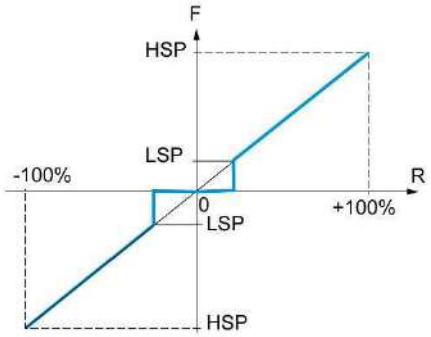
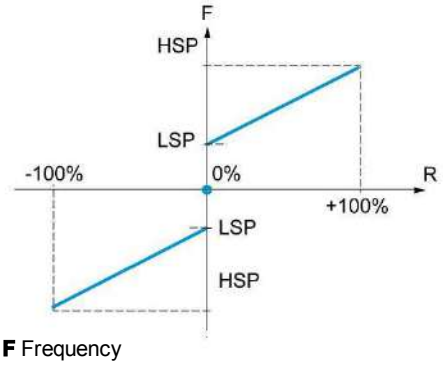
⚠ WARNING

UNANTICIPATED EQUIPMENT OPERATION DUE TO WRONG DIRECTION

If the analog input type is set to **[Voltage +/-]** N10U and **[Low Speed]** LSP is not set to zero, then **[Ref Freq template]** BSP must be set to **[Deadband at 0%]** BNS0.

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

Setting ( )	Code / Value	Description
[Standard]	BSD	 **F** Frequency **R** Reference At reference = 0, the frequency = **[Low Speed]** LSP **Factory setting**
[Pedestal]	BLS	 **F** Frequency **R** Reference At reference = 0 to **[Low Speed]** LSP, the frequency = **[Low Speed]** LSP

Setting ( )	Code / Value	Description
[Deadband]	BNS	 **F** Frequency **R** Reference At reference = 0 to LSP the frequency = 0
[Deadband at 0%]	BNS0	 **F** Frequency **R** Reference This operation is the same as **[Standard]** BSD, except that in the following cases at zero reference, the frequency = 0: The signal is less than **[Min value]**, which is greater than 0 (example: 1 Vdc on a 2–10 Vdc input). The signal is greater than **[Min value]**, which is greater than **[Max value]** (example: 11 Vdc on a 10–0 Vdc input). If the input range is configured as “bidirectional”, the operation remains identical to **[Standard]** BSD.

[Generic functions] - [Ramp] RAMP– Menu

Access

[Complete settings] ➞ **[Generic functions]** ➞ **[Ramp]**

[Ramp Type] RPT

Type of ramp.

Setting	Code / Value	Description
[Linear]	LIN	Linear ramp **Factory setting**
[S-Ramp]	S	S ramp
[U-Ramp]	U	U ramp
[Customized]	CUS	Customer ramp

[Ramp increment] INR

This parameter is valid for **[Acceleration]** ACC, **[Deceleration]** DEC, **[Acceleration 2]** AC2 and **[Deceleration 2]** DE2.

Setting	Code / Value	Description
[0.01]	001	Ramp up to 99.99 seconds
[0.1]	01	Ramp up to 999.9 seconds **Factory setting**
[1]	1	Ramp up to 6,000 seconds

[Acceleration] ACC

Time to accelerate from 0 to the **[Nominal Motor Freq]** FRS.

If this parameter is set to **[AUTO]** AUTO, the drive will monitor its own loading level and optimize the acceleration ramp. The acceleration rate will be automatically adjusted between 1/8 to 8 times the default value of the ramp acceleration time, depending on the drive's current rating and the load level on the motor. This parameter should be appropriately set for an average load in the application. If the load on the motor increases rapidly during ramp up, the auto ramp adaptation feature may not help prevent the drive from experiencing an overcurrent or overvoltage.

To have repeatability in ramps, the value of this parameter must be set according to the possibility of the application (for example, the inertia must be considered).

Setting	Description
[Auto] ...6,000.00 s (1)	Setting range **Factory setting**: **[Auto]**
(1) Range 0.01 to 99.99 s or 0.1 to 999.9 s or 1 to 6,000 according to **[Ramp increment]** INR	

[Deceleration] DEC

Time to decelerate from the **[Nominal Motor Freq]** FRS to 0.

If this parameter is set to **[AUTO]** AUTO, the drive will monitor its own loading level and optimize the deceleration ramp. The deceleration rate will be automatically adjusted between 1/8 to 8 times the default value of the ramp deceleration time, depending on the drive's current rating and the load level on the motor. This parameter should be appropriately set for an average load in the application. If the load on the motor increases rapidly during ramp up, the auto ramp adaptation feature may not help prevent the drive from experiencing an overcurrent or overvoltage.

To have repeatability in ramps, the value of this parameter must be set according to the possibility of the application (for example, the inertia must be considered).

NOTE:

- If the drive can achieve the requested deceleration time, auto ramp adaptation is not triggered
- If the drive cannot achieve the requested deceleration time—typically because the deceleration demand is too fast relative to ineratia or load—auto-ramp adaptation is activated. This automatically increases the deceleration time and displays **OBR**

Setting	Description
[Auto]...6,000.00 s (1)	Setting range **Factory setting**: **[Auto]**
(1) Range 0.01 to 99.99 s or 0.1 to 999.9 s or 1 to 6,000 according to **[Ramp increment]** INR	

[Begin Acc round] TA1 ★

Rounding of start of acceleration ramp as a percentage of the **[Acceleration]** ACC or **[Acceleration 2]** AC2 ramp time.

This parameter can be accessed if the **[Ramp Type]** RPT is set to **[Customized]** CUS.

Setting	Description
0...100%	Setting range **Factory setting**: 10%

[End Acc round] TA2 ★

Rounding of end of acceleration ramp as a percentage of the **[Acceleration]** ACC or **[Acceleration 2]** AC2 ramp time.

This parameter can be accessed if the **[Ramp Type]** RPT is set to **[Customized]** CUS.

Setting	Description
0...(100 - **[Begin Acc round]** TA1) %	Setting range **Factory setting**: 10%

[Begin Dec round] TA3 ★

Rounding of start of deceleration ramp as a percentage of the **[Deceleration]** DEC or **[Deceleration 2]** DE2 ramp time.

This parameter can be accessed if the **[Ramp Type]** RPT is set to **[Customized]** CUS.

Setting	Description
0...100%	Setting range **Factory setting**: 10%

[End Dec round] TA4 ★

Rounding of end of deceleration ramp as a percentage of the **[Deceleration]** DEC or **[Deceleration 2]** DE2 ramp time.

Can be set between 0 and (100% - **[Begin Dec round]** TA3).

This parameter can be accessed if the **[Ramp Type]** RPT is set to **[Customized]** CUS.

Setting	Description
0...(100 - **[Begin Dec round]** TA3) %	Setting range **Factory setting**: 10%

[Dec.Ramp Adapt] BRA

Deceleration ramp adaptation.

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

The function is incompatible with applications requiring:

- Positioning on a ramp

Setting	Code / Value	Description
[No]	NO	Function inactive
[Yes]	YES	Function active. **Factory setting**

[Generic functions] - [Ramp switching] RPT– Menu

Access

[Complete settings] ➞ **[Generic functions]** ➞ **[Ramp switching]**

[Ramp 2 Thd] FRT

The second ramp is switched if the value of **[Ramp 2 Thd]** FRT is not 0 (0 deactivates the function) and the output frequency is greater than **[Ramp 2 Thd]** FRT.

Threshold ramp switching can be combined with **[Ramp Switch Assign]** RPS switching as follows:

DI or Bit	Frequency	Ramp
0	< FRT	ACC, DEC
0	> FRT	AC2, DE2
1	< FRT	AC2, DE2
1	> FRT	AC2, DE2

Setting	Description
0.0...500.0 Hz	Setting range **Factory setting**: 0.0 Hz

[Ramp Switch Assign] RPS

Ramp switching assignment .

Value range	Code / Value	Description
[Not Assigned]	NO	Not assigned **Factory setting**
[DI1]...**[DI6]**	LI1...LI6	Digital input DI1...DI6
[DI11]...**[DI16]**	LI11...LI16	Digital input DI11...DI16 if VW3A3203 I/O extension module has been inserted
[CD00]... **[CD10]**	CD00...CD10	Virtual digital input CMD.0...CMD.10 in **[I/O profile]** IO configuration
[CD11]... **[CD15]**	CD11...CD15	Virtual digital input CMD.11...CMD.15 regardless of configuration

[Acceleration 2] AC2

Time to accelerate from 0 to the **[Nominal Motor Freq]** FRS. To have repeatability in ramps, the value of this parameter must be set according to the possibility of the application.

This parameter can be accessed if **[Ramp Switch Assign]** RPS is assigned and **[PID feedback Assign]** PIF is configured or **[RP]** PI is configured.

Setting	Description
0.0...6,000 s (1)	Setting range **Factory setting**: 5.0 s

(1) Range 0.01 to 99.99 s or 0.1 to 999.9 s or 1...6,000 s according to **[Ramp increment]** INR.

[Deceleration 2] DE2 ★

Time to decelerate from the **[Nominal 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.

This parameter can be accessed if:

- **[Ramp Switch Assign]** RPS is assigned.

Setting	Description
0.0...6,000 s (1)	Setting range **Factory setting**: 5.0 s

(1) Range 0.01 to 99.99 s or 0.1 to 999.9 s or 1...6,000 s according to **[Ramp increment]** INR.

[Generic functions] - [Stop configuration] STT– Menu

Access

[Complete settings] ➡ [Generic functions] ➡ [Stop configuration]

About This Menu

This function allows to manage the type of stop mode. If a stop is requested, the drive performs a stop according to **[Type of stop]** STT.

NOTE: This function cannot be used with some other functions.

[Type of stop] STT

Normal stop mode.

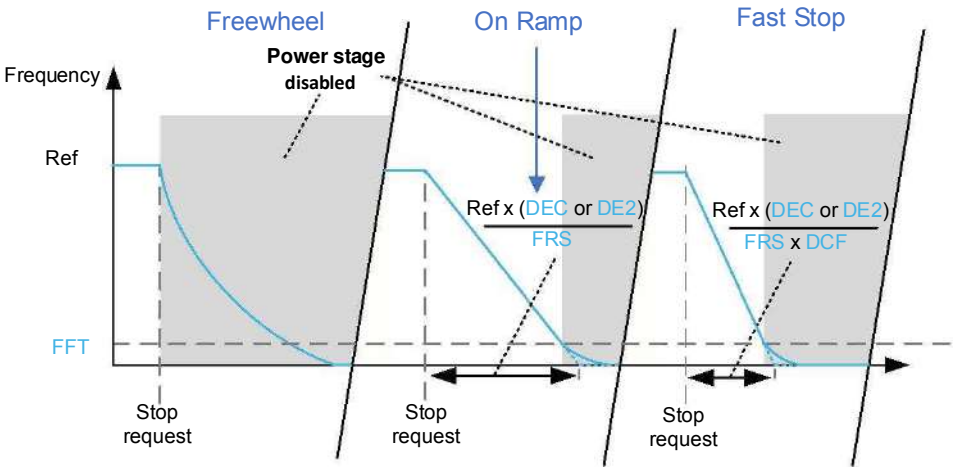
This parameter allows to configure the stop of the drive on removal of the run command.

NOTE: Some errors can follow this behavior.

The setting of this parameter is not taken into account when the active command channel is set to a communication channel and **[Control Mode]** CHCF is set to **[Not separ.]** SIM or **[Separate]** SEP. In this case, the stop mode is defined by the parameter **[SwitchOnDisable Stp]** DOTD , page 321.

Setting	Code / Value	Description
[On Ramp]	RMP	The stop follows a ramp determined according to **[Deceleration]** DEC (or **[Deceleration 2]** DE2 depending on which one is active at the corresponding stop request). It can be requested: • At removal of the run command or at stop request (such as pressing the OFF/RESET button), according to STT. • Drive switching from the operating state Operation enabled to the operating state Switched on depending on DOTD. **Factory setting**
[Fast stop]	FST	The stop follows a ramp determined by **[Deceleration]** DEC (or **[Deceleration 2]** DE2) divided by **[Ramp Divider]** DCF coefficient. It can be requested: • At removal of the run command or at stop request (such as pressing the STOP/RESET button), according to STT. • Using a digital input or a bit depending on FST.
[Freewheel Stop]	NST	Power stage is disabled. It can be requested: • At removal of the run command or at stop request (such as pressing the STOP/RESET button), according to STT. • Using a digital input or a bit depending on NST. • Using a configurable threshold FFT. • Drive switching from the operating state Operation enabled to the operating state Switched on depending on DOTD.
[DC injection]	DCI	DC voltage is injected in the winding of the motor. See below the profile of this DC injection. It can be requested: • At removal of the run command or at stop request (such as pressing the STOP/RESET button), according to STT. • Using a digital input or a bit depending on DCI. **NOTE:** Up to the 18.5 kW rating, if DC injection is applied while the motor is running, a **[DC Bus OverV]** OBF error may be triggered.

NOTE:if **[Type of stop]** STT set to**[DC injection]** DCI and synchronous law is configured then **[Type of stop]** STT is set to **[On Ramp]** RMP.



[Freewheel Stop] NST

The motor stops in freewheel when the assigned input or the bit changes to 0. If the input returns to state 1 and the run command is still active, the motor will only restart if **[2/3-Wire Control]** TCC is set to **[2-Wire Control]** 2C and if **[2-wire type]** TCT is set to **[Level]** LEL or **[Level With Fwd Priority]** PFO. If not, a new run command must be applied.

Setting	Code / Value	Description
[Not Assigned]	NO	Not assigned **Factory setting**
[CD00]...**[CD10]**	CD00...CD10	Virtual digital input CMD.0...CMD.10 in **[I/O profile]** IO configuration
[CD11]...**[CD15]**	CD11...CD15	Virtual digital input CMD.11...CMD.15 regardless of configuration
[DI1 (Low level)]...**[DI6 (Low level)]**	L1L...L6L	Digital input DI1...DI6 used at low level
[DI11 (Low level)]...**[DI16 (Low level)]**	L11L...L16L	Digital input DI11...DI16 used at low level if VW3A3203 I/O extension module has been inserted

[Freewheel stop Thd] FFT ★

Speed threshold below which the motor switches to freewheel stop.

This parameter allows switching from a ramp stop or a fast stop to a freewheel stop when the speed drops below a low speed threshold.

This parameter can be accessed if:

- **[Type of stop]** STT is set to **[Fast stop]** FST or **[On Ramp]** RMP, and
- **[Auto DC Injection]** ADC is not configured.

Setting	Description
0.2...500.0 Hz	Setting range **Factory setting**: **[Freewheel stop Thd]** FFT default value is 0.4% of FRS(S), with a minimum of 0.2 Hz.

[Fast Stop Assign] FST

The motor stops in fast stop when the assigned input or the bit changes to 1. (bit in **[I/O profile]** IO at 0). Fast stop function is activated as long as **[Fast Stop Assign]** FST is set to 1, whatever the channel which controls the drive.

If the input returns to state 1 and the run command is still active, the motor will only restart if **[2/3-Wire Control]** TCC is set to **[2-Wire Control]** 2C and if **[2-wire type]** TCT is set to **[Level]** LEL or **[Level With Fwd Priority]** PFO.

If not, a new run command must be applied.

NOTE: This function cannot be used with some other functions.

Setting	Code / Value	Description
[Not Assigned]	NO	Not assigned **Factory setting**
[CD00]...**[CD10]**	CD00...CD10	Virtual digital input CMD.0...CMD.10 in **[I/O profile]** IO configuration
[CD11]...**[CD15]**	CD11...CD15	Virtual digital input CMD.11...CMD.15 regardless of configuration
[DI1 (Low level)]...**[DI6 (Low level)]**	L1L...L6L	Digital input DI1...DI6 used at low level
[DI11 (Low level)]...**[DI16 (Low level)]**	L11L...L16L	Digital input DI11...DI16 used at low level if VW3A3203 I/O extension module has been inserted

[Ramp Divider] DCF

Fast Stop deceleration ramp reduction coefficient.

When the fast stop function is activated the current deceleration time **[Deceleration]** DEC and **[Deceleration 2]** DE2 is divided by **[Ramp Divider]** DCF, so the selected output ramp deceleration is equal to input ramp deceleration divided by **[Ramp Divider]** DCF.

Value 0 corresponds to a minimum ramp time. Make sure that this value is compatible with the inertia being driven.

Setting	Description
0...10	Setting range **Factory setting**: 4

[DC Injection Assign] DCI

DC injection assignment.

This function is used in application which need:

- To stop the motor if it is running at low speed.
- To apply and remove braking torque at stop.

NOTE: Up to the 18.5 kW rating, if DC injection is applied while the motor is running, a **[DC Bus OverV]** OBF error may be triggered.

WARNING

UNINTENDED MOVEMENT

- Do not use DC injection to generate holding torque when the motor is at a standstill.
- Use a holding brake to keep the motor in the standstill position.

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

DC injection braking is initiated when the assigned input or bit changes to state 1.

If DCI current is injected, **[DC Inj Level 1]** IDC is set to 1.

If **[DC Injection Assign]** DCI function is still activated after **[DC Inj Time 1]** TDI, the DC current is automatically reduced to **[DC Inj Level 2]** IDC2.

When **[DC Injection Assign]** DCI function is deactivated, no more current is injected.

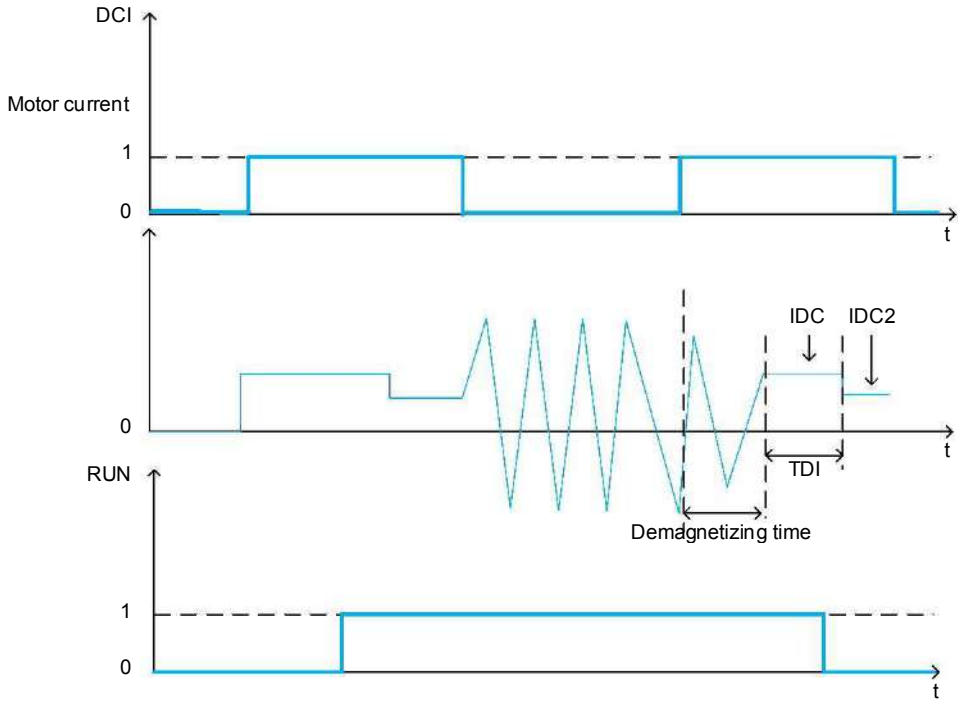
If the input returns to state 0 and the run command is still active, the motor will only restart if **[2/3-Wire Control]** TCC is set to **[2-Wire Control]** 2C and if **[2-wire type]** TCT is set to **[Level]** LEL or **[Level With Fwd Priority]** PFO. If not, a new run command must be applied.

When the stop requested mode is set to DC injection stop, first **[DC Inj Level 1]** **IDC** is injected during **[DC Inj Time 1]** **TDI** time, then **[DC Inj Level 2]** **IDC2** is injected during **[DC Inj Time 2]** **TDC** time.

NOTE:

- This function cannot be used with some other functions.
- This function is not available if synchronous law is activated.

Value range	Code / Value	Description
[Not Assigned]	NO	Not assigned **Factory setting**
[DI1]...**[DI6]**	LI1...LI6	Digital input DI1...DI6
[DI11]...**[DI16]**	LI11...LI16	Digital input DI11...DI16 if VW3A3203 I/O extension module has been inserted
[CD00]... **[CD10]**	CD00...CD10	Virtual digital input CMD.0...CMD.10 in **[I/O profile]** IO configuration
[CD11]... **[CD15]**	CD11...CD15	Virtual digital input CMD.11...CMD.15 regardless of configuration



[DC Inj Level 1] IDC ★

NOTICE
OVERHEATING Verify that the connected motor is properly rated for the DC injection current to be applied in terms of amount and time. **Failure to follow these instructions can result in equipment damage.**

Level of DC injection braking current activated via digital input or selected as stop mode.

This parameter can be accessed if:

- **[Type of stop]** STT is set to **[DC injection]** DCI, or
- **[DC Injection Assign]** DCI is not set to **[Not Assigned]** NO.

Setting	Description
0.1...1.41 In (1)	Setting range This setting is independent of the **[Auto DC injection]** ADC– function. **Factory setting**: 0.7 In (1)
(1) In corresponds to the rated drive current indicated in the Installation Manual and on the drive nameplate.	

[DC Inj Time 1] TDI

NOTICE

OVERHEATING

Verify that the connected motor is properly rated for the DC injection current to be applied in terms of amount and time.

Failure to follow these instructions can result in equipment damage.

Maximum current injection time **[DC Inj Level 1]** IDC. After this time, the injection current becomes **[DC Inj Level 2]** IDC2.

This parameter can be accessed if:

- **[Type of stop]** STT is set to **[DC injection]** DCI, or
- **[DC Injection Assign]** DCI is not set to **[Not Assigned]** NO.

Setting	Description
0.1...30 s	Setting range This setting is independent of the **[Auto DC injection]** ADC– function. **Factory setting**: 0.5 s

[DC Inj Level 2] IDC2 ★

NOTICE

OVERHEATING

Verify that the connected motor is properly rated for the DC injection current to be applied in terms of amount and time.

Failure to follow these instructions can result in equipment damage.

Injection current activated by digital input or selected as stop mode once period **[DC Inj Time 1]** TDI has elapsed.

This parameter can be accessed if:

- **[Type of stop]** STT is set to **[DC injection]** DCI, or
- **[DC Injection Assign]** DCI is not set to **[Not Assigned]** NO.

Setting	Description
0.1 In (1)...**[DC Inj Level 1]** IDC	Setting range This setting is independent of the **[Auto DC injection]** ADC– function. **Factory setting**: 0.5 In (1)
(1) In corresponds to the rated drive current indicated in the Installation Manual and on the drive nameplate.	

[DC Inj Time 2] TDC ★

NOTICE

OVERHEATING

Verify that the connected motor is properly rated for the DC injection current to be applied in terms of amount and time.

Failure to follow these instructions can result in equipment damage.

Maximum injection time **[DC Inj 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 Assign]** DCI.

Setting	Description
0.1...30 s	Setting range This setting is independent of the **[Auto DC injection]** ADC– function. **Factory setting**: 0.5 s

[SwitchOnDisable Stp] DOTD

Type of switchOn Disable Stop.

Setting	Code / Value	Description
[Freewheel Stop]	NST	The drive stops in freewheel when switching from the operating state Operation enabled to the operating state Switched on.
[Ramp Stop]	RMP	The drive stops on ramp when switching from the operating state Operation enabled to the operating state Switched on. **Factory setting**

NOTE: [SwitchOnDisable Stp] DOTD is used when the product is controlled via fieldbus (BACnet, ...). For more information refer to the Related Documents, page 15.

[Generic functions] - [Auto DC injection] ADC– Menu

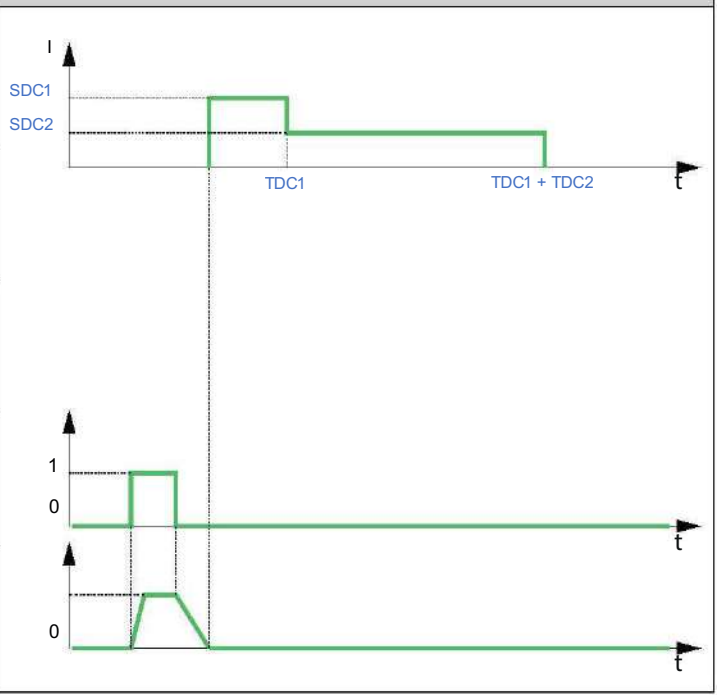
Access

[Complete settings] ➞ **[Generic functions]** ➞ **[Auto DC injection]**

About This Menu

This menu presents the automatic injection of motor current function. This is used to hold the rotor of the motor at the end of the deceleration ramp.

The following table presents an overview of the **[Auto DC injection]** ADC function:

ADC	SDC1	SDC2	Description	Operation
YES	x	x	The **[Auto DC inj Level 1]** SDC1 is injected during **[Auto DC Inj Time 1]** TDC1 and **[Auto DC inj Level 2]** SDC2 during **[Auto DC Inj Time 2]** TDC2 .	
CT	x	≠ 0	The **[Auto DC inj Level 1]** SDC1 is injected during TDC1 and then **[Auto DC inj Level 2]** SDC2 is injected.	
CT	x	= 0	Injection of **[Auto DC inj Level 1]** SDC1	
Run command				
Speed				

[Auto DC Injection] ADC

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

If the parameter **[Auto DC Injection]** ADC is set to **[Continuous]** CT, DC injection is always active, even if the motor does not run.

- Verify that using this setting does not result in unsafe conditions.

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

⚠WARNING

UNINTENDED MOVEMENT

- Do not use DC injection to generate holding torque when the motor is at a standstill.
- Use a holding brake to keep the motor in the standstill position.

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).

Setting	Code / Value	Description
[No]	NO	No injection **Factory setting**
[Yes]	YES	Time Limited DC injection
[Continuous]	CT	Continuous standstill injection

[Auto DC inj Level 1] SDC1 ★

NOTICE

OVERHEATING

Verify that the connected motor is properly rated for the DC injection current to be applied in terms of amount and time.

Failure to follow these instructions can result in equipment damage.

Level of standstill DC injection current.

This parameter can be accessed if:

- **[Auto DC Injection]** ADC is not set to **[No]** NO

Setting	Description
0...1.1 In (1)	Setting range **Factory setting**: 0.7 In (1)
(1) In corresponds to the rated drive current indicated in the Installation Manual and on the drive nameplate.	

[Auto DC Inj Time 1] TDC1 ★

NOTICE

OVERHEATING

Verify that the connected motor is properly rated for the DC injection current to be applied in terms of amount and time.

Failure to follow these instructions can result in equipment damage.

This parameter can be accessed if

- **[Auto DC Injection]** ADC is not set to **[No]** NO.

Setting	Description
0.1...30.0 s	Setting range **Factory setting**: 0.5 s

This parameter is not applicable when the **[Auto DC Injection]** ADC is set to **[Continuous]** CT and **[Auto DC inj Level 2]** SDC2 value is 0.

[Auto DC inj Level 2] SDC2 ★

NOTICE
OVERHEATING Verify that the connected motor is properly rated for the DC injection current to be applied in terms of amount and time. **Failure to follow these instructions can result in equipment damage.**

Second level of standstill DC injection current.

This parameter can be accessed if:

- **[Auto DC Injection]** ADC is not set to **[No]** NO.

Setting	Description
0...1.1 In (1)	Setting range **Factory setting**: 0.5 In (1)
(1) In corresponds to the rated drive current indicated in the Installation Manual and on the drive nameplate.	

[Auto DC Inj Time 2] TDC2 ★

NOTICE
OVERHEATING Verify that the connected motor is properly rated for the DC injection current to be applied in terms of amount and time. **Failure to follow these instructions can result in equipment damage.**

Second standstill injection time.

This parameter can be accessed if:

- **[Auto DC Injection]** ADC is set to **[Yes]** YES.

Setting	Description
0.0...30.0 s	Setting range **Factory setting**: 0.0 s

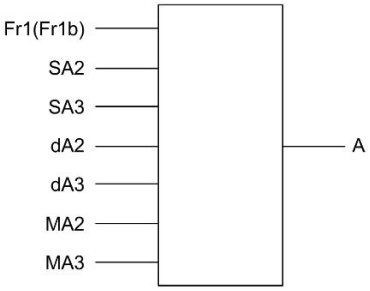
[Generic functions] - [Ref. operations] OAI– Menu

Access

[Complete settings] ➡ **[Generic functions]** ➡ **[Ref. operations]**

About This Menu

Summing input / subtraction input / multiplier



A (FR1 or FR1B + SA2 + SA3 - DA2 - DA3) x MA2 x MA3

NOTE:

- The reference output is signed and limited by **[High Speed]** HSP and **[Low Speed]** LSP.
- 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 a multiplication, the signal on MA2, or MA3 is interpreted as a %. 100% corresponds to the maximum value of the corresponding input. If MA2, or MA3 is sent via the communication bus or Graphic Display Terminal, an MFR multiplication variable must be sent via the bus or Graphic Display Terminal.
- Reversal of the direction of operation in the event of a negative result can be blocked (see **[Reverse Disable]** RIN).

[Summing Input 2] SA2

Selection of a reference to be added to **[Ref Freq 1 Config]** FR1 or **[Ref.1B channel]** FR1B.

Setting	Code / Value	Description
[Not Configured]	NO	Not assigned **Factory Setting**
[AI1]	AI1	Analog input AI1
[AI2]...**[AI3]**	AI2...AI3	Analog input AI2...AI3
[AI4]...**[AI5]**	AI4...AI5	Analog input AI4...AI5 if VW3A3203 I/O extension module has been inserted
[HMI]	LCC	Reference Frequency via remote terminal
[Ref. Freq-Modbus]	MDB	Reference frequency via Modbus
[Ref. Freq-Com. Module]	NET	Reference frequency via fieldbus module if a fieldbus module has been inserted

Setting	Code / Value	Description
[Bacnet MS/TP]	EBM	Reference frequency via the embedded BACnet MSTP module
[AI Virtual 1]...**[AI Virtual 3]**	AIV1...AIV3	Virtual analogic input 1...3

[Summing Input 3] SA3

Selection of a reference to be added to **[Ref Freq 1 Config]** FR1 or **[Ref.1B channel]** FR1B.

Identical to **[Summing Input 2]** SA2

[Subtract Ref Freq 2] DA2

Selection of a reference to be subtracted from **[Ref Freq 1 Config]** FR1 or **[Ref.1B channel]** FR1B.

Identical to **[Summing Input 2]** SA2

[Subtract Ref Freq 3] DA3

Selection of a reference to be subtracted from **[Ref Freq 1 Config]** FR1 or **[Ref.1B channel]** FR1B.

Identical to **[Summing Input 2]** SA2.

[Ref Freq 2 Multiply] MA2

Reference frequency 2 multiply (in % of the source range).

Selection of a multiplier reference **[Ref Freq 1 Config]** FR1 or **[Ref.1B channel]** FR1B.

Identical to **[Summing Input 2]** SA2.

[Ref Freq 3 Multiply] MA3

Reference frequency 3 multiply (in % of the source range).

Selection of a multiplier reference **[Ref Freq 1 Config]** FR1 or **[Ref.1B channel]** FR1B.

Identical to **[Summing Input 2]** SA2.

[Generic functions] - [Preset speeds] PSS– Menu

Access

[Complete settings]➞ [Generic functions]➞ [Preset speeds]

About This Menu

NOTE: This function cannot be used with some other functions.

Combination Table for Preset Speed Inputs

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

It is necessary to configure:

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

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

(1) Reference 1 = SP1, refer to diagram , page 211

[2 Preset Freq] PS2

2 Preset Freq assignment.

Value range	Code / Value	Description
[Not Assigned]	NO	Not assigned **Factory setting**
[DI1]...[DI6]	LI1...LI6	Digital input DI1...DI6
[DI11]...[DI16]	LI11...LI16	Digital input DI11...DI16 if VW3A3203 I/O extension module has been inserted

Value range	Code / Value	Description
[CD00]... **[CD10]**	CD00...CD10	Virtual digital input CMD.0...CMD.10 in **[I/O profile]** IO configuration
[CD11]... **[CD15]**	CD11...CD15	Virtual digital input CMD.11...CMD.15 regardless of configuration

[4 Preset Freq] PS4

Identical to **[2 Preset Freq]** PS2

To obtain 4 speeds, you must also configure 2 speeds.

[8 Preset Freq] PS8

Identical to **[2 Preset Freq]** PS2

To obtain 8 speeds, you must also configure 2 and 4 speeds.

[16 Preset Freq] PS16

Identical to **[2 Preset Freq]** PS2

To obtain 16 speeds, you must also configure 2, 4 and 8 speeds.

[Preset speed 2] SP2 to [Preset speed 16] SP16 ★

This parameter is visible only if **[2 Preset Freq]** PS2,**[4 Preset Freq]** PS4,**[8 Preset Freq]** PS8 and **[16 Preset Freq]** PS16 are not set to **[Not Assigned]** NO.

See the combination table for preset speed inputs, page 327.

Setting	Description
0.0...500.0 Hz	Setting range **Factory setting**: • **[Preset speed 2]** SP2: 10.0 Hz • **[Preset speed 3]** SP3: 15.0 Hz • **[Preset speed 4]** SP4: 20.0 Hz • **[Preset speed 5]** SP5: 25.0 Hz • **[Preset speed 6]** SP6: 30.0 Hz • **[Preset speed 7]** SP7: 35.0 Hz • **[Preset speed 8]** SP8: 40.0 Hz • **[Preset speed 9]** SP9: 45.0 Hz • **[Preset speed 10]** SP10: 50.0 Hz • **[Preset speed 11]** SP11: 55.0 Hz • **[Preset speed 12]** SP12: 60.0 Hz • **[Preset speed 13]** SP13: 70.0 Hz • **[Preset speed 14]** SP14: 80.0 Hz • **[Preset speed 15]** SP15: 90.0 Hz • **[Preset speed 16]** SP16: 100.0 Hz

[Generic functions] - [+/- speed] UPD– Menu

Access

[Complete settings]➡ [Generic functions]➡ [+/- speed]

About This Menu

This function can be accessed if reference channel **[Ref Freq 2 Config]** FR2 is set to **[Ref Freq via DI]** UPDT

NOTE: This function cannot be used with some other functions.

2 types of operations are available:

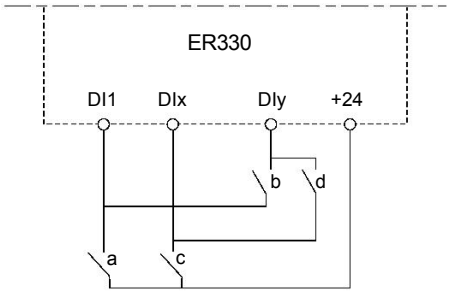
- **Use of single press buttons:** 2 digital inputs are required in addition to the operating directions.

  The input assigned to the “+ speed” command increases the speed, the input assigned to the “– speed” command decreases the speed.
- **Use of double press buttons:** Only one digital input assigned 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.

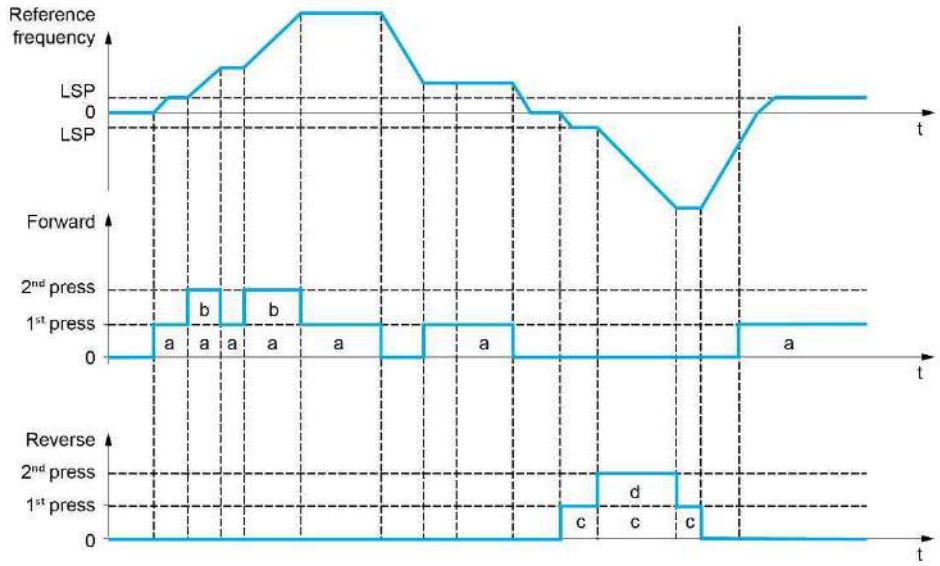
Setting	Released (– Speed)	First Press (Speed Maintained)	Second Press (Faster)
Forward button	–	a	a and b
Reverse button	–	c	c and d



DI1 Forward

DIx Reverse

DIy + speed



Do not use this +/– speed with double-press buttons with a 3-wire control.

Whichever type of operation is selected, the max. speed is set by **[High Speed]** HSP.

NOTE: If the reference is switched via **[Freq Switch Assign]** RFC from any reference channel to another reference channel with "+/– speed", the value of reference **[Motor Frequency]** RFR (after ramp) may be copied at the same time in accordance with the **[Copy Ch1-Ch2]** COP parameter.

This helps to prevent the speed from being incorrectly reset to zero when switching takes place.

[+ Speed Assign] USP

Increase speed input assignment.

Function active if the assigned input or bit is at 1.

Value range	Code / Value	Description
[Not Assigned]	NO	Not assigned **Factory setting**
[DI1]...**[DI6]**	LI1...LI6	Digital input DI1...DI6
[DI11]...**[DI16]**	LI11...LI16	Digital input DI11...DI16 if VW3A3203 I/O extension module has been inserted
[CD00]... **[CD10]**	CD00...CD10	Virtual digital input CMD.0...CMD.10 in **[I/O profile]** IO configuration
[CD11]... **[CD15]**	CD11...CD15	Virtual digital input CMD.11...CMD.15 regardless of configuration

[- Speed Assign] DSP

Down speed input assignment. See the assignment conditions.

Parameter settings identical to **[+ Speed Assign]** USP.

Function active if the assigned input or bit is at 1.

[Ref Frequency Save] STR ★

Reference frequency saves. This parameter can be accessed if **[+ Speed Assign]** USP is not set to **[Not Assigned]** NO or **[- Speed Assign]** DSP is not set to **[Not Assigned]** NO.

Associated with the "+/– speed" function, this parameter can be used to save the reference:

- When the run commands disappear (saved to RAM).
- When the supply mains or the run commands disappear (saved to EEPROM).

Therefore, next time the drive starts up, the speed reference is the last reference frequency saved.

Setting	Code / Value	Description
[No Save]	NO	Not saved **Factory setting**
[Save to RAM]	RAM	+/- speed with saving of the reference frequency in RAM
[Save to EEPROM]	EEP	+/- speed with saving of the reference frequency in EEPROM

[+/- Speed Reference] SRT

This parameter is available only if **[+ Speed Assign]** USP or **[- Speed Assign]** DSP are configured.

Setting	Code / Value	Description
[Motor Speed]	NO	Motor speed **Factory setting**
[Reference Speed]	YES	Reference speed

[Generic functions] - [Jump frequency] JUF– Menu

Access

[Complete settings] ➡ **[Generic functions]** ➡ **[Jump frequency]**

About This Menu

Identical to **[Jump frequency]** JUF– Menu , page 301.

[Generic functions] - [PID controller] PID– Menu

Access

[Complete settings] ➞ [Generic functions] ➞ [PID controller]

About This Menu

Identical to **[PID controller]** PID– Menu , page 242.

[Generic functions] - [Feedback Monitoring] FKM– Menu

Access

[Complete settings] ➞ **[Generic functions]** ➞ **[Feedback Monitoring]**

About This Menu

Identical to **[Feedback Monitoring]** FKM– Menu , page 274.

[Generic functions] - [Threshold reached] THRE– Menu

Access

[Complete settings] ➡ [Generic functions] ➡ [Threshold reached]

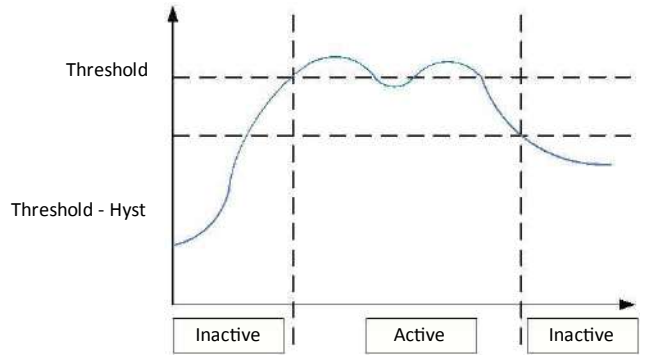
About This Menu

This menu contains parameters used to define thresholds. The event linked to the reach of each one of these thresholds can be used to:

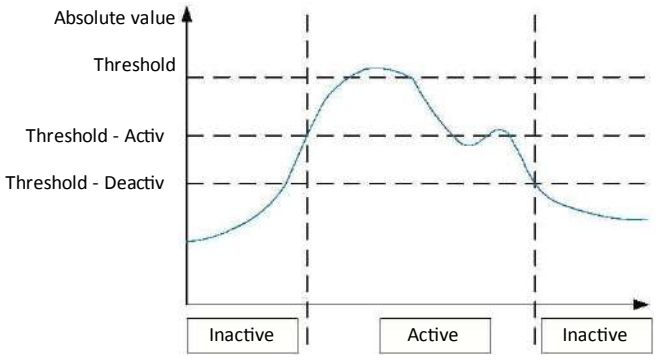
- Trigger a warning,
- Trigger an output relay (or digital output),
- Activate/Deactivate a function.

There are many types of activation of threshold:

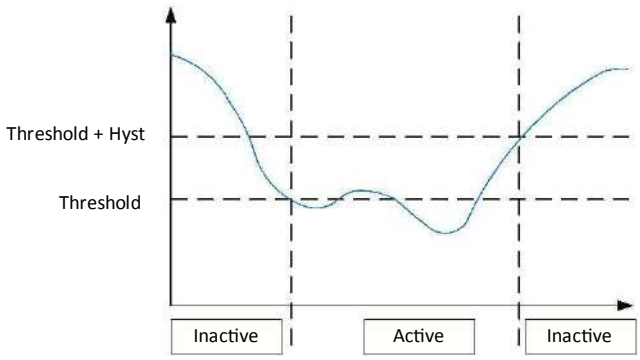
1. High Threshold



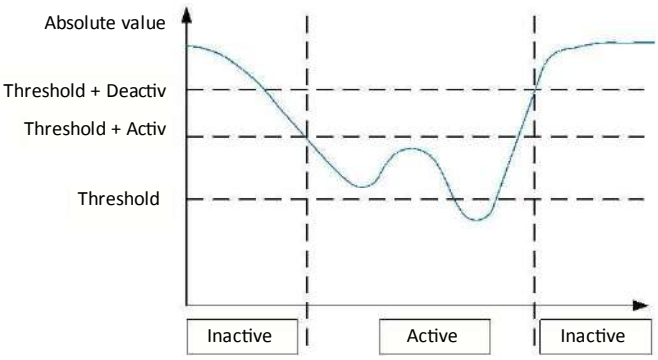
2. High Threshold (with a different active threshold)



3. Low Threshold



4. Low Threshold (with a different active threshold)



The list of parameters used to define thresholds.

Parameter (Threshold)	Type of threshold	Range (threshold value)	Factory setting	Hysteresis value	Warning triggered / Output setting	Monitored value (and additional information)
[Low I Threshold] CTDL	3 Low	Max. value of CTDL is MAX between 1.1*INV(PN) and 1.5*INV(PN-1)	0 A	Maximum of 0.2 A and 3% of CTDL	**[Low Cur Reached]** CTAL	**[Motor Current]** LCR
[High Current Thd] CTD	1 High	Max. value of CTD is MAX between 1.1*INV(PN) and 1.5INV*(PN-1)	INV Drive nominal current	Maximum of 0.2 A and 3% of CTD	**[Cur Thd Reached]** CTA	**[Motor Current]** LCR It can be used to indicate an important load on the motor.

The list of parameters used to define thresholds. (Continued)

Parameter (Threshold)	Type of threshold	Range (threshold value)	Factory setting	Hysteresis value	Warning triggered / Output setting	Monitored value (and additional information)
[Low Freq. Threshold] FTDL	4 Low	0.0…500.0 Hz	0.0 Hz	Activ: maximum of 0.1 Hz and 0.2% of FTDL Deactiv: maximum of 0.3 Hz and 0.6% of FTDL	**[Mot Freq Low Thd]** FTAL	Absolute value of **[Motor Frequency]** RFR. The event can be triggered if the drive is in RUN. It can be used to put to sleep a function (such as PID).
[Motor Freq Thd] FTD	2 High	0.0…500.0 Hz	50.0 or 60.0 Hz (according to **[Motor Standard]** BFR)	Activ: maximum of 0.1 Hz and 0.2% of FTD Deactiv: maximum of 0.3 Hz and 0.6% of FTD	**[Mot Freq High Thd]** FTA	
[2 Freq. Threshold] F2DL	4 Low	0.0…500.0 Hz	0.0 Hz	Similar to **[Low Freq.Threshold]** FTDL	**[Mot Freq Low Thd 2]** F2AL	
[Freq. threshold 2] F2D	2 High	0.0…500.0 Hz	50.0 or 60.0 Hz (according to **[Motor Standard]** BFR)	Similar to **[Motor Freq Thd]** FTD	**[Mot Freq High Thd 2]** F2A	
[Motor Therm Thd] TTD	1 High	0…118 % of the thermal value of the sensors in the motor	100 % of the thermal value of the sensors in the motor	5%	**[Motor Th Thd reached]** TSA	**[Mot Thermal]** THR
[Reference high Thd] RTD	1 High	0.0…500.0 Hz	0.0 Hz	1.0 Hz	**[Ref Freq High Thd reached]** RTAH	Absolute value of **[Pre-Ramp Ref Freq]** FRH. The event can be triggered if the drive is in RUN. ---
[Reference low Thd] RTDL	3 Low	0.0…500.0 Hz	0.0 Hz	1.0 Hz	**[Ref Freq Low Thd reached]** RTAL	

[Generic functions] - [Mains contactor cmd] LLC– Menu

Access

[Complete settings]➞ [Generic functions]➞ [Mains contactor cmd]

About This Menu

The line contactor closes every time a run command (forward or reverse) is sent and opens after every stop, as soon as the drive is locked. For example, if the stop mode is stop on ramp, the contactor opens when the motor reaches zero speed.

NOTE: The drive control power supply must be provided via an external 24 Vdc source.

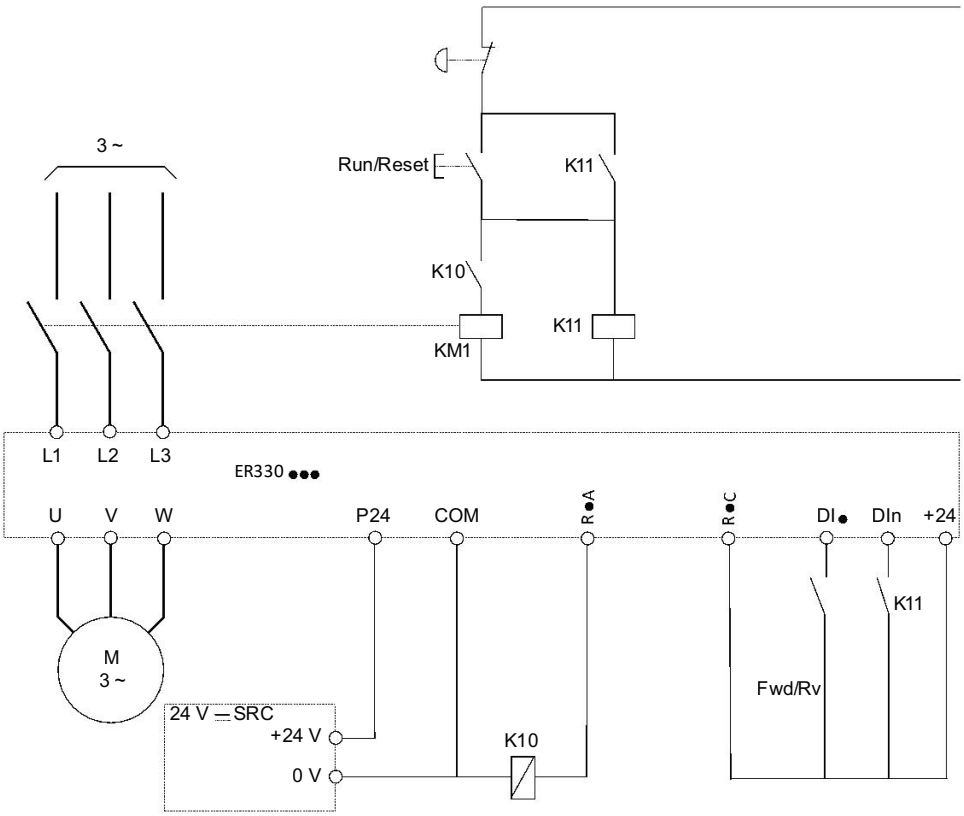
NOTICE

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.

Example circuit (24 Vdc power supply):



DI• = Run command **[Forward]** FRD or **[Reverse Assign]** RRS

R•A/R•C = **[Mains Contactor]** LLC

DIn = **[Device Lock]** LES

NOTE: The Run/Reset key must be pressed once the emergency stop key has been released.

[Mains Contactor] LLC

Mains contactor control.

This parameter is available only if stop and go function is not configured.

Setting	Code / Value	Description
[No]	NO	Not assigned **Factory setting**
[R2]...**[R3]**	R2...R3	Relay output R2...R3
[R4]...**[R6]**	R4...R6	Relay output R4...R6 if VW3A3204 relay output option module has been inserted
[DQ11]... **[DQ12]**	DO11...DO12	Digital output DQ11...DQ12 if VW3A3203 I/O extension module has been inserted

[Device Lock] LES ★

This parameter can be accessed if:

- **[Mains Contactor]** LLC is assigned.

The drive locks when the assigned input or bit changes to 0.

Setting	Code / Value	Description
[Not Assigned]	NO	Not assigned **Factory setting**
[CD00]... **[CD10]**	CD00...CD10	Virtual digital input CMD.0...CMD.10 in **[I/O profile]** IO configuration
[CD11]... **[CD15]**	CD11...CD15	Virtual digital input CMD.11...CMD.15 regardless of configuration
[DI1 (Low level)]...**[DI6 (Low level)]**	L1L...L6L	Digital input DI1...DI6 used at low level
[DI11 (Low level)]...**[DI16 (Low level)]**	L11L...L16L	Digital input DI11...DI16 used at low level if VW3A3203 I/O extension module has been inserted

[Mains V. time out] LCT

Mains V. time out.

Setting	Description
1...999 s	Setting range **Factory setting**: 5 s

[Generic functions] – [Reverse disable] REIN– Menu

Access

[Complete settings] ➞ [Generic functions] ➞ [Reverse disable]

[Reverse Disable] RIN

Reverse direction disable.

Reverse direction requests sent by digital inputs are taken into account.

Reverse direction requests sent by the Graphic Display Terminal or sent by the line are not taken into account.

Any reverse speed reference originating from the PID, summing input, and so on, is interpreted as a zero reference (0 Hz).

Setting	Code / Value	Description
[No]	NO	Motor rotation direction is defined by the run command **[Forward]** FRD or **[Reverse Assign]** RRS and the sign of the reference frequency. When the reference frequency is positive and a: • **[Forward]** FRD run command is given: the motor starts in forward direction • **[Reverse Assign]** RRS run command is given: the motor starts in reverse direction When the reference frequency is negative and a: • **[Forward]** FRD run command is given: the motor starts in reverse direction • **[Reverse Assign]** RRS run command is given: the motor starts in forward direction
[Yes]	YES	Any reverse speed reference originating from the PID, summing input, and so on, is interpreted as a zero reference (0 Hz). **Factory setting**

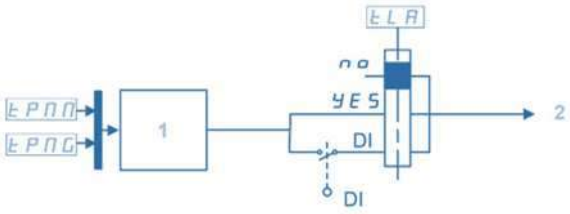
[Generic functions] – [Torque limitation] TOL– Menu

Access

[Complete settings] ➞ **[Generic functions]** ➞**[Torque limitation]**

About This Menu

The value of the torque limitation is fixed by a parameter.



1 Torque limitation via parameter in power

2 Limitation Value

[Torque limit activ.] TLA

Activation of the permanent torque limitation.

If the assigned input or bit is at 0, the function is inactive.

If the assigned input or bit is at 1, the function is active.

Value range	Code / Value	Description
[Not Assigned]	NO	Not assigned **Factory setting**
[Yes]	YES	YES
[DI1]...**[DI6]**	LI1...LI6	Digital input DI1...DI6
[DI11]...**[DI16]**	LI11...LI16	Digital input DI11...DI16 if VW3A3203 I/O extension module has been inserted
[CD00]... **[CD10]**	CD00...CD10	Virtual digital input CMD.0...CMD.10 in **[I/O profile]** IO configuration
[CD11]... **[CD15]**	CD11...CD15	Virtual digital input CMD.11...CMD.15 regardless of configuration

[Pmax Motor] TPMM ★

Maximum acceptable power in motor mode.

This parameter can be accessed if **[Torque limit activ.]** TLA is not set to **[Not Assigned]** NO.

Setting	Description
10...300%	Setting range **Factory setting**: 300%

[Generic functions] – [Parameters switching] MLP– Menu

Access

[Complete settings] ➡ [Generic functions] ➡ [Parameters switching]

About This Menu

A set of 1 to 15 parameters from the **[Parameter Selection]** SPS list , page 342 can be selected and 2 or 3 different values assigned. These 2 or 3 sets of values can then be switched using 1 or 2 digital inputs or control word bits. This switching can be performed during operation (motor running). It can also be controlled based on 1 or 2 frequency thresholds, whereby each threshold acts as a digital input (0 = threshold not reached, 1 = threshold reached).

	Values 1	Values 2	Values 3
Parameter 1 ... Parameter 15	Parameter 1 ... Parameter 15	Parameter 1 ... Parameter 15	Parameter 1 ... Parameter 15
Input DI or bit or frequency threshold 2 values	0	1	0 or 1
Input DI or bit or frequency threshold 3 values	0	0	1

NOTE: Do not modify the parameters in **[Parameter Selection]** SPS , page 342, because any modifications made in this menu will be lost on the next power-up. The parameters can be adjusted during operation in the **[Parameters switching]** MLP– menu, on the active configuration.

[2 Parameter sets] CHA1

Switching 2 parameter sets.

Setting	Code / Value	Description
[Not Assigned]	NO	Not assigned **Factory setting**
[Mot Freq High Thd]	FTA	Motor frequency high threshold reached
[Mot Freq High Thd 2]	F2A	Second frequency threshold reached
[DI1]...**[DI6]**	LI1...LI6	Digital input DI1...DI6
[DI11]...**[DI16]**	LI11...LI16	Digital input DI11...DI16 if VW3A3203 I/O extension module has been inserted
[CD00]... **[CD10]**	CD00...CD10	Virtual digital input CMD.0...CMD.10 in **[I/O profile]** IO configuration
[CD11]... **[CD15]**	CD11...CD15	Virtual digital input CMD.11...CMD.15 regardless of configuration

[3 Parameter sets] CHA2

Identical to **[2 Parameter sets]** CHA1.

Switching 3 parameter sets.

NOTE: In order to obtain 3 parameter sets, it is necessary to configure first **[2 Parameter sets]** CHA1.

[Parameter Selection] SPS

This parameter can be accessed if **[2 Parameter sets]** CHA1 is not set to **[Not Assigned]** NO.

Making an entry in this parameter opens a window containing all the adjustment parameters that can be accessed. Select 1 to 15 parameters using **OK** key. Parameter(s) can also be deselected using **OK** key.

Available parameters for parameters switching function are:

Parameter	Code
[Ramp increment]	INR
[Acceleration]	ACC
[Deceleration]	DEC
[Acceleration 2]	AC2
[Deceleration 2]	DE2
[Begin Acc round]	TA1
[End Acc round]	TA2
[Begin Dec round]	TA3
[End Dec round]	TA4
[Low Speed]	LSP
[High Speed]	HSP
[Motor Th Current]	ITH
[IR compensation]	UFR
[Slip compensation]	SLP
[K speed loop filter]	SFC
[Speed time integral]	SIT
[Speed prop. gain]	SPG
[Inertia Factor]	SPGU
[Ramp Divider]	DCF
[DC Inj Level 1]	IDC
[DC Inj Time 1]	TDI
[DC Inj Level 2]	IDC2
[DC Inj Time 2]	TDC
[Auto DC inj Level 1]	SDC1
[Auto DC Inj Time 1]	TDC1
[Auto DC inj Level 2]	SDC2
[Auto DC Inj Time 2]	TDC2
[Switching frequency]	SFR
[Current Limitation]	CLI
[Low Speed Timeout]	TLS
[Sleep Offset Thres.]	SLE
[Preset speed 2]...[Preset speed 16]	SP2...SP16
[Multiplying coeff.]	MFR
[PID Prop.Gain]	RPG
[PID Intgl.Gain]	RIG
[PID derivative gain]	RDG
[PID ramp]	PRP
[PID Min Output]	POL
[PID Max Output]	POH
[PID Start Ref Freq]	SFS
[PID acceleration time]	ACCP

Parameter	Code
[Min fbk Warning]	PAL
[Max fbk Warning]	PAH
[PID error Warning]	PER
[Speed input %]	PSR
[Ref PID Preset 2]	RP2
[Ref PID Preset 3]	RP3
[Ref PID Preset 4]	RP4
[PID Fdbk Range]	PFMR
[PID Fdbk Error Delay]	PFMD
[High Current Thd]	CTD
[Low I Threshold]	CTDL
[High torque thd.]	TTH
[Low torque thd.]	TTL
[Motor Freq Thd]	FTD
[Low Freq.Threshold]	FTDL
[Freq. threshold 2]	F2D
[2 Freq. Threshold]	F2DL
[Freewheel stop Thd]	FFT
[Motor Therm Thd]	TTD
[Reference high Thd]	RTD
[Reference low Thd]	RTDL
[Skip Frequency]	JPF
[Skip Frequency 2]	JF2
[3rd Skip Frequency]	JF3
[Skip Freq.Hysteresis]	JFH
[Unld.Thr.Nom.Speed]	LUN
[Unld.Thr.0.Speed]	LUL
[Unld. FreqThr. Det.]	RMUD
[Hysteresis Freq]	SRB
[Underload T.B.Rest.]	FTU
[Overload Threshold]	LOC
[Overload T.B.Rest.]	FTO
[Fan mode]	FFM
[Pmax Motor]	TPMM
[Pmax Generator]	TPMG
[Stall Max Time]	STP1
[Stall Current]	STP2
[Stall Frequency]	STP3
[AI2 Th Warn Level]	TH2A
[AI5 Th Warn Level]	TH5A
[AI2 Th Error Level]	TH2F
[AI5 Th Error Level]	TH5F

Parameter	Code
[Start Accel Ramp]	ACCS
[Dec. Check Valve]	DECV
[Check Valve Spd 2]	CVHS
[Check Valve Spd 1]	CVLS
[Final Dec. Ramp]	DECS
[Sleep Flow Level]	SLNL
[Sleep Min Speed]	SLSL
[Sleep Power Level]	SLPR
[Sleep Pressure Level]	SLPL
[Sleep Delay]	SLPD
[Sleep Boost Speed]	SLBS
[Sleep Boost Time]	SLBT
[Wake Up Proc level]	WUPF
[Wake Up Proc Error]	WUPE
[Wake Up Press level]	WUPL
[Sleep Condition]	ASLC
[Sleep Check Delay]	ASLD
[Check Sleep Ref spd]	ASLR
[Flow Lim Thd Active]	CHT
[FlowLim Thd Disable]	RCHT
[Flow. Limit Dec.]	DFL
[Pipe Fill Time]	PFHT
[Pipe Fill Speed]	PFHS
[Pipe Fill Pressure]	PFHP
[Priming Time]	PPSD
[Primed Inlet Level]	PPIL
[Primed Condition Delay]	PPFD
[Minimum Pressure]	JPRP
[Delay to start]	JPRD
[Maximum Pressure]	JPSP
[Reference Speed]	JPRS
[Wake up Delay]	JPWD
[Alpha]	FLDA
[Comp. at Point 1]	FLH1
[Flow at Point 1]	FLQ1
[Static Compensation]	FLH0
[OutPres Min Level]	OPPL
[OutPres Max Level]	OPPH
[OutPresError Delay]	OPPD
[HighFlow MaxLevel]	HFPL
[HighFlowError Delay]	HFPD
[PumpCycle MaxStarts]	PCPN

Parameter	Code
[PumpCycle timeframe]	PCPT
[InletPres High Thd]	IPPH
[InletPres Low Thd]	IPPL
[InletPres Max Comp]	IPPC
[DryRun Error Delay]	DRYD
[DryRun Restart Delay]	DRYR
[Dry Run Factor]	DRYX
[PumpLF Min Level]	PLFL
[PumpLF Pwr Factor]	PLFX
[PumpLF ActivDelay]	PLFA
[PumpLF Error Delay]	PLFD
[PumpLF Restart Delay]	PLFR
[Booster Stg Speed]	BSS
[Booster Dstg Spd]	BDS
[Booster Stg Delay]	BSD
[Booster Stg Bypass Spd]	BSBS
[Boost S Ramp Delay]	BSRD
[Boost S Bypass Time]	BSBT
[Booster Dstg Delay]	BDD
[Boost D bypass Spd]	BDBS
[Boost D Ramp Delay]	BDRD
[Boost D bypass Time]	BDBT
[Booster S/D Interval]	BSDT
[Boost Working range]	BCWA
[Boost Override range]	BCOA
[Booster S/D Flow Hyst]	BSDH
[Booster Dstg Flow]	BDF
[FeedFwd Stage Delay]	FFSD
[FeedFwd Destage Delay]	FFDD
[FeedFwd Disturb Gain]	FFG
[FeedFwd Disturb Time]	FFTG
[Pump Fixed Freq]	MPFS
[Pump Op Point Filter]	WPXF

[Set 1] PS1– to [Set 3] PS3–

3 possible sets of values.

Making an entry in this menu opens a settings window containing the selected parameters in the order in which they were selected.

Access to each menu in order to configure their own set of values.

[Generic functions] – [Multimotors config] MMC– Menu

Access

[Complete settings] ➞ **[Generic functions]** ➞ **[Multimotors config]**

About This Menu

This function is used to switch between up to 4 configurations using digital inputs or bits.

2 Different modes exist:

- **Multi-Configuration** mode (**[Multimotors]** CHM set to **[No]** NO): Up to 4 different configurations for a single motor. The drive parameters linked to the motor are shared between the configurations.
- **Multi–Motor** mode (**[Multimotors]** CHM set to **[Yes]** YES): Up to 4 different motor configuration. The drive parameters linked to the motor depends on the configuration; they must be defined for each configuration.

NOTE: The two modes cannot be combined.

Observe the following conditions:

- Switching may take place when stopped (drive locked). If a switching request is sent during operation, it is executed at next stop.
- When switching between motors, the concerned power and control terminals must be switched as appropriate.
- All configurations must share the same hardware configuration, i.e. the option modules cannot be removed or replaced by another when switching between configuration; otherwise the drive locks in **[Incorrect Config]** CFF.
- Switching to a configuration that does not exist causes the drive to lock in **[Empty Config]** CFI4. Use **[Save Configuration]** SCSI to save the current drive configuration.

Menus and Parameters Switched in Multi-Motor Mode

In multi-configurations mode, communication parameters are not switched.

- **[Motor parameters]** MPA– menu.
- **[Input/Output]** IO – menu.
- **[Generic functions]** CSGF– menu except for the **[Multimotors config]** MMC– function (to be configured once only).
- **[Generic monitoring]** GPR– menu.
- **[My menu]** MYMN– menu.

Define/Enter a drive configuration

Irrespective of the mode (multi-motor or multi-configuration), each one of the configurations must be entered in the drive; otherwise, the error **[Empty Config]** CFI4 is triggered.

The followings can be used to define/enter a drive configuration:

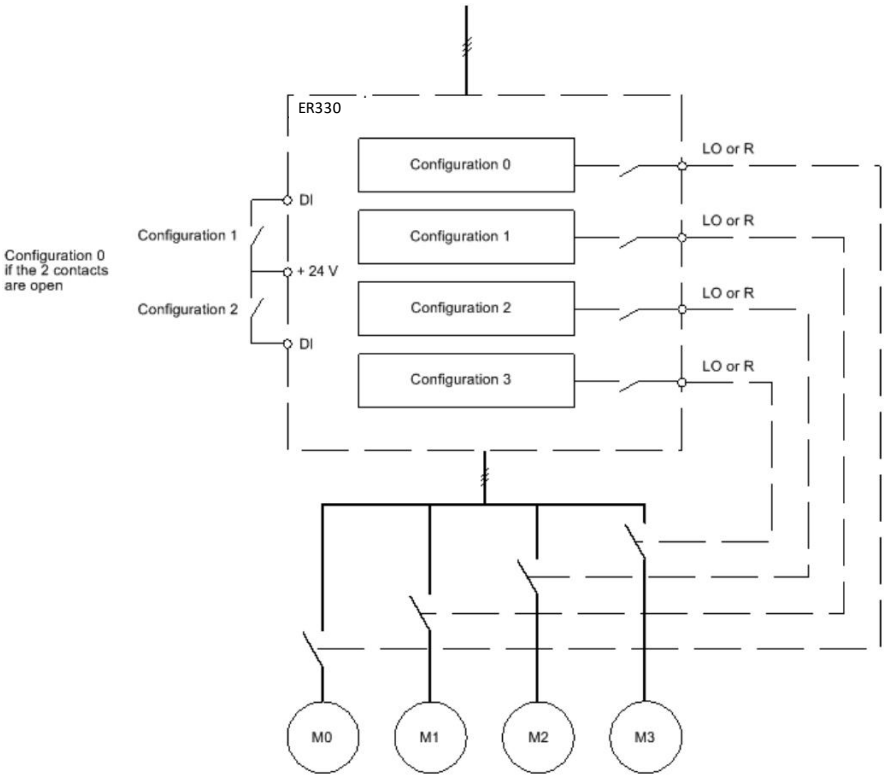
- Use **[Save Configuration]** SCSI to save the current drive configuration in the corresponding memory slot.
- Use the toolbar or the dedicated view in SoMove/DTM (refer to the DTM online help for more information).

Switching Command

Depending on the number of motors or selected configurations (Up to 4), the switching command is sent using one or two digital inputs (or bits). The table below lists the possible combinations.

DI or bit assigned to **[2 Configurations]** CNF1	DI or bit assigned to **[3 Configurations]** CNF2	Selected configuration or motor
0	0	Config 0
1	0	Config 1
0	1	Config 2
1	1	Config 3

Schematic Diagram for Multi-Motor Mode



Auto-Tuning in Multi-Motor Mode

On Multi-Motor mode, autotuning parameters for each motor are handled and stored. However, it is necessary to firstly perform autotuning on each motor.

This auto-tuning can be performed:

- Manually using a Digital input when the motor changes.
- Automatically on the selected motor at drive power-up if the **[Automatic autotune]** AUT is set to **[Yes]** YES.

Motor thermal states in multi-motor mode:

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

NOTICE
MOTOR OVERHEATING When the drive is switched off, the thermal states of the connected motors are not saved. When the drive is switched on again, the drive is not aware of the thermal states of the connected motors. • Use separate temperature sensors for each connected motor for thermal monitoring. **Failure to follow these instructions can result in equipment damage.**

Configuration Information Output

In the **[Input/Output]** IO – menu, a digital output can be assigned to each configuration or motor (2 to 4) for remote information transmission.

NOTE: As the **[Input/Output]** IO – menu is switched, these outputs must be assigned in all configurations in which information is required.

[Multimotors] CHM

Multimotors selection.

Value	Code / Value	Description
[No]	NO	Multi-configuration possible **Factory setting**
[Yes]	YES	Multi-motor possible

[2 Configurations] CNF1 and [3 Configurations] CNF2

To switch between configurations (multi-configuration or multi-motor).

NOTE: In order to obtain 4 motors or 4 configurations, **[2 Configurations]** CNF1 and **[3 Configurations]** CNF2 must be configured.

Setting	Code / Value	Description
[Not Assigned]	NO	Not assigned **Factory setting**
[DI1]...**[DI6]**	LI1...LI6	Digital input DI1...DI6
[DI11]...**[DI16]**	LI11...LI16	Digital input DI11...DI16 if VW3A3203 I/O extension module has been inserted
[CD00]... **[CD10]**	CD00...CD10	Virtual digital input CMD.0...CMD.10 in **[I/O profile]** IO configuration
[CD11]... **[CD15]**	CD11...CD15	Virtual digital input CMD.11...CMD.15 regardless of configuration
[C101]... **[C110]**	C101...C110	Virtual digital input CMD1.01...CMD1.10 with integrated Modbus Serial in **[I/O profile]** IO configuration
[C111]... **[C115]**	C111...C115	Virtual digital input CMD1.11...CMD1.15 with integrated Modbus Serial regardless of configuration
[C301]... **[C310]**	C301...C310	Virtual digital input CMD3.01...CMD3.10 with a fieldbus module in **[I/O profile]** IO configuration
[C311]... **[C315]**	C311...C315	Virtual digital input CMD3.11...CMD3.15 with a fieldbus module regardless of configuration

[C901] ... **[C910]**	C901...C910	Virtual digital input CMD9.01...CMD9.10 with BACnet MSTP **[I/O profile]** IO configuration
[C911] ... **[C915]**	C911...C915	Virtual digital input CMD9.11...CMD9.15 with BACnet MSTP regardless of configuration

[Generic monitoring]

[Process underload] ULD– Menu

Access

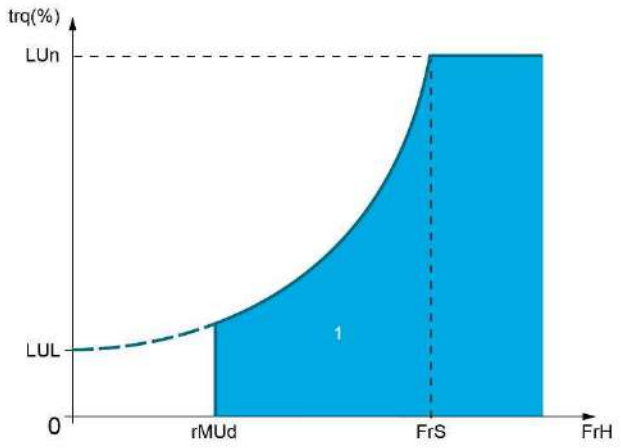
[Complete settings] ➡ **[Generic monitoring]** ➡ **[Process underload]**

Process Underload Detected Error

A process underload is detected when the next event occurs and remains pending for a minimum time **[Unld Detect Delay]** ULT, which is configurable:

- The motor is in steady state and the torque is below the set underload limit (**[Unld.Thr.0.Speed]** LUL, **[Unld.Thr.Nom.Speed]** LUN, **[Unld. FreqThr. Det.]** RMUD parameters).
- The motor is in steady state when the offset between the frequency reference and motor frequency falls below the configurable threshold **[Hysteresis Freq]** SRB.

Between zero frequency and the rated frequency, the curve reflects the following equation: torque = LUL + (LUN - LUL) x (frequency)^2 / (rated frequency)^{2}The underload function is not active for frequencies below RMUD.



1 Underload zone.

A relay or a digital output can be assigned to the signaling of this detected error in the **[Input/Output]** IO –, **[I/O assignment]** IOAS– menus.

[Unld Detect Delay] ULT

Underload detection time delay.

It is reset to zero if the torque rises above the value of **[Unld.Thr.0.Speed]** LUL + 10% (hysteresis).

A value of 0 deactivates the function and makes the other parameters inaccessible.

Setting	Description
0...100 s	Setting range **Factory setting**: 0 s

[Unld.Thr.Nom.Speed] LUN ★

Underload threshold at nominal motor speed **[Nominal Motor Freq]** FRS, as a % of the rated motor torque.

This parameter can be accessed if **[Unld Detect Delay]** ULT is not set to 0.

Setting	Description
20...100%	Setting range **Factory setting**: 60%

[Unld.Thr.0.Speed] LUL ★

Underload threshold at zero frequency as a % of the rated motor torque.

This parameter can be accessed if **[Unld Detect Delay]** ULT is not set to 0.

Setting	Description
0...**[Unld.Thr.Nom.Speed]** LUN	Setting range **Factory setting**: 0%

[Unld. FreqThr. Det.] RMUD ★

Minimum frequency underload detection threshold.

This parameter can be accessed if **[Unld Detect Delay]** ULT is not set to 0.

Setting	Description
0.0...500.0 Hz	Setting range **Factory setting**: 0.0 Hz

[Hysteresis Freq] SRB ★

Maximum deviation between the frequency reference and the motor frequency, which defines a steady state operation.

This parameter can be accessed if **[Unld Detect Delay]** ULT or **[Ovld Detection Delay]** TOL is not set to 0.

Setting	Description
0.3...500.0 Hz	Setting range **Factory setting**: 0.3 Hz

[Underload ErrorResp] UDL ★

Behavior on switching to underload detection.

This parameter can be accessed if **[Unld Detect Delay]** ULT is not set to 0.

Setting	Code / Value	Description
[Ignore]	NO	Detected error ignored
[Freewheel Stop]	YES	Freewheel stop

Setting	Code / Value	Description
		Factory setting
[Ramp stop]	RMP	Stop on ramp
[Fast stop]	FST	Fast stop

[Underload T.B.Rest.] FTU

Minimum time permitted between an underload being detected and any automatic restart.

To allow an automatic restart, the value of **[Fault Reset Time]** TAR must exceed this parameter by at least 1 minute.

This parameter can be accessed if **[Underload ErrorResp]** UDL is not set to **[Ignore]** NO.

Setting()	Description
0...6 min	Setting range **Factory setting**: 0 min

[Process overload] OLD– Menu

Access

[Complete settings] → **[Generic monitoring]** → **[Process overload]**

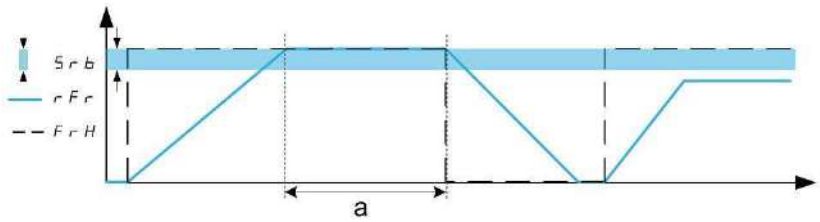
About This Menu

A process overload error is detected when the next event occurs and remains pending for a minimum time **[Ovld Detection Delay]** TOL, which is configurable:

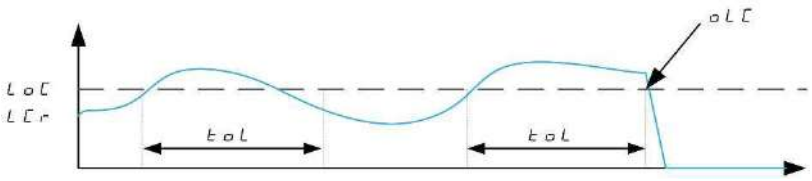
- The drive is in **[Current Limitation]** CLI mode during acceleration, deceleration, or,
- The motor is in steady state and the **[Motor Current]** LCR is above the set overload threshold **[Overload Threshold]** LOC.

NOTE: If **[Ovld Detection Delay]** TOL is set to 0, then the overload detection is not enabled.

The motor is in steady state when the offset difference between **[Pre-Ramp Ref Freq]** FRH and **[Motor Frequency]** RFR is less than the configurable threshold **[Hysteresis Freq]** SRB.



NOTE: Process overload monitoring is always active in **[Current Limitation]** CLI state.



[Ovld Detection Delay] TOL

A value of 0 deactivates the function and makes the other parameters inaccessible.

Setting	Description
0...100 s	Setting range **Factory setting**: 0 s

[Overload Threshold] LOC ★

Overload detection threshold, as a % of the rated motor current **[Nom Motor Current]** NCR. This value must be less than the limit current in order for the function to work.

This parameter can be accessed if **[Ovld Detection Delay]** TOL is not set to 0.

Setting	Description
70...150%	Setting range **Factory setting**: 110%

[Hysteresis Freq] SRB ★

Maximum deviation between the frequency reference and the motor frequency, which defines a steady state operation. Steady state is maintained as long as this deviation remains below the steady level plus hysteresis.

This parameter can be accessed if **[Ovld Detection Delay]** TOL or **[Unld Detect Delay]** ULT is not set to 0.

Setting	Description
0.3...500.0 Hz	Setting range **Factory setting**: 0.3 Hz

[Overload ErrorResp] ODL ★

Behavior on switching to overload detection.

This parameter can be accessed if **[Ovld Detection Delay]** TOL is not set to 0.

Setting	Code / Value	Description
[Ignore]	NO	Detected error ignored
[Freewheel Stop]	YES	Freewheel stop **Factory setting**
[Ramp stop]	RMP	Stop on ramp
[Fast stop]	FST	Fast stop

[Overload T.B.Rest.] FTO ★

Minimum time permitted between an overload being detected and any automatic restart.

In order to allow an automatic restart, the value of **[Fault Reset Time]** TAR must exceed this parameter by at least 1 minute.

This parameter can be accessed if **[Ovld Detection Delay]** TOL or **[Overload ErrorResp]** ODL is not set to 0.

Setting	Description
0...6 min	Setting range **Factory setting**: 0 min

[Stall monitoring] STPR– Menu

Access

[Complete settings] ➞ **[Generic monitoring]** ➞ **[Stall monitoring]**

NOTE: This function is not called when the drive is in DC injection mode.

About This Menu

This function helps to prevent a motor overload by monitoring the motor current and the speed rise time.

A stalling condition is when:

- An output frequency is smaller than the stalling frequency **[Stall Frequency]** STP3
- And an output current is higher than the stalling current **[Stall Current]** STP2
- During a time longer than the stalling time **[Stall Max Time]** STP1

When a stalling condition occurs, a **[Motor Stall Error]** STF error is triggered.

[Stall Monitoring] STPC

Stall monitoring activation.

Setting	Code / Value	Description
[No]	NO	Function disabled **Factory setting**
[Yes]	YES	Function enabled

[Stall Max Time] STP1 ★

This parameter can be accessed if **[Stall Monitoring]** STPC is not set to **[No]** NO.

Setting	Description
0.0...200 s	Setting range **Factory setting**: 60.0 s

[Stall Current] STP2 ★

Stall monitoring current level, as a % of the rated motor current. (**[Nom Motor Current]** NCR or **[Sync Nominal I]** NCRS, depending on the motor control type.)

This parameter can be accessed if **[Stall Monitoring]** STPC is not set to **[No]** NO.

Setting	Description
0.0...150.0%	Setting range **Factory setting**: 150.0%

[Stall Frequency] STP3 ★

This parameter can be accessed if **[Stall Monitoring]** STPC is not set to **[No]** NO.

Setting	**Description**
0.0...**[Max Frequency]** TFR	Setting range **Factory setting**: 2.0 Hz

[Thermal monitoring] TPP– Menu

Access

[Complete settings] ➞**[Generic monitoring]** ➞ **[Thermal monitoring]**

About This Menu

Identical to **[Thermal monitoring]** TPP– Menu , page 169.

[Input/Output] - [I/O assignment]

[DI1 Assignment] L1A– to [DI6 Assignment] L6A– Menus

Access

[Complete settings]➞ [Input/Output] ➞ [I/O assignment]➞ [DI6 Assignment]

[DI1 Low Assign] L1L to [DI6 Low Assign] L6L

Read-only parameter, cannot be configured. It displays all the functions associated with digital input in order to verify, for example, for compatibility problems.

If no functions have been assigned, **[No]** NO is displayed.

[DI1 High Assign] L1H to [DI6 High Assign] L6H

Read-only parameter, cannot be configured. It displays all the functions associated with digital input in order to verify, for example, for compatibility problems.

If no functions have been assigned, **[No]** NO is displayed.

[DI11 Assignment] L11A– to [DI16 Assignment] L16A– Menus

Access

[Complete settings] ➞ **[Input/Output]** ➞ **[I/O assignment]** ➞ **[DI11 Assignment]** to **[DI16 Assignment]**

About These Menus

Identical to **[DI1 Assignment]** L1A– menu, page 359.

These menus can be accessed if VW3A3203 I/O extension module has been inserted.

[DI11 Low Assign] L11L to [DI16 Low Assign] L16L ★

Read-only parameters, cannot be configured. It displays all the functions associated with the digital input in order to verify, for example, for compatibility problems.

If no functions have been assigned, **[No]** NO is displayed.

[DI11 High Assign] L11H to [DI16 High Assign] L16H ★

Read-only parameters, cannot be configured. It displays all the functions associated with the digital input in order to verify, for example, for compatibility problems. If no functions have been assigned, **[No]** NO is displayed.

[AI1 assignment] AI1A– to [AI5 assignment] AI5A– Menus

Access

[Complete settings] ➞ **[Input/Output]** ➞ **[I/O assignment]** ➪ **[AI1 assignment]** to **[AI5 assignment]**

About These Menus

AI4 and AI5 can be accessed if VW3A3203 I/O extension module has been inserted.

[AI1 assignment] AI1A to [AI5 assignment] AI5A

Analog input AI1 functions assignment to Analog input AI5 functions assignment.

Read-only parameter, cannot be configured. It displays all the functions associated the related analog input in order to verify, for example, for compatibility problems.

If no functions have been assigned, **[No]** NO is displayed.

[AIV1 assignment] AV1A– to [AIV3 assignment] AV3A– Menus

Access

[Complete settings] ➪ **[Input/Output]** ➪ **[I/O assignment]** ➪ **[AIV1 assignment]**

[AIV1 assignment] AV1A to [AIV3 assignment] AV3A

Virtual analog input function assignment.

Read-only parameter, cannot be configured. It displays all the functions associated with the related virtual analog input in order to verify, for example, for compatibility problems. If no functions have been assigned, **[No]** NO is displayed.

[Input/Output] - [DI/DQ]

[DI1 Configuration] DI1– to [DI6 Configuration] DI6– Menus

Access

[Complete settings] → **[Input/Output]** → **[DI/DQ]** → **[DI1 Configuration]** to **[DI6 Configuration]**

[DI1 Low Assign] L1L to [DI6 Low Assign] L6L

Read-only parameter, cannot be configured. It displays all the functions associated with the related digital input in order to verify, for example, for compatibility problems.

If no functions have been assigned, **[No]** NO is displayed.

[DI1 High Assign] L1H to [DI6 High Assign] L6H

Read-only parameter, cannot be configured. It displays all the functions associated with the related digital input in order to verify, for example, for compatibility problems.

If no functions have been assigned, **[No]** NO is displayed.

The digital input DI1 is assigned to:

- **[Forward]** FRD in 2-wire control
- **[Drive Running]** RUN in 3-wire control.

[Drive Running] RUN and **[Forward]** FRD settings cannot be modified manually.

NOTE: In IO profile, the assignment of **[Drive Running]** RUN (respectively **[Forward]** FRD) switches to **[CD00]** CD00 in 2-wire control (respectively 3-wire control).

The digital input DI2 is assigned to **[Forward]** FRD in 3-wire control. **[Forward]** FRD setting cannot be modified manually.

NOTE: In IO profile, the assignment of **[Forward]** FRD switches to **[CD01]** CD01 in 3-wire control.

The digital input DI4 is assigned to **[Fault Reset]** LIRSF.

[DI1 Delay] L1D to [DI6 Delay] L6D

NOTE: Commands received via this digital input are processed once the delay time set via this parameter has elapsed.

Setting	Description
0...200 ms	Setting range **Factory setting**: 5 ms

[DI11 Configuration] DI11– to [DI16 Configuration] DI16– Menus

Access

[Complete settings] → **[Input/Output]** → **[DI/DQ]** → **[DI11 Configuration]** to **[DI16 Configuration]**

About These Menus

Identical to **[DI1 Configuration]** DI1– menu , page 362.

These menus can be accessed if VW3A3203 I/O extension module has been inserted.

[DI11 Low Assign] L11L to [DI16 Low Assign] L16L ★

***DI**11 **low assignment** to **DI**16 **low assignment**.*

[DI11 High Assign] L11H to [DI16 High Assign] L16H ★

***DI**11 **high assignment** to **DI**16 **high assignment**.*

[DI11 Delay] L11D to [DI16 Delay] L16D ★

***DI**11 **delay** to **DI**16 **delay**.*

[DQxx Configuration] DOxx– Menu

Access

[Complete settings] → **[Input/Output]** → **[DI/DQ]** → **[DQxx Configuration]**

About This Menu

These menus are used to configure the digital outputs of the drive:

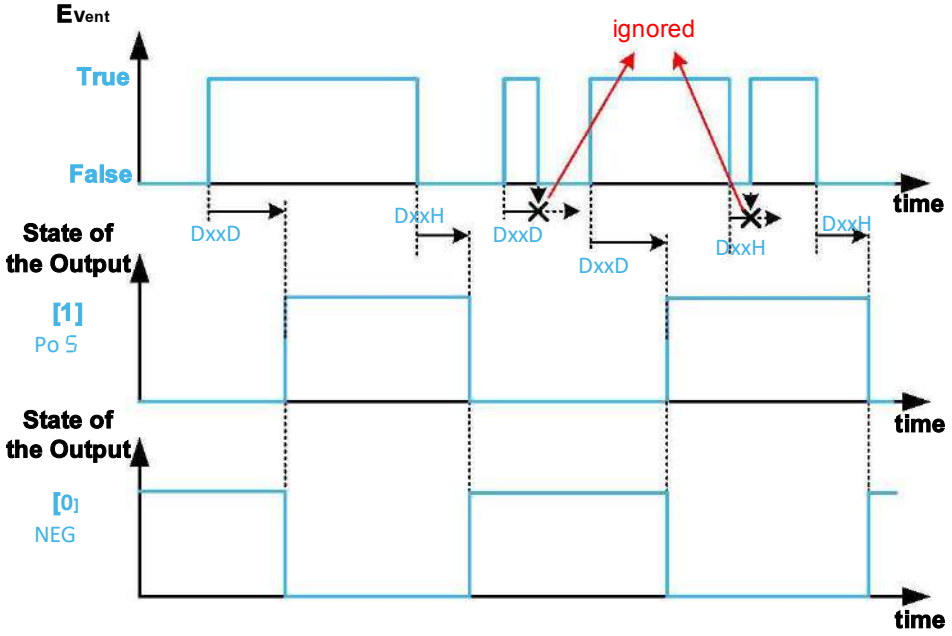
- **[DQ11 Configuration]** DO11– and **[DQ12 Configuration]** DO12–: the digital output DQ11 and DQ12 if the VW3A3203 Extended I/O option module is inserted.

Use the touch wheel to scroll through the digital outputs. Click OK to access the configuration of the digital output.

On Graphic Display Terminal, if an output is assigned then a check mark is displayed.

For a given digital output (DQxx), the configuration is composed by:

- **[DQxx assignment]** DOxx: the assignment of the digital output DQxx,
- **[DQxx actv delay]** DxxD: the delay time of the digital output DQxx. It represents the delay before modifying the state of the output when the assigned event becomes true,
- **[DQxx status]** DxxS: the active level of the digital output DQxx. It defines the state 1 or 0 of the output to the “True” state of the assigned event.
- **[DQxx hold delay]** DxxH: the holding time of the digital output DQxx. It represents the delay before modifying the state of the output when the assigned event becomes false.
- **[Enable DQxx fallback]** DxxF / LOxF: parameter used to enable/disable the fallback mode triggered in case of communication interruption (if the output is controled by fieldbus communication).



Assignments When the Drive is in RUN State

[DQxx assignment] DOxx

[DQ11 assignment] DO11, **[DQ12 assignment]** DO12

Digital output xx assignment.

It is used to assign an output to an event or a function.

Possible settings: Identical to **[Rx Assignment]** Rx parameter.

If the output is set to **[CDxx]** CDxx and has been enabled, transition to operating state Fault such as, but not limited to, communication interruption, will not disable the output.

WARNING

LOSS OF CONTROL

Only set the output to **[CDxx]** CDxx after having verified that this setting cannot result in unsafe conditions including communication interruption.

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

[DQxx actv delay] DxxD ★

DQxx activation delay time.

[DQ11 actv delay] D11D, **[DQ12 actv delay]** D12D

It represents the delay before modifying the state of the output when the assigned event becomes true.

If the corresponding output is assigned to one of the following assignments, the delay is forced to 0 ms and it cannot be modified:

- **[Operating State Fault]** FLT,
- **[Mains Contactor]** LLC,
- **[Pump 1 Cmd]** MPO1...**[Pump 6 Cmd]** MPO6,

Value range	Description
0...60,000 ms (step: 1 ms)	

[DQxx status] DxxS ★

[DQ11 status] D11S, **[DQ12 status]** D12S

DQxx status (output active level)

It defines the state 1 or 0 of the output to the “True” state of the assigned event.

If the output is assigned to one of the following assignments, the delay is forced to **[High Level]** POS:

- **[Operating State Fault]** FLT,
- **[Mains Contactor]** LLC,
- **[Pump 1 Cmd]** MPO1...**[Pump 6 Cmd]** MPO6,

Value	Code / Value	Description
[High Level]	POS	State 1 if the event is true. **Factory Setting**
[Low Level]	NEG	State 0 if the event is true.

[DQxx hold delay] DxxH★

[DQ11 hold delay] D11H, **[DQ12 hold delay]** D12H

DQxx holding delay time.

It represents the delay before modifying the state of the output when the assigned event becomes false.

If the corresponding output is assigned to one of the following assignments, the delay is forced to 0 ms and it cannot be modified:

- **[Operating State Fault]** FLT,
- **[Mains Contactor]** LLC,
- **[Pump 1 Cmd]** MPO1...**[Pump 6 Cmd]** MPO6,

Value range	Description
0...9,999 ms (step: 1 ms)	**Factory setting**: 0 ms

[Enable DQxx fallback] DxxF / LOxF

[Enable DQ11 fallback] D11F, **[Enable DQ12 fallback]** D12F

Enable DQxx fallback.

[Enable DQ11 fallback] D11F (respectively **[Enable DQ12 fallback]** D12F) is forced to **[No]** NO if **[DQ11 assignment]** DO11 (respectively **[DQ12 assignment]** DO12) is assigned.

If the output is controlled by fieldbus and has been enabled, transition to operating state Fault such as, but not limited to, communication interruption, will not disable the output if this parameter is set to **[No]** NO .

⚠ WARNING

LOSS OF CONTROL

- Verify that using this default setting does not result in unsafe conditions including communication interruption.
- Set this parameter to **[Yes]** YES to disable the output if an error is triggered.

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

Value	Code / Value	Description
[No]	NO	Fallback feature disabled. When the output is assigned, the output value is defined according to its assignment, page 364. When the output is not assigned, the state of the output can be controlled via a bit of OL1R. If an error is triggered, the output remains unchanged. **Factory setting**
[Yes]	YES	Fallback feature enabled. The state of the output is controlled via a bit of OL1R (refer to the communication parameter addresses file). If an error is detected, the output is disabled. **NOTE:** If an error is detected, the process applied on the output (e.g. delays, active level) remains applied.

[Input/Output] - [AI/AQ]

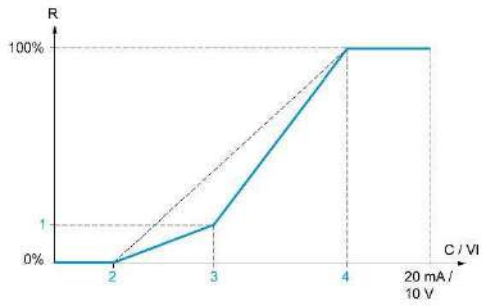
[AI1 configuration] AI1– Menu

Access

[Complete settings] → **[Input/Output]** → **[AI/AQ]** → **[AI1 configuration]**

About This Menu

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



R Reference

C / VI Current or Voltage Input

1 [Y Interm. point]

2 [Min value] (0%)

3 [X Interm. point]

4 [Max value] (100%)

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

[AI1 assignment] AI1A

Analog input AI1 functions assignment.

Read-only parameter, cannot be configured. It displays all the functions associated with input AI1 in order to verify, for example, for compatibility problems.

If no functions have been assigned, **[No]** NO is displayed.

[AI1 Type] AI1T

Configuration of AI1.

Setting	Code / Value	Description
[Voltage]	10U	0-10 Vdc **Factory setting**
[Current]	0A	0-20 mA

[AI1 Min. Value] UIL1 ★

AI1 voltage scaling parameter of **0%**.

This parameter can be accessed if **[AI1 Type]** AI1T is set to **[Voltage]** 10U.

Setting	Description
0.0...10.0 Vdc	Setting range **Factory setting**: 0.0 Vdc

[AI1 Max Value] UIH1 ★

AI1 voltage scaling parameter of **100%**.

This parameter can be accessed if **[AI1 Type]** AI1T is set to **[Voltage]** 10U.

Setting	Description
0.0...10.0 Vdc	Setting range **Factory setting**: 10.0 Vdc

[AI1 Min. Value] CRL1 ★

AI1 current scaling parameter of **0%**.

This parameter can be accessed if **[AI1 Type]** AI1T is set to **[Current]** 0A.

Setting	Description
0.0...20.0 mA	Setting range **Factory setting**: 0.0 mA

[AI1 Max Value] CRH1 ★

AI1 current scaling parameter of **100%**.

This parameter can be accessed if **[AI1 Type]** AI1T is set to **[Current]** 0A.

Setting	Description
0.0...20.0 mA	Setting range **Factory setting**: 20.0 mA

[AI1 filter] AI1F

AI1 filter.

Setting	Description
0.00...10.00 s	Setting range **Factory setting**: 0.00 s

[AI1 X Interm. Point] AI1E

Input delinearization point coordinate. Percentage of the physical input signal.

0% corresponds to **[AI1 Min. Value]** (UIL1)

100% corresponds to **[AI1 Max Value]** (UIH1)

Setting	Description
0...100%	Setting range **Factory setting**: 0%

[AI1 Interm. point Y] AI1S

Input delinearization point coordinate (frequency reference).

Percentage of the internal frequency reference corresponding to the **[AI1 X Interm. Point]** (AI1E) percentage of physical input signal.

Setting	Description
0...100%	Setting range **Factory setting**: 0%

[AI1 range] AI1L

Analog input 1 range.

This parameter can be accessed if **[AI1 Type]** AI1T is set to **[Current]** 0A.

This parameter is forced to **[0 - 100%]** POS if:

- **[AI1 Type]** AI1T is not set to **[Current]** 0A, or
- **[AI1 Min. Value]** CRL1 is lower than 3.0 mA

Setting	Code / Value	Description
[0 - 100%]	POS	Unidirectional: AI1 current scaling is 0% up to 100%. **Factory Setting**
[+/- 100%]	POSNEG	Bidirectional: AI1 current scaling is -100% up to 100%. **[AI1 Min. Value]** CRL1 corresponds to -100%. **[AI1 Max Value]** CRH1 corresponds to 100%.

[AI2 configuration] AI2– Menu

Access

[Complete settings] ➞ **[Input/Output]** ➞ **[AI/AQ]** ➞ **[AI2 configuration]**

[AI2 Assignment] AI2A

Identical to **[AI1 assignment]** AI1A , page 367.

[AI2 Type] AI2T

Configuration of AI2.

Setting	Code / Value	Description
[Voltage]	10U	0-10 Vdc **Factory setting**
[Current]	0A	0-20 mA
[PTC]	PTC	1 to 6 PTC (in serial)
[KTY]	KTY	1 KTY84
[PT1000]	1PT3	1 PT1000 connected with 2 wires
[PT100]	1PT2	1 PT100 connected with 2 wires
[Water Prob]	LEVEL	Water level

[AI2 Min. Value] UIL2 ★

AI2 voltage scaling parameter of **0%**.

This parameter can be accessed if **[AI2 Type]** AI2T is set to **[Voltage]** 10U.

Identical to **[AI1 Min. Value]** UIL1 , page 368.

[AI2 Max value] UIH2 ★

AI2 voltage scaling parameter of **100%**.

This parameter can be accessed if **[AI2 Type]** AI2T is set to **[Voltage]** 10U.

Identical to **[AI1 Max Value]** UIH1 , page 368.

[AI2 Min. Value] CRL2 ★

AI2 current scaling parameter of **0%**.

This parameter can be accessed if **[AI2 Type]** AI2T is set to **[Current]** 0A.

Identical to **[AI1 Min. Value]** CRL1 , page 368.

[AI2 Max Value] CRH2 ★

AI2 current scaling parameter of **100%**.

This parameter can be accessed if **[AI2 Type]** AI2T is set to **[Current]** 0A.

Identical to **[AI1 Max Value]** CRH1 , page 368.

[AI2 filter] AI2F

Identical to **[AI1 filter]** AI1F , page 368.

[AI2 X Interm. Point] AI2E

AI2 delinearization input level.

Identical to **[AI1 X Interm. Point]** AI1E , page 368.

[AI2 Interm. point Y] AI2S

AI2 delinearization output level.

Identical to **[AI1 Interm. point Y]** AI1S , page 369.

[AI2 range] AI2L

This parameter can be accessed if **[AI2 Type]** AI2T is set to **[Current]** 0A.

Identical to **[AI1 Type]** AI1T , page 371

[AI3 configuration] AI3– Menu

Access

[Complete settings] → **[Input/Output]** → **[AI/AQ]** → **[AI3 configuration]**

[AI3 Assignment] AI3A

Identical to **[AI1 assignment]** AI1A , page 367.

[AI3 Type] AI3T

Identical to **[AI2 Type]** AI2T , page 370 with factory setting: **[Current]** 0A.

[AI3 Min. Value] UIL3

AI3 voltage scaling parameter of **0%**.

Identical to **[AI1 Min. Value]** UIL1 , page 368.

This parameter can be accessed if **[AI3 Type]** AI3T is set to **[Voltage]** 10U.

[AI3 Max Value] UIH3

AI3 voltage scaling parameter of **100%**.

Identical to **[AI1 Max Value]** UIH1 , page 368.

This parameter can be accessed if **[AI3 Type]** AI3T is set to **[Voltage]** 10U.

[AI3 Min. Value] CRL3

AI3 current scaling parameter of **0%**.

Identical to **[AI1 Min. Value]** CRL1 , page 368.

This parameter can be accessed if **[AI3 Type]** AI3T is set to **[Current]** 0A.

[AI3 Max Value] CRH3

AI3 current scaling parameter of **100%**.

Identical to **[AI1 Max Value]** CRH1 , page 368.

This parameter can be accessed if **[AI3 Type]** AI3T is set to **[Current]** 0A.

[AI3 filter] AI3F

AI3 cutoff time of the low filter.

Identical to **[AI1 filter]** AI1F , page 368.

[AI3 X Interm. point] AI3E

AI3 delinearization input level.

Identical to **[AI1 X Interm. Point]** AI1E , page 368.

[AI3 Y Interm. point] AI3S

AI3 delinearization output level.

Identical to **[AI1 Interm. point Y]** AI1S , page 369.

[AI3 range] AI3L

This parameter can be accessed if **[AI3 Type]** AI3T is set to **[Current]** 0A.

Identical to **[AI1 Type]** AI1T , page 373

[AI4 configuration] AI4– Menu

Access

[Complete settings] → **[Input/Output]** → **[AI/AQ]** **[AI4 configuration]**

[AI4 assignment] AI4A

This parameter can be accessed if VW3A3203 I/O extension module has been inserted.

Identical to **[AI1 assignment]** AI1A , page 367.

[AI4 Type] AI4T

Configuration of AI4.

This parameter can be accessed if VW3A3203 I/O extension module has been inserted.

Setting	Code / Value	Description
[Voltage]	10U	0-10 Vdc
[Current]	0A	0-20 mA **Factory setting**
[Voltage +/-]	N10U	-10/+10 Vdc
[PTC]	PTC	1 to 6 PTC (in serial)
[KTY]	KTY	1 KTY84
[PT1000]	1PT3	1 PT1000 connected with 2 wires
[PT100]	1PT2	1 PT100 connected with 2 wires

[AI4 Min. Value] UIL4 ★

AI4 voltage scaling parameter of **0%**.

Identical to **[AI1 Min. Value]** UIL1 , page 368.

[AI4 Max Value] UIH4 ★

AI4 voltage scaling parameter of **100%**.

Identical to **[AI1 Max Value]** UIH1 , page 368.

[AI4 Min. Value] CRL4 ★

AI4 current scaling parameter of **0%**.

Identical to **[AI1 Min. Value]** CRL1 , page 368.

[AI4 Max Value] CRH4 ★

AI4 current scaling parameter of **100%**.

Identical to **[AI1 Max Value]** CRH1 , page 368.

[AI4 filter] AI4F ★

AI4 cutoff time of the low filter.

This parameter can be accessed if VW3A3203 I/O extension module has been inserted.

Identical to **[AI1 filter]** AI1F , page 368.

[AI4 X Interm. point] AI4E ★

AI4 delinearization input level.

This parameter can be accessed if VW3A3203 I/O extension module has been inserted.

Identical to **[AI1 X Interm. Point]** AI1E , page 368.

[AI4 Y Interm.point] AI4S ★

AI4 delinearization output level.

This parameter can be accessed if VW3A3203 I/O extension module has been inserted.

Identical to **[AI1 Interm. point Y]** AI1S , page 369.

[AI4 range] AI4L ★

This parameter can be accessed if **[AI4 Type]** AI4T is set to **[Current]** 0A.

Identical to **[AI1 Type]** AI1T , page 375

[AI5 configuration] AI5– Menu

Access

[Complete settings] → **[Input/Output]** → **[AI/AQ]** → **[AI5 configuration]**

[AI5 assignment] AI5A ★

This parameter can be accessed if VW3A3203 I/O extension module has been inserted.

Identical to **[AI1 assignment]** AI1A , page 367.

[AI5 Type] AI5T ★

This parameter can be accessed if VW3A3203 I/O extension module has been inserted.

Identical to **[AI4 Type]** AI4T. , page 374

[AI5 Min. Value] UIL5 ★

AI5 voltage scaling parameter of **0%**.

Identical to **[AI1 Min. Value]** UIL1 , page 368.

[AI5 Max Value] UIH5 ★

AI5 voltage scaling parameter of **100%**.

Identical to **[AI1 Max Value]** UIH1 , page 368.

[AI5 Min. Value] CRL5 ★

AI5 current scaling parameter of **0%**.

Identical to **[AI1 Min. Value]** CRL1 , page 368.

[AI5 Max Value] CRH5 ★

AI5 current scaling parameter of **100%**.

Identical to **[AI1 Max Value]** CRH1 , page 368.

[AI5 filter] AI5F ★

AI5 cutoff time of the low filter.

This parameter can be accessed if VW3A3203 I/O extension module has been inserted.

Identical to **[AI1 filter]** AI1F , page 368.

[AI5 X Interm. point] AI5E ★

AI5 delinearization input level.

This parameter can be accessed if VW3A3203 I/O extension module has been inserted.

Identical to **[AI1 X Interm. Point]** AI1E , page 368.

[AI5 Y Interm.point] AI5S ★

AI5 delinearization output level.

This parameter can be accessed if VW3A3203 I/O extension module has been inserted.

Identical to **[AI1 Interm. point Y]** AI1S , page 369.

[AI5 range] AI5L

This parameter can be accessed if **[AI5 Type]** AI5T is set to **[Current]** 0A.

Identical to **[AI1 Type]** AI5T , page 377

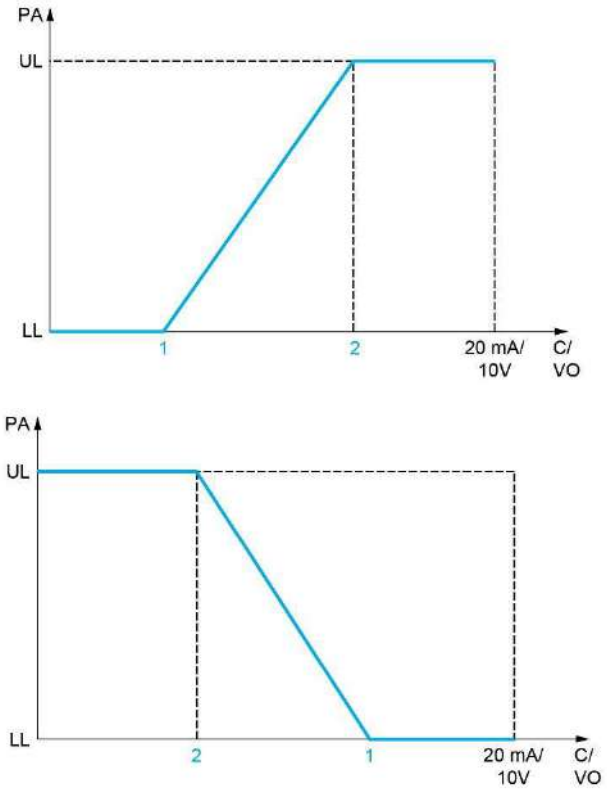
[AQ1 configuration] AO1– Menu

Access

[Complete settings] → **[Input/Output]** → **[AI/AQ]** → **[AQ1 configuration]**

Minimum and Maximum Output Values

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



PA Parameter assigned

C / VO Current or voltage output

UL Upper limit

LL Lower limit

1 [AQx min output] AOLx or UOLx

2 [AQx max output] AOHx or UOHx

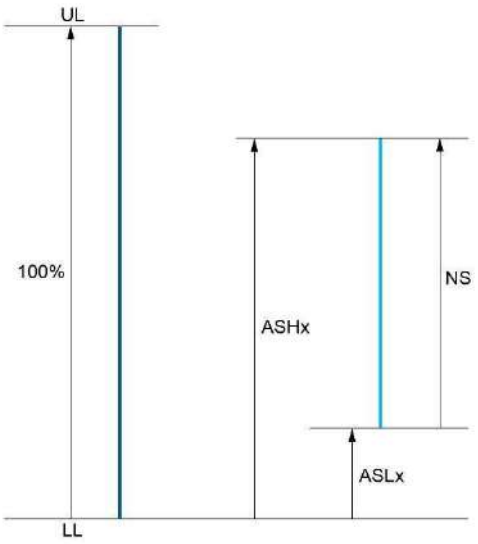
Scaling of the Assigned Parameter

The scale of the assigned parameter can be adapted in accordance with the requirements by modifying the values of the lower and upper limits with two parameters for each analog output (**[Scaling AQx Min]** ASLx and **[Scaling AQx Max]** ASHx).

These parameters are given in %. 100 % corresponds to the total variation range of the configured parameter, so: 100% = upper limit - lower limit.

For example, **[Sign. Torque]** STQ which varies between –3 and +3 times the rated torque, 100% corresponds to 6 times the rated torque.

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



UL Upper limit of the assigned parameter

LL Lower limit of the assigned parameter

NS New scale

1 ASHx

2 ASLx

Application Example

In an application, it is requested to read on the analog output AQ1 the value of the motor current. The value must in current (0...20 mA) and the full range must correspond to 0 up to 2 x nominal motor current (2 x IN motor).

In this example, IN motor corresponds to 0.8 x IN drive.

Consequently, the analog output AQ1 must be configured as following:

- Set **[AQ1 assignment]** AO1 to **[Motor Current]** OCR. By default, the total variation range is 0 to 2 times the nominal drive current (2 x IN drive).
- Set **[AQ1 Type]** AO1T to **[Current]** 0A. Then, set **[AQ1 min output]** AOL1 and **[AQ1 max output]** AOH1. By default, they are equal to 0.0 mA and 20.0 mA, that is corresponding to the requirements.
- The requested minimum value is 0 A (0 x IN motor = 0 x IN drive): **[Scaling AQ1 Min]** ASL1 does not need to be modified (its factory setting is 0 %).
- The requested total variation range is 2 x IN motor (= 1.6 x IN drive). By default, the full range for **[Motor Current]** OCR is 2 x IN drive. It means that the requested total variation range must be reduced to 80 % (1.6/2 = 0.8). Consequently, **[Scaling AQ1 Max]** ASH1 must be set to 80 %.

[AQ1 assignment] AO1

AQ1 assignment.

Setting	Code / Value	Description
[Not Configured]	NO	Not assigned **NOTE:** In this case, the output can be controlled via the internal parameter AO1R (refer to the communication parameter addresses file). By default, if an error (such as a communication interruption) is detected, the output remains unchanged. Use the parameter **[Enable AQ1 fallback]** AOF1 to disable the output in case of error detection.
[Motor Current]	OCR	Current in the motor, from 0 to 2 In (In = rated drive current indicated in the Installation manual and on the drive nameplate)
[Motor Frequency]	OFR	Output frequency, from 0 to **[Max Frequency]** TFR **Factory Setting**
[Sig. O/P Frq.]	OFS	Signed output frequency, between –**[Max Frequency]** TFR and + **[Max Frequency]** TFR
[PID Error]	OPE	PID controller detected error between –5% and +5% of **[Max PID feedback]** PIF2 – **[Min PID feedback]** PIF1
[PID Feedbk]	OPF	PID controller feedback between **[Min PID feedback]** PIF1 and **[Max PID feedback]** PIF2
[PID Output]	OPI	PID controller output between **[Low Speed]** LSP and **[High Speed]** HSP
[Mot Mech Pwr %]	OPR	Motor power, between 0 and 2.5 times **[Nominal Motor Power]** NPR
[PID Ref.]	OPS	PID controller reference between **[Min PID Process]** PIP1 and **[Max PID Process]** PIP2
[Ramp Out.]	ORP	From 0 to **[Max Frequency]** TFR
[sign Ramp]	ORS	Signed ramp output, between –**[Max Frequency]** TFR and + **[Max Frequency]** TFR
[Outlet Pres Value]	PS2V	Outlet pressure value
[Sign. Torque]	STQ	Signed motor torque, between –3 and +3 times the rated motor torque. The + sign corresponds to the motor mode and the – sign to the generator mode (braking).
[Drv Thermal]	THD	Drive thermal state, from 0 to 200% of the rated thermal state
[Mot Thermal]	THR	Motor thermal state, from 0 to 200% of the rated thermal state
[Motor Torq.]	TRQ	Motor torque, from 0 to 3 times the rated motor torque
[Motor volt.]	UOP	Voltage applied to the motor, between 0 and **[Nom Motor Voltage]** UNS

[AQ1 Type] AO1T

Select according to the requirements the type of output.

Setting	Code / Value	Description
[Voltage]	10U	0-10 Vdc If necessary, adjust **[AQ1 min Output]** UOL1 and **[AQ1 max Output]** UOH1.
[Current]	0A	0-20 mA If necessary, adjust **[AQ1 min output]** AOL1 and **[AQ1 max output]** AOH1. **Factory setting**

[AQ1 min output] AOL1 ★

This parameter can be accessed if **[AQ1 Type]** AO1T is set to **[Current]** 0A.

Setting	Description
0.0...20.0 mA (step: 0.1 mA)	Setting range **Factory setting**: 0.0 mA

[AQ1 max output] AOH1

This parameter can be accessed if **[AQ1 Type]** AO1T is set to **[Current]** 0A.

Setting	Description
0.0...20.0 mA (step: 0.1 mA)	Setting range **Factory setting**: 20.0 mA

[AQ1 min Output] UOL1 ★

This parameter can be accessed if **[AQ1 Type]** AO1T is set to **[Voltage]** 10U.

Setting	Description
0.0...10.0 Vdc (step: 0.1 Vdc)	Setting range **Factory setting**: 0.0 Vdc

[AQ1 max Output] UOH1 ★

This parameter can be accessed if **[AQ1 Type]** AO1T is set to **[Voltage]** 10U.

Setting	Description
0.0...10.0 Vdc (step: 0.1 Vdc)	Setting range **Factory setting**: 10.0 Vdc

[Scaling AQ1 Min] ASL1

Scaling of the lower limit of the assigned parameter, as a % of the maximum possible variation.

Setting	Description
0.0...**[Scaling AQ1 Max]** ASH1 (step: 0.1 %)	Setting range **Factory setting**: 0.0%

[Scaling AQ1 Max] ASH1

Scaling of the upper limit of the assigned parameter, as a % of the maximum possible variation.

Setting	Description
[Scaling AQ1 Min] ASL1...100.0% (step: 0.1 %)	Setting range **Factory setting**: 100.0%

[AQ1 Filter] AO1F

Enable/disable the low pass-filter and configure its time constant.

Setting	Description
0.00...10.00 s (step: 0.01 s)	Setting range. If this parameter is set to 0.00 s, the filter is deactivated. **Factory setting**: 0.00 s

[AQ2 configuration] AO2– Menu

Access

[Complete settings] ➞ **[Input/Output]** ➞ **[AI/AQ]** ➞ **[AQ2 configuration]**

About This Menu

This menu is used to configure the analog output AQ2.

In this menu, the following parameters can be accessed:

- **[AQ2 assignment]** AO2
- **[AQ2 Type]** AO2T
- **[AQ2 min output]** AOL2
- **[AQ2 max output]** AOH2
- **[AQ2 min Output]** UOL2
- **[AQ2 max Output]** UOH2
- **[Scaling AQ2 Min]** ASL2
- **[Scaling AQ2 Max]** ASH2
- **[AQ2 Filter]** AO2F
- **[Enable AQ2 fallback]** AOF2

Refer to **[AQ1 configuration]** AO1– for more information about analog output configuration and the possible settings.

NOTE: In factory setting, the analog input AQ2 is set to **[Motor Current]** OCR and is configured in **[Current]** 0A.

[Virtual AI1] AV1– Menu to [Virtual AI3] AV3– Menus

Access

[Complete settings] > **[Input/Output]** > **[AI/AQ]** > **[Virtual AI1]** to **[Virtual AI3]**

[AIV1 assignment] AV1A to [AIV3 assignment] AV3A

Virtual analog input function assignment. Read-only parameter.

Setting	Code / Value	Description
[No]	NO	Not assigned
[Ref Freq 2 Sum]	AISA2	Reference frequency 2 summing
[PID feedback]	AIPIF	PI controller feedback
[Subtract Ref Freq 2]	AIDA2	Subtract reference frequency 2
[Ref Freq 3 Sum]	AISA3	Reference frequency 3 summing
[Subtract Ref Freq 3]	AIDA3	Subtract reference frequency 3
[Ref Freq 2 multi]	AIMA2	Reference frequency 2 multiplier
[Ref Freq 3 multi]	AIMA3	Reference frequency 3 multiplier
[OutletPres Sensor]	PS2A	Select the source of outlet pressure sensor

[AIV1 Channel Assign] AIC1 to [AIV3 Channel Assign] AIC3

Channel assignment for virtual analog input AIV1, AIV2 and AIV3.

Setting	Code / Value	Description
[Not Configured]	NO	Not assigned **Factory setting**
[Ref. Freq-Modbus]	MDB	Reference frequency via Modbus
[MS/TP Ref Freq]	EBM	Reference frequency via the embedded BACnet MSTP module
[Ref. Freq-Com. Module]	NET	Reference frequency via fieldbus module if a fieldbus module has been inserted

[AIV1 Type] AV1T to [AIV3 Type] AV3T

***Configuration of virtual analog input AI**V1* to ***Configuration of virtual analog input AI**V3*.

Setting	Code / Value	Description
[+/- 8192]	INEG	-8192/+8192 **Factory setting**
[+/- 100%]	PNEG	-100.00/+100.00 %

[Input/Output] - [Relay]

[Relay] RELA– Menu

Access

[Complete settings] ➡ **[Input/Output]** ➡ **[Relay]**

About This Menu

This menu is used to configure the relays of the drive:

- **[R1 configuration]** R1 – to **[R3 configuration]** R3 –: the relays R1 to R3 embedded to the drive.
- **[R4 configuration]** R4 – to **[R6 configuration]** R6 –: the relays R4 to R6 if the VW3A3204 relay output option module is inserted,

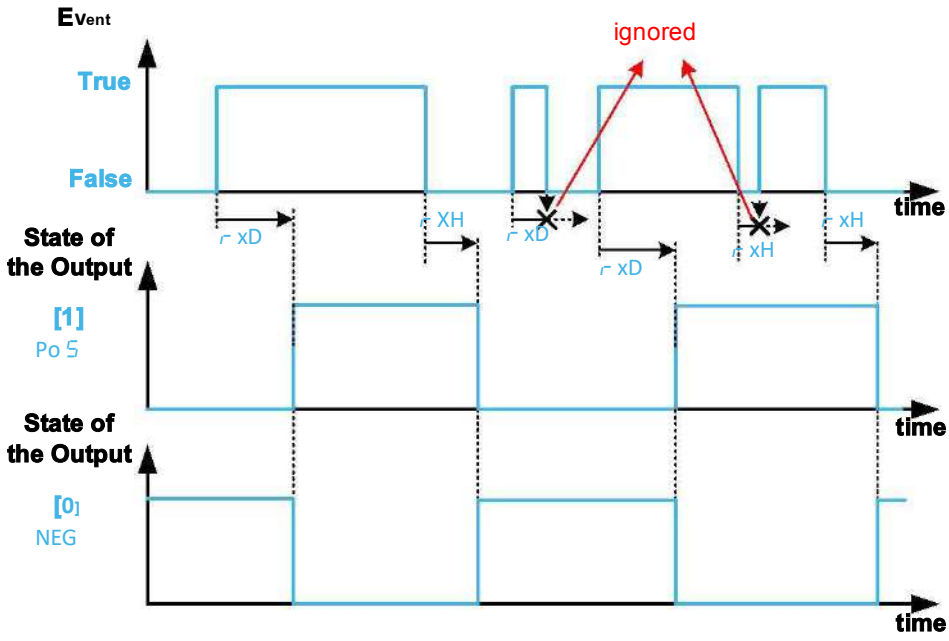
On Graphic Display Terminal, **[Relay]** RELA– menu is the fourth tab displayed in the menu **[Input/Output]** IO – (the tab is named “Relay”).

Use the touch wheel to scroll through the relays. Click OK to access the configuration of the relay.

On Graphic Display Terminal, if a relay is assigned then a check mark is displayed.

For a given relay (Rx), the configuration is composed by:

- **[Rx Assignment]** Rx: the assignment of the relay Rx,
- **[Rx Delay time]** RxD: the delay time of the relay Rx. It represents the delay before modifying the state of the relay when the assigned event becomes true,
- **[Rx Active at]** RxS: the active level of the relay Rx. It defines the state 1 or 0 of the relay to the true state of the assigned event.
- **[Rx Holding time]** RxH: the holding time of the relay Rx. It represents the delay before modifying the state of the relay when the assigned event becomes false.
- **[Enable Rx fallback]** RxF: parameter used to enable/disable the fallback mode triggered in case of communication interruption (if the relay is controled by fieldbus communication).



[Rx Assignment] Rx

[R1 Assignment] R1, **[R2 Assignment]** R2, **[R3 Assignment]** R3, **[R4 Assignment]** R4, **[R5 Assignment]** R5, **[R6 Assignment]** R6

It is used to assign the relay to an event or a function. The following table gives the possible settings:

If the output is set to **[CDxx]** CDxx and has been enabled, transition to operating state Fault such as, but not limited to, communication interruption, will not disable the output.

⚠WARNING

LOSS OF CONTROL

Only set the output to **[CDxx]** CDxx after having verified that this setting cannot result in unsafe conditions including communication interruption.

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

Setting	Code / Value	Description
[Not Assigned]	NO	Not assigned. **NOTE:** In this case, the output can be controlled via the internal parameter OL1R (refer to the communication parameter addresses file). By default, if an error (such as a communication interruption is detected), the output remains unchanged. Use the parameter **[Enable Rx Fallback]** rxF to disable the output in case of error detection. **Factory setting** (1)
[Warning Grp 1]... **[Warning Grp 5]**	AG1...AG5	Warning group 1 to Warning group 5.
[AI1 4-20 Warning]... **[AI5 4-20 Warning]**	AP1...AP5	4-20 mA loss warning on AI
[Neg Torque]	ATS	Actual torque sign
[HMI L/R cmd]	BMP	Control via the Graphic Display Terminal is active. (only active with Local/Remote button)
[CB Stop Pulse]	CBDP	Circuit Breaker stop pulse (2) The output is automatically configured to this function by setting the parameter **[CB stop pulse activated]** CBDP.
[CB Start Pulse]	CBEP	Circuit Breaker start pulse (2) The output is automatically configured to this function by setting the parameter **[CB start pulse activated]** CBEP.
[CD00] [CD15]	CD00..CD15	Bit x digital input ctrl word (e.g. virtual digital input CMD.0...CMD.15). The state of the output is modified accordingly with the bit of the control word. If an error is triggered (such as a communication error), the output remains unchanged. **NOTE:** CD00...CD10 are only accessible with **[Control Mode]** CHCF set to **[I/O profile]** IO.
[set 1 active] [set 3 active]	CFP1...CFP3	Parameter set 1, 2 or 3 is active.
[Cnfg.0 act.]	CNF0	Configuration 0 is active
[Cur Thd Reached]	CTA	Motor current threshold (**[High Current Thd]** CTD) reached
[Low Cur Reached]	CTAL	Current low threshold (**[Low I Threshold]** CTDL) reached
[DC charged]	DBL	DC bus charged

Setting	Code / Value	Description
[Ext Error Warn]	EFA	External error warning
[Forced Run]	ERN	Emergency Run
[Mot Freq High Thd 2]	F2A	Second frequency threshold (**[Freq. threshold 2]** F2D) reached
[Mot Freq Low Thd 2]	F2AL	Second frequency low threshold (**[2 Freq. Threshold]** F2DL) reached
[High Speed Reached]	FLA	High speed reached
[Operating State Fault]	FLT	Operating state fault
[Fallback speed]	FRF	Reaction on event / fallback speed
[Mot Freq High Thd]	FTA	Motor frequency threshold (**[Motor Freq Thd]** FTD) reached
[Mot Freq Low Thd]	FTAL	Frequency low threshold (**[Low Freq.Threshold]** FTDL) reached
[Idle State]	IDLE	Device in energy saving state
[Idle Rdy Or Run State]	IDRR	Device in energy saving or ready or running state.
[Idle Or Rdy State]	IDRY	Device in energy saving or ready state.
[Mains Contactor]	LLC	Mains contactor (2) The output is automatically configured to this function by setting the parameter **[Mains Contactor]** LLC.
[I present]	MCP	Motor current present
[Run Forward]	MFRD	Run forward
[M/P Device Warn]	MPDA	MultiPump Device Warning (2)
[Pump 1 Cmd]...**[Pump 6 Cmd]**	MPO1...MPO6	Pump command(2) The output is automatically configured to this function by setting the parameter **[Pump X Cmd Assign]** MPOx.
[Run Reverse]	MRRS	Run reverse
[Proc Overload Warn]	OLA	Overload warning
[PID error Warning]	PEE	PID error warning
[PID Fdbk Warn]	PFA	PID feedback warning
[PID High Fdbk Warn]	PFAH	PID feedback high threshold (PAH) reached
[PID Low Fdbk Warn]	PFAL	PID feedback low threshold (PAL) reached
[Regulation Warn]	PISH	PID regulation unabled to reach the set point
[Power Removal State]	PRM	Power removal state. Without power supply, the information cannot be delivered. With this setting value, the power supply must be not external.
[Ready]	RDY	Ready to start
[Speed Maintained]	RLS	Reaction on event / maintain speed
[Ramp switching]	RP2	Ramp switching state
[Ref Freq High Thd reached]	RTAH	Frequency reference high threshold reached
[Ref Freq Low Thd reached]	RTAL	Frequency reference low threshold reached
[Device Running]	RUN	Drive running
[Rdy Or Run State]	RYRN	Device in ready or running state.
[Ref Freq Reached]	SRA	Frequency reference reached
[Modbus Com Inter.]	SLF1	Modbus communication interruption warning

Setting	Code / Value	Description
[Per Type of Stop]	STT	Reaction on event / stop on STT without an error triggered after stop.
[Dev Th reached]	TAD	Drive thermal threshold reached
[Device Th Warn]	THA	Drive thermal state warning
[Th Junction Warn]	TJA	Thermal junction warning
[AI1 Th Warning]...**[AI5 Th Warning]**	TP1A...TP5A	Thermal warning on AI (3)
[Temp Sens AI1 Warn]...**[Temp Sens AI5 Warn]**	TS1A...TS5A	Temperature sensor AI warning (open circuit) (3)
[Motor Th Thd reached]	TSA	Motor thermal threshold (**[Motor Therm Thd]** TTD) reached
[High Torque Warn]	TTHA	High torque threshold
[Low Torque Warn]	TTLA	Low torque threshold
[Proc Undld Warn]	ULA	Underload warning
[Preventive UnderV Active]	UPA	Undervoltage prevention warning
[UnderV Warn]	USA	Undervoltage warning

(1): On relay R1, the factory setting is **[Operating State Fault]** FLT. .

(2): This setting cannot be accessed with R1.

(3): Event on AI1 is not available.

(4): This parameter displays the state of the safety function STO.

Value	Code / Value	Description
[Active]	STO	STO active. This setting is displayed when STOA and STOB both have a low status. The relay is in state 0 (relay open).
[Not active]	IDLE	STO not active. Drive in IDLE state. This state is displayed when STOA and STOB both have a high status . The relay is in state 1 (relay closed).
[Error]	FLT	Drive is in error. This state is displayed when STOA and STOB have different status (High/Low). The relay is in state 0 (relay open).

[Rx Delay time] RxD

[R1 Delay time] R1D, **[R2 Delay time]** R2D, **[R3 Delay time]** R3D, **[R4 Delay time]** R4D, **[R5 Delay time]** R5D, **[R6 activ delay time]**

Rx activation delay time.

It represents the delay before modifying the state of the relay when the assigned event becomes true.

If the corresponding relay is assigned to one of the following assignments, the delay is forced to 0 ms and it cannot be modified:

- **[Operating State Fault]** FLT,
- **[Mains Contactor]** LLC,
- **[Pump 1 Cmd]** MPO1...**[Pump 6 Cmd]** MPO6,

Value range	Description
0...60,000 ms (step: 1 ms)	**Factory setting**: 0 ms

[Rx Active at] RxS

[R1 Active at] R1S, **[R2 Active at]** R2S, **[R3 Active at]** R3S, **[R4 Active at]** R4S, **[R5 Active at]** R5S, **[R6 Active at]**

Rx status (output active level).

It defines the state 1 or 0 of the relay to the true state of the assigned event.

If the relay R1...R6 is assigned to one of the following assignments, the delay is forced to **[High Level]** POS:

- **[Operating State Fault]** FLT,
- **[Mains Contactor]** LLC,
- **[Pump 1 Cmd]** MPO1...**[Pump 6 Cmd]** MPO6,

Value	Code / Value	Description
[High Level]	POS	State 1 if the event is true. **Factory setting**
[Low Level]	NEG	State 0 if the event is true.

[Rx Holding time] RxH

[R1 Holding time] R1H, **[R2 Holding time]** R2H, **[R3 Holding time]** R3H, **[R4 Holding time]** R4H, **[R5 Holding time]** R5H, **[R6 hold delay time]**

It represents the delay before modifying the state of the relay when the assigned event becomes false.

If the corresponding relay is assigned to one of the following assignments, the delay is forced to 0 ms and it cannot be modified:

- **[Operating State Fault]** FLT,
- **[Mains Contactor]** LLC,
- **[Pump 1 Cmd]** MPO1...**[Pump 6 Cmd]** MPO6,

Value range	Description
0...60,000 ms (step: 1 ms)	**Factory setting**: 0 ms

[Enable Rx fallback] RxF

[Enable R1 fallback] R1F, **[Enable R2 fallback]** R2F, **[Enable R3 fallback]** R3F, **[Enable R4 fallback]** R4F, **[Enable R5 fallback]** R5F, **[Enable R6 fallback]** R6F

This parameter is forced to **[No]** NO if **[Rx Assignment]** Rx is set to a value different from **[Not Assigned]** NO.

If the output is controlled by fieldbus and has been enabled, transition to operating state Fault such as, but not limited to, communication interruption, will not disable the output if this parameter is set to **[No]** NO .

⚠WARNING

LOSS OF CONTROL

- Verify that using this default setting does not result in unsafe conditions including communication interruption.
- Set this parameter to **[Yes]** YES to disable the output if an error is triggered.

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

Value	Code / Value	Description
[No]	NO	Fallback feature disabled. When the output is assigned, the state of the output is defined according to its assignment, page 386 When the corresponding output is not assigned, the state of the output can be controlled via a bit of OL1R (refer to the communication parameter addresses file). If a error is detected, the output remains unchanged. **Factory setting**
[Yes]	YES	Fallback feature enabled. The state of the relay can be controlled via a bit of OL1R (refer to the communication parameter addresses file). If an error is detected, the output is disabled when **[Auto Fault Reset]** ATR is set to NO, but when **[Auto Fault Reset]** TAR is set to YES the output remains unchanged as long as the **[Auto Fault Reset]** ATR has not been elapsed. **NOTE:** If an error is detected, the process applied on the output (e.g. delays, active level) remains applied.

[Input/Output] IO – Menu

Access

[Complete settings] ➡ [Input/Output]

About This Menu

This parameter can be accessed with the Plain Text Remote Terminal or via the commissioning software.

[Ref Freq template] BSP

Reference frequency template selection.

This parameter defines how the speed reference is taken into account, for analog inputs and pulse input. In the case of the PID controller, this is the PID output reference.

A very low level of voltage on bipolar analog input can create a wrong sign on the reference frequency if **[Low Speed]** LSP is different from 0.

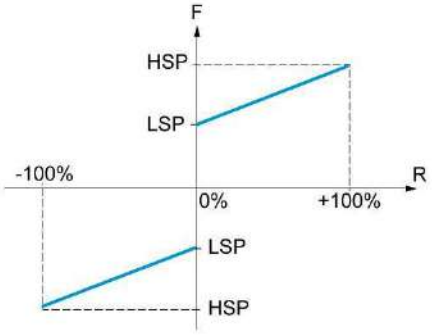
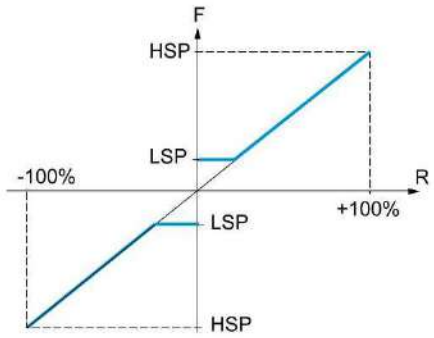
WARNING

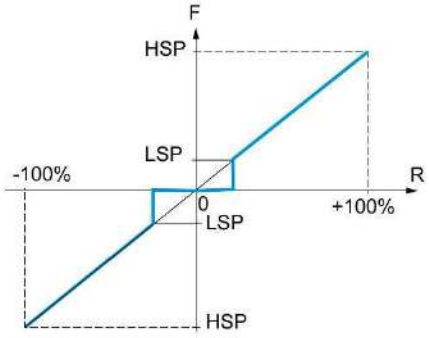
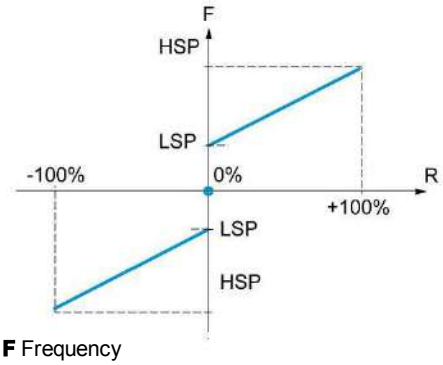
UNANTICIPATED EQUIPMENT OPERATION DUE TO WRONG DIRECTION

If the analog input type is set to **[Voltage +/-]** N10U and **[Low Speed]** LSP is not set to zero, then **[Ref Freq template]** BSP must be set to **[Deadband at 0%]** BNS0.

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

The limits are set by the **[Low Speed]** LSP and **[High Speed]** HSP parameters

Setting ( )	Code / Value	Description
[Standard]	BSD	 **F** Frequency **R** Reference At reference = 0, the frequency = **[Low Speed]** LSP **Factory setting**
[Pedestal]	BLS	 **F** Frequency **R** Reference At reference = 0 to **[Low Speed]** LSP, the frequency = **[Low Speed]** LSP

Setting ( )	Code / Value	Description
[Deadband]	BNS	 **F** Frequency **R** Reference At reference = 0 to **[Low Speed]** LSP the frequency = 0
[Deadband at 0%]	BNS0	 **F** Frequency **R** Reference This operation is the same as **[Standard]** BSD, except that in the following cases at zero reference, the frequency = 0: The signal is less than **[Min nvalue]**, which is greater than 0 (example: 1 Vdc on a 2–10 Vdc input) The signal is greater than **[Min nvalue]**, which is greater than **[Max value]** (example: 11 Vdc on a 10–0 Vdc input). If the input range is configured as “bidirectional”, operation remains identical to **[Standard]** BSD.

[Error/Warn handling]

[Auto Fault Reset] ATR– Menu

Access

[Complete settings] ➞ **[Error/Warn handling]** ➞ **[Auto Fault Reset]**

[Auto Fault Reset] ATR

This function can be used to automatically perform individual or multiple Fault Resets. If the cause of the error that has triggered the transition to the operating state Fault disappears while this function is active, the device resumes normal operation. While the Fault Reset attempts are performed automatically, the output signal "Operating state Fault" is not available. If the attempts to perform the Fault Reset are not successful, the device remains in the operating state Fault and the output signal "Operating state Fault" becomes active.

⚠ WARNING

UNANTICIPATED EQUIPMENT OPERATION

- Verify that activating this function does not result in unsafe conditions.
- Verify that the fact that the output signal "Operating state Fault" is not available while this function is active does not result in unsafe conditions.

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

The drive fault relay remains activated if this function is active. The speed reference and the operating direction must be maintained.

It is recommended to use 2-wire control (**[2/3-Wire Control]** TCC is set to **[2-Wire Control]** 2C and **[2-wire type]** TCT is set to **[Level]** LEL, refer to **[2/3-Wire Control]** TCC.

If the restart has not taken place once the configurable time **[Fault Reset Time]** TAR has elapsed, the procedure is aborted and the response to external error. remains locked until it is turned off and then on again.

The detected error codes, which permit this function, are listed in the Diagnostics part of the manual.

Setting	Code / Value	Description
[No]	NO	Function inactive **Factory setting**
[Yes]	YES	After locking in error state, if the detected error has disappeared and the other operating conditions permit the motor automatic restart. **The automatic restart** is performed by a series of automatic attempts separated by increasingly longer waiting periods: 1 s, 5 s, 10 s, then 1 minute for the following attempts. **NOTE:** If the automatic restart is in progress **(less than the max time)**, the error management **doesn't** see the error(s) present(s) and the error relay is always closed.

[Fault Reset Time] TAR ★

Maximum time for automatic restart function.

This parameter appears if **[Auto Fault Reset]** ATR is set to **[Yes]** YES. It can be used to limit the number of consecutive restarts on a recurrent detected error.

Setting	Code / Value	Description
[5 minutes]	5	5 minutes **Factory setting**
[10 minutes]	10	10 minutes
[30 minutes]	30	30 minutes
[1 hour]	1H	1 hour
[2 hours]	2H	2 hours
[3 hours]	3H	3 hours
[Unlimited]	CT	Continuous

[Fault reset] RST– Menu

Access

[Complete settings] ➞ **[Error/Warn handling]** ➞ **[Fault reset]**

[Fault Reset Assign] RSF

Detected errors are cleared manually when the assigned input or bit changes to 1 if the cause of the detected error has been removed.

All errors cannot be cleared via a Fault Reset. Refer to the table in the part Diagnostics and Troubleshooting to have the full list , page 533.

The **OFF/RESET** key on the Display Terminalperforms the same function.

Value range	Code / Value	Description
[Not Assigned]	NO	Not assigned
[DI1]...**[DI6]**	LI1...LI6	Digital input DI1...DI6 used at high level **Factory setting**: **[DI4]** LI4
[DI11]...**[DI16]**	LI11...LI16	Digital input DI11...DI16 if VW3A3203 extended I/O module has been inserted.
[CD00]... **[CD15]**	CD00...CD15	Virtual digital input CMD.0...CMD.10 in **[I/O profile]** IO configuration.

[Product restart] RP ★

The Restart function performs a Fault Reset and then restarts the device. During this Restart procedure, the device goes through the same steps as if it had been switched off and on again. Depending on the wiring and the configuration of the device, this may result in immediate and unanticipated operation.

⚠WARNING

UNANTICIPATED EQUIPMENT OPERATION

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

- 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.

Product restart.

This parameter can be accessed if **[Access Level]** LAC is set to **[Expert]** EPR mode.

This parameter can be used to reset all detected errors without having to disconnect the drive from the supply mains.

Value	Code / Value	Description
[No]	NO	Function inactive **Factory setting**
[Yes]	YES	Reinitialization. Press and hold down the OK key for 2 s. The parameter changes back to **[No]** NO automatically as soon as the operation is complete. The drive can only be reinitialized when locked.

[Prod Restart Assign] RPA ★

The Restart function performs a Fault Reset and then restarts the device. During this Restart procedure, the device goes through the same steps as if it had been switched off and on again. Depending on the wiring and the configuration of the device, this may result in immediate and unanticipated operation.

⚠ WARNING

UNANTICIPATED EQUIPMENT OPERATION

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

- 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 be accessed if **[Access Level]** LAC is set to **[Expert]** EPR mode.

Value range	Code / Value	Description
[Not Assigned]	NO	Not assigned **Factory setting**
[DI1]...**[DI6]**	LI1...LI6	Digital input DI1...DI6 used at high level
[DI11]...**[DI16]**	LI11...LI16	Digital input DI11...DI16 if VW3A3203 extended I/O module has been inserted.

[Extended Fault Reset] HRFC ★

When HRFC is set to YES, it allows you to reset hardware type error with the Fault Reset function (see above **[Fault Reset Assign]** RSF).

All hardware type errors cannot be cleared via a this feature. Refer to the table in the part Diagnostics and Troubleshooting to have the full list, page 533.

This feature allows to clear these hardware type errors without disconnection the drive from the power supply.

NOTICE

INOPERATIVE DRIVE

- Verify that enabling this parameter does not result in equipment damage.
- Before resetting the detected error, identify and correct the cause of the error.

Failure to follow these instructions can result in equipment damage.

This parameter can be accessed if **[Access Level]** LAC is set to **[Expert]** EPR mode.

Value	Code / Value	Description
[No]	NO	Not enable **Factory setting**
[Yes]	YES	Enable, some hardware type errors can be reset via Fault Reset function.

NOTE: [Extended Fault Reset] HRFC is forced to **[Yes]** if :

- **[Mode Selection]** FMM is configured (assigned to a value different than **[No]** NO) and
- **[Fire Mode ErrorResp]** FMFB is set to **[Restart]** RESTART

[Catch on the fly] FLR– Menu

Access

[Complete settings] ➞ **[Error/Warn handling]** ➞ **[Catch on the fly]**

[Catch On Fly] FLR

Used to enable a smooth restart if the run command is maintained after the following events:

- Loss of line supply or disconnection.
- Clearing clearance of current detected error or automatic restart.
- Freewheel stop.

The speed given by the drive resumes from the estimated or measured speed of the motor at the time of the restart, then follows the ramp to the reference speed.

This function requires 2-wire level control.

When the function is operational, it activates at each run command, resulting in a slight delay of the current (0.5 s max).

[Catch On Fly] FLR is forced to **[Not Configured]** NO if **[Auto DC Injection]** ADC is set to **[Continuous]** CT.

Setting	Code / Value	Description
[Not Configured]	NO	Function inactive. **Factory setting**
[Yes On Freewheel]	YES	Function active only after freewheel stop.
[Yes Always]	ALL	Function active after all stop type

[Catch on Fly Sensitivity] VCB ★

This parameter can only be accessed if

- the drive nominal power is equal or higher than 22 kW. Refer to ER330 Installation Manual ER330 Installation Manual, page 15, in the chapter “Electrical Data – Drive Ratings”, for more information.
- **[Access Level]** LAC is set to **[Expert]** EPR.

If the value of parameter **[Catch on Fly Sensitivity]** VCB is reduced below the default value, this can result in an incorrect calculation of the speed of the motor.

⚠WARNING

LOSS OF CONTROL

- Only reduce the value of parameter **[Catch on Fly Sensitivity]** VCB in increments of 0.01V.
- After each reduction of the value of parameter **[Catch on Fly Sensitivity]** VCB, perform a comprehensive commissioning test to verify that the speed of the motor is correct.

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

Setting	Description
0.10...100.00 V	Setting range **Factory setting**: 0.20 V

[Catch On Fly Mode] COFM

Velocity detection method for the Catch on Fly function.

[Catch On Fly Mode] COFM is forced to **[Measured]** HWCOF for synchronous motors.

Setting	Code / Value	Description
[Measured]	HWCOF	Hardware catch on the fly The motor voltage signal should be greater than **[Catch on Fly Sensitivity]** VCB to be able to estimate the speed. **Factory setting**
[Computed]	SWCOF	Software catch on the fly A signal is injected to estimate the speed and the position of the rotor. **[Computed]** SWCOF method is not effective for a motor velocity range exceeding -HSP or +HSP.

[Error detect disabling] INH– Menu

Access

[Complete settings] ➞ **[Error/Warn handling]** ➞ **[Error detect disabling]**

[Disable Error Detect] INH ★

In rare cases, the monitoring functions of the device may be unwanted because they impede the purpose of the application. A typical example is a smoke extractor fan operating as a part of a fire protection system. If a fire occurs, the smoke extractor fan should operate as long as possible, even if, for example, the permissible ambient temperature of the device is exceeded. In such applications, damage to or destruction of the device may be acceptable as collateral damage, for example, to keep other damage from occurring whose hazard potential is assessed to be more severe.

A parameter is provided to disable certain monitoring functions in such applications so that automatic error detection and automatic error responses of the device are no longer active. You must implement alternative monitoring functions for disabled monitoring functions that allow operators and/or master control systems to adequately respond to conditions which correspond to detected errors. For example, if overtemperature monitoring of the device is disabled, the device of a smoke extractor fan may itself cause a fire if errors go undetected. An overtemperature condition can be, for example, signaled in a control room without the device being stopped immediately and automatically by its internal monitoring functions.

⚠DANGER

ERROR DETECTION FUNCTIONS DISABLED, NO ERROR DETECTION

- Only use this parameter after a thorough risk assessment in compliance with all regulations and standards that apply to the device and to the application.
- Implement alternative monitoring functions for disabled monitoring functions that do not trigger automatic error responses of the device, but allow for adequate, equivalent responses by other means in compliance with all applicable regulations and standards as well as the risk assessment.
- Commission and test the system with the monitoring functions enabled.
- During commissioning, verify that the device and the system operate as intended by performing tests and simulations in a controlled environment under controlled conditions.

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

This parameter can be accessed if **[Access Level]** LAC is set to **[Expert]** EPR.

If the assigned input or bit is at 0, detected error monitoring is active. If the assigned input or bit is at 1, detected error monitoring is inactive. If an error is already active, it will be cleared when a rising edge (change from 0 to 1) occurs on the assigned input or bit.

It can result in immediate start if the Run command is active on level (**[2/3-Wire Control]** TCC is set to **[2-Wire Control]** 2C and **[2-wire type]** TCT is set to **[Level]** LEL)

NOTE:

- The Safe Torque Off function and any detected errors that help to prevent any form of operation are not affected by this function.
- If you want the activation to be done on low level, prefer to set **[Mode Selection]** FMM in **[Fire modes]** FMOR to **[Not Forced]** FIRE.

Detection of following errors can be disabled: NOF, CFI, SLF1, CNF, EPF1, LFF2, OHF, OLF, OBF, OSF, OPF1, PHF, USF, SOF, TNF, OPF2, EPF2, SLF2, SLF3, INF9, INFB, TJF, INFC, LCF, INF6, LFF3, LFF4, HCF,

LFF5, CSF, ULF, OLC, LFF1, TH2F, T2CF, TH3F, T3CF, PCPF, OPLF, HFPF, PLFF, TH4F, T4CF, TH5F, T5CF, OPHF, DRYF, PFMF, PGLF, MPLF, LCLF, LCHF, INFG, INFH, STF, INFL, FWER, FDR2, DCRE, IDLF, SPFC, FWPF, INFZ, SPTF, FWMC, HPF, BELF, OIMF, DUCF, PSMF, BRBF, SPOF, ATDF, DGOF.

Value range	Code / Value	Description
[Not Assigned]	NO	Not assigned **Factory setting**
[DI1]...**[DI6]**	LI1...LI6	Digital input DI1...DI6
[DI11]...**[DI16]**	LI11...LI16	Digital input DI11...DI16 if VW3A3203 I/O extension module has been inserted
[CD00]... **[CD10]**	CD00...CD10	Virtual digital input CMD.0...CMD.10 in **[I/O profile]** IO configuration
[CD11]... **[CD15]**	CD11...CD15	Virtual digital input CMD.11...CMD.15 regardless of configuration

[Forced Run] INHS ★

Disable error detection on run order.

In rare cases, the monitoring functions of the drive may be unwanted because they impede the purpose of the application. In addition, the Run command is to be forced via a digital input. A typical example is a smoke extractor fan operating as a part of a fire protection system. If a fire occurs, the smoke extractor fan should operate as long as possible, even if, for example, the permissible ambient temperature of the drive is exceeded or the wiring is destroyed. In such applications, damage to or destruction of the device may be acceptable as collateral damage, for example, to keep other damage from occurring whose hazard potential is assessed to be more severe.

A parameter is provided to disable certain monitoring functions in such applications so that automatic error detection and automatic error responses of the device are no longer active. You must implement alternative monitoring functions for disabled monitoring functions that allow operators and/or master control systems to adequately respond to conditions which correspond to detected errors. For example, if overtemperature monitoring of the drive is disabled, the drive of a smoke extractor fan may itself cause a fire if errors go undetected. An overtemperature condition can be, for example, signaled in a control room without the drive being stopped immediately and automatically by its internal monitoring functions. In addition, it may not be possible to stop the drive.

⚠ DANGER

MONITORING FUNCTIONS DISABLED, NO ERROR DETECTION, UNANTICIPATED EQUIPMENT OPERATION

- Only use this parameter after a thorough risk assessment in compliance with all regulations and standards that apply to the device and to the application.
- Implement alternative monitoring functions for disabled monitoring functions that do not trigger automatic error responses of the drive, but allow for adequate, equivalent responses by other means in compliance with all applicable regulations and standards as well as the risk assessment.
- Verify that permanently forcing the Run command via a digital input does not result in unsafe conditions.
- Commission and test the system with the monitoring functions enabled.
- During commissioning, verify that the drive and the system operate as intended by performing tests and simulations in a controlled environment under controlled conditions.

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

Value	Code / Value	Description
[Disabled]	NO	Function inactive **Factory setting**
[Forced Run FW]	FRD	Forced forward run.
[Forced Run RV]	RRS	Forced reverse run.

[Forced Run Ref] INHR ★

This parameter can be accessed if **[Forced Run]** INHS is not set to **[Disabled]** NO.

This parameter causes the reference to be forced to the configured value when the input or bit for error detection disabled is at 1, with priority over all other references. Value 0 = function inactive. The factory setting changes to 60 Hz if **[Motor Standard]** BFR = **[60 Hz]** 60Hz.

Value range	Description
0...**[Max Frequency]** TFR	**Factory setting:** 50 Hz

[External error] ETF– Menu

Access

[Complete settings] ➞ [Error/Warn handling] ➞ [External error]

[Ext Error assign] ETF

External error assignment.

If the assigned bit state is:

- 0: there is no external error.
- 1: there is an external error

Setting	Code / Value	Description
[Not Assigned]	NO	Not assigned **Factory setting**
[DI1]...[DI6]	LI1...LI6	Digital input DI1...DI6
[DI11]...[DI16]	LI11...LI16	Digital input DI11...DI16 if VW3A3203 I/O extension module has been inserted
[CD00]... [CD10]	CD00...CD10	Virtual digital input CMD.0...CMD.10 in **[I/O profile]** IO configuration
[CD11]... [CD15]	CD11...CD15	Virtual digital input CMD.11...CMD.15 regardless of configuration
[DI1 (Low level)]...[DI6 (Low level)]	L1L...L6L	Digital input DI1...DI6 used at low level

[Ext Error Resp] EPL

Drive response to external error.

Type of stop in the event of an external detected error.

Setting	Code / Value	Description
[Ignore]	NO	External detected error ignored
[Freewheel Stop]	YES	Freewheel stop **Factory setting**
[Configured Stop]	STT	Stop according to configuration of **[Type of stop]** STT , page 315, without tripping. In this case, the detected error relay does not open and the drive is ready to restart as soon as the detected error 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 223if control is via the terminals). Configuring a warning for this detected error is recommended (assigned to a digital output, for example) in order to indicate the cause of the stop.
[Fallback Speed]	LFF	Change to fallback speed, maintained as long as the detected error persists and the run command has not been removed(1)
[Speed maintain]	RLS	The drive maintains the speed being applied when the detected error occurred, as long as the detected error is active and the run command has not been removed(1)
[Ramp stop]	RMP	Stop on ramp
[Fast stop]	FST	Fast stop

Setting	Code / Value	Description
[DC injection]	DCI	DC injection stop. This type of stop cannot be used with some other functions.
(1) Because, in this case, the detected error does not trigger a stop, it is advisable to assign a relay or digital output to its indication.		

[Output phase loss] OPL– Menu

Access

[Complete settings] → **[Error/Warn handling]** → **[Output phase loss]**

[OutPhLoss Assign] OPL

⚠⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

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

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

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

Setting	Code / Value	Description
[Function Inactive]	NO	Function inactive **NOTE:** The drive may trigger a **[DC Bus OverV]** OBF error.
[OPF Error]	YES	Tripping on **[Single out ph loss]** OPF1 or OPF2 with freewheel stop **Factory setting** **NOTE:** The drive may trigger a **[DC Bus OverV]** OBF error.
[No Error]	OAC	No detected error triggered, but management of the output voltage in order to avoid an overcurrent when the link with the motor is re-established and catch on the fly performed (even if this function has not been configured).The drive switches to **[Output cut]** SOC state after **[OutPhaseLoss Delay]** ODT time. Catch on fly is possible as soon as the drive is in stand by output cut **[Output cut]** SOC state.

[OutPhaseLoss Delay] ODT

Output (motor) phase loss detection time.

Time delay for taking the **[OutPhLoss Assign]** OPL detected error into account.

Setting	Description
0.5...10 s	Setting range **Factory setting**: 0.5 s

[Input phase loss] IPL– Menu

Access

[Complete settings] ➞ **[Error/Warn handling]** ➞ **[Input phase loss]**

[InPhaseLoss Assign] IPL ★

Loss of input phase error response.

⚠⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

If input phase monitoring is disabled, phase loss and, by implication, accidental disconnection of cables, are not detected.

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

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

If one supply mains phase is missing and if this leads to performance decrease, an **[Input Phase Loss]** PHF error is triggered.

If 2 or 3 supply mains phases are missing, the drive operate until an **[Supply Mains UnderV]** USF error is triggered.

Setting	Code / Value	Description
[Ignore]	NO	The input phase loss monitoring function is disabled to be used when the drive is supplied via a single-phase supply or by the DC bus
[Freewheel Stop]	YES	The drive stops in freewheel in case of a supply mains phase loss has been detected **Factory setting**

[4-20 mA loss] LFL– Menu

Access

[Complete settings]➞ [Error/Warn handling]➞ [4-20 mA loss]

[AI1 4-20mA loss] LFL1

Drive behavior on AI1 4-20 event.

Setting	Code / Value	Description
[Ignore]	NO	Detected error ignored. This is the only possible configuration if **[AI1 Min. Value]** CRL1 is not greater than 3 mA **Factory setting**
[Freewheel Stop]	YES	Device trips in error and is stopped in Freewheel.
[Configured Stop]	STT	Stop according to configuration of **[Type of stop]** STT, without tripping. In this case, the error relay does not open and the drive is ready to restart as soon as the detected error 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 if control is via the terminals). Configuring a warning for this detected error is recommended (assigned to a digital output, for example) in order to indicate the cause of the stop
[Fallback Speed]	LFF	Change to fallback speed, maintained as long as the detected error persists and the run command has not been removed (1)
[Speed maintain]	RLS	The drive maintains the speed being applied when the detected error occurred, as long as the detected error is active and the run command has not been removed(1). If the run order is removed and a new run order is given while the error is still active, the speed setpoint is defined by **[Spd Maint Behavior]** RLS: • **[Spd Maint Behavior]** RLS=0, then the speed setpoint is 0 Hz • **[Spd Maint Behavior]** RLS=LSp, then the speed setpoint is the value of the **[Low Speed]** LSP parameter.
[Ramp stop]	RMP	Stop on ramp
[Fast stop]	FST	Fast stop
[DC injection]	DCI	DC injection stop. This type of stop cannot be used with some other functions
(1) Because, in this case, the detected error does not trigger a stop, it is advisable to assign a relay or digital output to its indication.		

[AI2 4-20mA loss] LFL2

Drive behavior on AI2 4-20 event.

Identical to **[AI1 4-20mA loss]** LFL1

[AI3 4-20mA loss] LFL3

Drive behavior on AI3 4-20 event.

Identical to **[AI1 4-20mA loss]** LFL1

[AI4 4-20mA loss] LFL4 ★

Drive behavior on AI4 4-20 event.

Identical to **[AI1 4-20mA loss]** LFL1

This parameter can be accessed if VW3A3203 I/O extension module has been inserted.

[AI5 4-20mA loss] LFL5 ★

Drive behavior on AI5 4-20 event.

Identical to **[AI1 4-20mA loss]** LFL1

This parameter can be accessed if VW3A3203 I/O extension module has been inserted.

[FallbackSpeed] LFF ★

Fall back speed.

Setting	Description
0.0...500.0 Hz	Setting range **Factory setting**: 0.0 Hz

[AI Loss Inhibition] INLF

Drive behavior on AI 4-20 event inhibition.

Setting	Code / Value	Description
[No]	NO	The drive behaves according to the selection of the AI 4-20 mA Loss **Factory setting**
[Yes]	YES	When the lost AI is assigned to **[Ref Freq 1 Config]** FR1, **[Ref.1B channel]** FR1B or **[Ref Freq 2 Config]** FR2, the drive ignores the response to the 4-20 mA loss event when set to **[Speed maintain]** RLS or **[Fallback Speed]** LFF, and prioritizes the channels switching by applying the reference frequency given through the reference channels **[Ref Freq 1 Config]** FR1 or **[Ref.1B channel]** FR1B or **[Ref Freq 2 Config]** FR2 or **[Forced Local Chan]** FLOC (according to **[Freq Switch Assign]** RFC, **[Ref 1B switching]** RCB and **[Forced Local Assign]** FLO parameters). **Note:** When the lost AI is assigned to **[Forced Local Chan]** FLOC, the reference channel switching is possible only after deactivating **[Forced Local Assign]** FLO.

[Fallback speed] LFF– Menu

Access

[Complete settings] ➞ [Error/Warn handling] ➞ [Fallback speed]

[FallbackSpeed] LFF

Fall back speed.

Setting	Description
0.0...500.0 Hz	Setting range **Factory setting**: 0.0 Hz

[Spd Maint Behavior] RLS– Menu

Access

[Complete settings] ➞ **[Error/Warn handling]** ➞ **[Spd Maint Behavior]**

[Spd Maint Behavior] RLS

⚠WARNING

LOSS OF CONTROL

- Only modify this parameter after a thorough risk assessment in compliance with all regulations and standards that apply to the device and to the application.
- Only modify this parameter from the default value if you can positively exclude that this can result in unsafe condition.
- Always consider to limit the duration of this usage by identifying and clearing, as soon as possible, the cause of the detected error

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

[Speed maintain] RLS behavior on ramp output 0.

This parameter defines the speed setpoint when the response to the **[4-20 mA loss]** LFL event is **[Speed maintain]** RLS.

Setting	Code / Value	Description
0		The speed setpoint is 0 **Factory setting**
[Low Speed]	LSP	The speed setpoint equals the value of the **[Low Speed]** LSP when the speed reference is 0 Hz before the **[4-20 mA loss]** LFL event

[Fieldbus monitoring] CLL– Menu

Access

[Complete settings] ➞ **[Error/Warn handling]** ➞ **[Fieldbus monitoring]**

[Modbus Error Resp] SLL

⚠ WARNING

LOSS OF CONTROL

If this parameter is set to **[Ignore]**, Modbus communication monitoring is disabled.

- Only use this setting after a thorough risk assessment in compliance 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 commissioning procedure and performing the final commissioning test.

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 Modbus.

Setting	Code / Value	Description
[Ignore]	NO	Detected error ignored
[Freewheel Stop]	YES	Freewheel stop **Factory setting**
[Configured Stop]	STT	Stop according to configuration of **[Type of stop]** STT, without tripping. In this case, the error relay does not open and the drive is ready to restart as soon as the detected error 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 if control is via the terminals)(1)
[Fallback Speed]	LFF	Change to fallback speed, maintained as long as the detected error persists and the run command has not been removed(1)
[Speed maintain]	RLS	The drive maintains the speed being applied when the detected error occurred, as long as the detected error is active and the run command has not been removed(1). If the run order is removed and a new run order is given while the error is still active, the speed setpoint is defined by **[Spd Maint Behavior]** RLS: • **[Spd Maint Behavior]** RLS=0, then the speed setpoint is 0 Hz • **[Spd Maint Behavior]** RLS=LSp, then the speed setpoint is the value of the **[Low Speed]** LSP parameter.
[Ramp stop]	RMP	Stop on ramp
[Fast stop]	FST	Fast stop
[DC injection]	DCI	DC injection stop. This type of stop cannot be used with some other functions
(1) Because, in this case, the detected error does not trigger a stop, it is advisable to assign a relay or digital output to its indication.		

[FallbackSpeed] LFF

Fall back speed.

Setting	Description
0.0...500.0 Hz	Setting range **Factory setting**: 0.0 Hz

[Fallback Channel] AFFL

Automatic fallback behavior in case of fieldbus communication interruption.

For more information about this parameter refer to .

[Comm Module] COMO– Menu

Access

[Complete settings] ➞ [Error/Warn handling] ➞ [Comm Module]

[Fdbus Interrupt Resp] CLL

⚠ WARNING

LOSS OF CONTROL

If this parameter is set to **[Ignore]**, fieldbus module communication monitoring is disabled.

- Only use this setting after a thorough risk assessment in compliance 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 commissioning procedure and performing the final commissioning test.

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

Response to fieldbus module communication interruption.

Setting	Code / Value	Description
[Ignore]	NO	Detected error ignored
[Freewheel Stop]	YES	Freewheel stop **Factory setting**
[Configured Stop]	STT	Stop according to configuration of **[Type of stop]** STT, without tripping. In this case, the error relay does not open and the drive is ready to restart as soon as the detected error 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 if control is via the terminals)(1)
[Fallback Speed]	LFF	Change to fallback speed, maintained as long as the detected error persists and the run command has not been removed(1)
[Speed maintain]	RLS	The drive maintains the speed being applied when the detected error occurred, as long as the detected error is active and the run command has not been removed(1). If the run order is removed and a new run order is given while the error is still active, the speed setpoint is defined by **[Spd Maint Behavior]** RLS: • **[Spd Maint Behavior]** RLS=0, then the speed setpoint is 0 Hz • **[Spd Maint Behavior]** RLS=LSp, then the speed setpoint is the value of the **[Low Speed]** LSP parameter.
[Ramp stop]	RMP	Stop on ramp
[Fast stop]	FST	Fast stop
[DC injection]	DCI	DC injection stop. This type of stop cannot be used with some other functions
(1) Because, in this case, the detected error does not trigger a stop, it is advisable to assign a relay or digital output to its indication.		

[FallbackSpeed] LFF ★

Fall back speed.

Setting	Description
0.0...500.0 Hz	Setting range **Factory setting**: 0.0 Hz

[Fallback Channel] AFFL

Fieldbus communication loss fallback channel.

Automatic fallback behavior in case of fieldbus communication interruption.

If this feature is enabled, in case of communication interruption, **[Freq Switch Assign]** RFC and **[Command Switching]** CCS are both forced to channel 1 or channel 2 (depending on **[Fallback Channel]** AFFL configuration) while the communication interruption is active. During this fallback behavior **[Fallback Channel]** AFFL warning remains active.

It is required to not use continuously the fallback mode. The cause of the communication interruption must be analyzed and cleared to switch back to normal operation using fieldbus.

⚠WARNING

WRONG BEHAVIOR

- Only modify this parameter from the default value after a thorough risk assessment in compliance with all regulations and standards that apply to the device and to the application.
- Only modify this parameter from the default value if you can positively exclude that this can result in unsafe conditions.
- Perform a comprehensive commissioning test to verify correct operation of the application when fallback mode is active.

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

This parameter can be accessed if **[Access Level]** LAC is set to **[Expert]** EPR.

This feature is incompatible with 2-wire control on level (i.e. this parameter is forced to **[Not Active]** NO if **[2-wire type]** TCT is set to **[Level]** LEL or **[Level With Fwd Priority]** PFO).

Setting	Code / Value	Description
[Not Active]	NO	Feature disabled.**(1)** **Factory setting**
[Fallback To CH1]	CH1	Fallback to channel 1.**(2)**
[Fallback To CH2]	CH2	Fallback to channel 2.**(2)**

(1): If this parameter is switched back to **[Not Active]** NO, verify that the settings of the parameters listed below are configured accordingly with the application requirements.

(2): According to the channel switched on in case of communication interruption, the related communication monitoring parameters must be disabled manually.

List of parameters:

- **[Modbus Error Resp]** SLL,
- **[Fdbus Interrupt Resp]** CLL,
- Appropriate BACnet parameter?

[UnderV handling] USB– Menu

Access

[Complete settings]➞ [Error/Warn handling]➞ [UnderV handling]

[Undervoltage Resp] USB

Response to undervoltage.

Setting	Code / Value	Description
[Error Triggered]	0	The drive triggers an error (the detected error relay assigned to **[Operating State Fault]** FLT is opened) **Factory setting**
[Error Triggered w/o Relay]	1	The drive triggers an error (the detected error relay assigned to **[Operating State Fault]** FLT remains closed)
[Warning Triggered]	2	The warning and detected error relay remain closed. The warning can be assigned to a digital output or a relay

[Mains voltage] URES

Rated voltage of the mains supply in Vac.

The factory setting value of this parameter depends of drive rating.

Settings	Code / Value	Description
[200 Vac]	200	200 Vac
[220 Vac]	220	220 Vac
[230 Vac]	230	230 Vac
[240 Vac]	240	240 Vac
[380 Vac]	380	380 Vac
[400 Vac]	400	400 Vac
[415 Vac]	415	415 Vac
[440 Vac]	440	440 Vac
[460 Vac]	460	460 Vac
[480 Vac]	480	480 Vac

[Undervoltage level] USL

The factory setting is determined by the drive voltage rating.

Setting	Description
100...354 Vac	Setting range, according to drive rating **Factory setting**: According to drive rating

[UnderVolt timeout] UST

Undervoltage timeout.

Setting	Description
0.2...999.9 s	Setting range **Factory setting**: 0.2 s

[Stop Type PLoss] STP

Behavior in the event of the undervoltage prevention level being reached.

Setting	Code / Value	Description
[Inactive]	NO	No action **Factory setting**
[Ramp Stop]	RMP	Stop following an adjustable deceleration ramp **[Max stop time]** STM in order to help to prevent from uncontrolled stop of the application.
[Freewheel Stop]	LNF	Lock (freewheel stop): • If the voltage value is lower than **[Prevention level]** UPL, the **[UnderV Warn]** USA warning is triggered. • If the voltage value is lower than **[Undervoltage level]** USL, the **[Supply Mains UnderV]** USF error is triggered.

[UnderV. restart tm] TSM ★

This parameter can be accessed if **[Stop Type PLoss]** STP is set to **[Ramp Stop]** RMP.

The time delay before authorizing the restart after a complete stop for **[Stop Type PLoss]** STP is set to **[Ramp Stop]** RMP if the voltage has returned to normal.

Setting ( )	Description
1.0...999.9 s	Setting range **Factory setting**: 1.0 s

[Prevention level] UPL ★

This parameter can be accessed if **[Stop Type PLoss]** STP is set to a value different than **[Inactive]** NO.

The adjustment range and factory setting are determined by the drive voltage rating and the **[Mains voltage]** URES value.

Setting	Description
141...414 V	Setting range **Factory setting**: According to drive rating

[Max stop time] STM ★

This parameter can be accessed if **[Stop Type PLoss]** STP is set to **[Ramp Stop]** RMP.

This parameter defines the deceleration ramp time in case of mains loss. During this controlled stop, the drive is powered thanks to the inertia of the application, the motor is in generator mode. It is recommended to verify that the deceleration set is compatible with the application inertia.

Setting	**Description**
0.01...60.00 s	Setting range **Factory setting**: 1.00 s

[Ground Fault] GRFL– Menu

Access

[Complete settings] ➞ **[Error/Warn handling]** ➞ **[Ground Fault]**

About This Menu

This menu can be accessed if **[Access Level]** LAC is set to **[Expert]** EPR

If the internal ground fault detection **[Grd Fault Activation]** GRFL causes unwanted results in your application, it is possible to substitute the internal ground fault detection by an appropriate external ground fault monitoring system. Setting the parameter **[Grd Fault Activation]** GRFL to **[Disable Error Detect]** INH or to a percentage value of the nominal current of the drive disables the internal ground fault detection of the drive or reduces its effectiveness. Therefore, you must install an external ground fault detection system that is able to reliably detect ground faults.

⚠⚠ DANGER

GROUND FAULT MONITORING DISABLED

- Only set the parameter **[Grd Fault Activation]** GRFL to **[Disable Error Detect]** INH or to a percentage value of the nominal current of the drive after a thorough risk assessment in compliance with all regulations and standards that apply to the device and to the application.
- Implement an alternative, external ground fault monitoring function that allows for an adequate, equivalent response to a ground fault of the drive in compliance with all applicable regulations and standards as well as the risk assessment.
- Commission and test the system with all monitoring functions enabled.
- During commissioning, verify that the alternative, external ground fault detection system properly detects any type of ground faults by performing tests and simulations in a controlled environment under controlled conditions.

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

[Grd Fault Activation] GRFL

This parameter is accessible only for drives with nominal power equal or higher than 22 kW. Refer to chapter “Electric Data – Drive Rating” in the ER330 Installation Manual ER330 Installation Manual, page 15, for more information.

NOTE: The setting of this parameter is taken into account after a product restart.

Setting	Code / Value	Description
[No]	INH	Disables error detection
[Yes]	YES	Use product internal value. Around 25% of the drive nominal current. **Factory setting**
0.0...100.0%	_	Setting range, in % of the drive nominal current

[Motor thermal monit] THT– Menu

Access

[Complete settings] ➞ [Error/Warn handling] ➞ [Motor thermal monit]

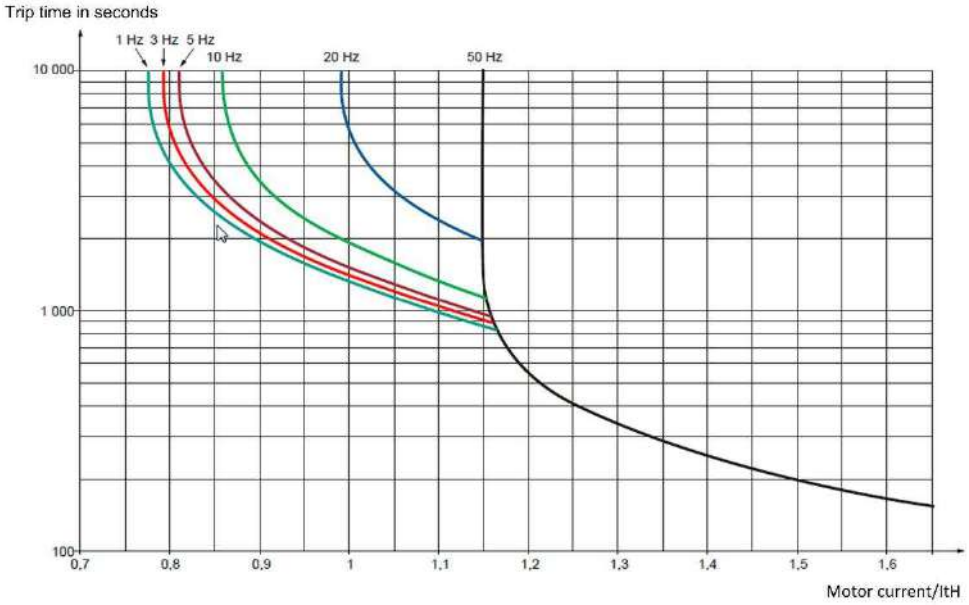
About this Menu

Motor thermal protection by calculating the I^2t.

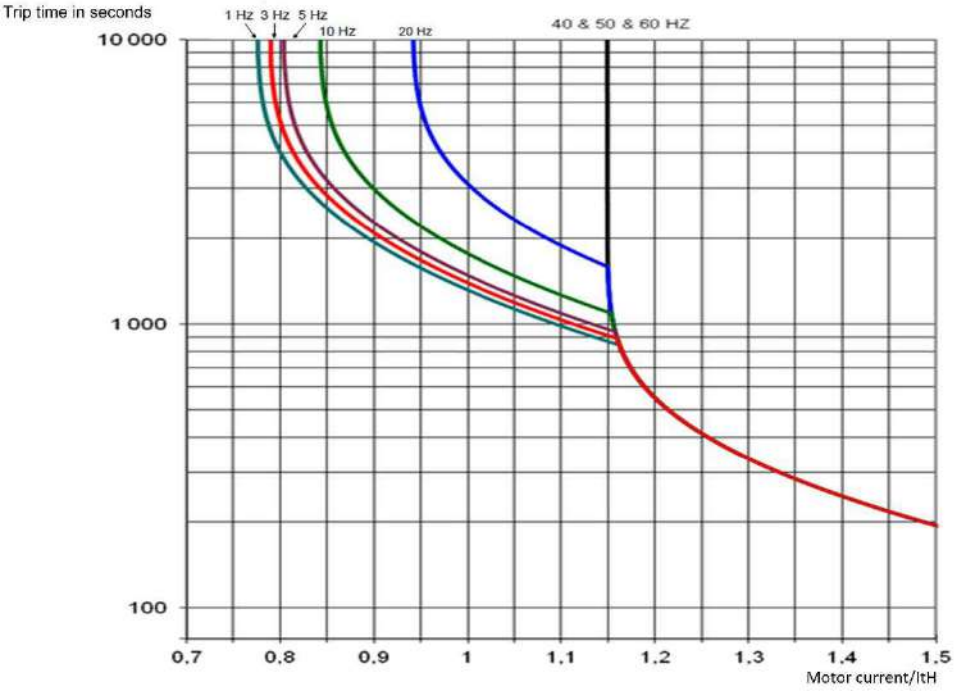
NOTE: The motor thermal state is memorized when the drive is switched off. The power-off time is used to calculate the motor thermal state at the next startup.

- Self-cooled motors: The trigger curves depend on the motor frequency.
- Forced-cooled motors: Only the 50 Hz trigger curves needs to be considered, regardless of the motor frequency.

Below a curve for 50Hz motor.



Below a curve for 60Hz motor.



[Motor Th Current] ITH

Motor thermal monitoring current to be set to the rated current indicated on the nameplate.

Setting ( )	Description
0.12...1.1_In(1)	Setting range **Factory setting**: According to drive rating
(1) Corresponding to the rated drive current indicated in the installation manual and on the drive nameplate.	

[Motor Thermal Mode] THT

NOTE: An error is detected when the thermal state reaches 118% of the rated state and reactivation occurs when the state falls back below 100%.

Setting	Code / Value	Description
[No]	NO	No thermal monitoring
[Self cooled]	ACL	Self ventilated motor **Factory setting**
[Force-cool]	FCL	Fan-cooled motor

[Drive overload monit] OBR– Menu

Access

[Complete settings]➞ [Error/Warn handling]➞ [Drive overload monit]

[DriveTemp ErrorResp] OHL

Drive overtemp error response.

NOTICE

OVERHEATING

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.

- Verify that the settings of this parameter do not result in equipment damage.

Failure to follow these instructions can result in equipment damage.

Setting	Code / Value	Description
[Ignore]	NO	Detected error ignored
[Freewheel Stop]	YES	Freewheel stop **Factory setting**
[Configured Stop]	STT	Stop according to configuration of **[Type of stop]** STT, without tripping. In this case, the error relay does not open and the drive is ready to restart as soon as the detected error 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 if control is via the terminals)(1)
[Fallback Speed]	LFF	Change to fallback speed, maintained as long as the detected error persists and the run command has not been removed(1)
[Speed maintain]	RLS	The drive maintains the speed being applied when the detected error occurred, as long as the detected error is active and the run command has not been removed(1). If the run order is removed and a new run order is given while the error is still active, the speed setpoint is defined by **[Spd Maint Behavior]** RLS: • **[Spd Maint Behavior]** RLS=0, then the speed setpoint is 0 Hz • **[Spd Maint Behavior]** RLS=LSp, then the speed setpoint is the value of the **[Low Speed]** LSP parameter.
[Ramp stop]	RMP	Stop on ramp
[Fast stop]	FST	Fast stop
[DC injection]	DCI	DC injection stop. This type of stop cannot be used with some other functions
(1) Because, in this case, the detected error does not trigger a stop, it is advisable to assign a relay or digital output to its indication.		

[Dev Thermal Warning] THA

Drive thermal state warning (for **[Dev Th reached]** TAD warning).

Setting	Description
0...118%	Setting range **Factory setting**: 100%

[Warn grp 1 definition] A1C– to [Warn grp 5 definition] A5C– Menus

Access

[Complete settings] ➞ **[Error/Warn handling]** ➞ **[Warn groups config]**
[Warn grp 1 definition] to **[Warn grp 5 definition]**

About This Menu

The following submenus group the warnings into 1 to 5 groups, each of which can be assigned to a relay or a digital output for remote signaling.

When one or a number of warnings selected in a group occur, this warning group is activated.

List of Warnings

The list of warning codes is available in the chapter Diagnostics and Troubleshooting, page 528.

[Maintenance]

[Diagnostics] DAU– Menu

Access

[Complete settings] ➡ **[Maintenance]** ➡ **[Diagnostics]**

About This Menu

This menu allows you to make simple test sequences for diagnostics.

[Fan Diagnostics] FNT

This starts a test sequence.

NOTE: Fan diagnostics of internal fan(s) will be not-successful if the DC bus is not fully charged. This will be the case:

- on separate control (e.g. the control block is only supplied on 24V), or
- if the drive is in **[Energy Saving]** IDLE mode (e.g. Stop and go function is active).

[HMI LED diagnostics] HLT

This starts a test sequence.

[Drive warranty mgnt] DWMA– Menu

Access

[Complete settings] ➞ **[Maintenance]** ➞ **[Drive warranty mgnt]**

About This Menu

The product life cycle date is initialized during product manufacturing.

A **[Life Cycle Warn 1]** LCA1 is triggered 2 months before the end of the warranty period. At the end of the warranty period a **[Life Cycle Warn 2]** LCA2 is triggered. This function requires date and time data coming from Graphic Display Terminal.

[LifeCycle Warning] LCAC

Lifecycle warning configuration.

Value( )	Code / Value	Description
[No]	NO	No
[Yes]	YES	Yes **Factory setting**

[Warranty expired] LCAD

Life cycle date.

End of warranty date (YYYY/MM/DD).

It can also be read via fieldbus communication. To convert the read value process as the following example.

Read value: 11679 ➞ Binary conversion: **0010 110**1 100*1 1111* ➞ Date: 2000 +**22**/12/3*1*=**2022**/12/3*1*

For more information such as its logic address, refer to the communication parameters file.

Value	Description
YYYY/MM/DD	**Factory setting**: 0

[Customer event 1] CE1– Menu

Access

[Complete settings]➞ [Maintenance]➞ [Customer events] ➞ [Customer event 1]

About This Menu

This menu allows you to define customized customer events based on the time.

NOTE: The Drive's Date and Time needs to be configured first.

[Config Warning 1] CCA1

Configuration of customer warning 1.

Setting	Code / Value	Description
[Not Configured]	NO	Not configured **Factory setting**
[Counter]	CPT	Counter
[Date and Time]	DT	Date and time

[Counter limit 1] CCL1

Configuration counter limit 1.

Setting	Description
0...4294967295 s	Setting range **Factory setting**: 0 s

[Counter Source 1] CCS1

Configuration counter Source 1.

Setting	Code / Value	Description
[Mains/ Control ON]	0	Power or control supply on
[Mains Supply ON]	1	Power supply on
[Drive is Running]	2	Drive in running state **Factory setting**

[Time counter 1] CC1

Time counter 1.

Setting	Description
0...4294967295 s	Setting range **Factory setting**: 0 s

[Date Time Warn 1] CDT1★

NOTE: This parameter is only accessible with the graphic display terminal.

Setting ( )	Description
hh:mm DD/MM/YYYY	Setting range **Factory setting**: 00:00 01/01/2000

[Customer event 2] CE2– to [Customer event 5] CE5– Menus

Access

[Complete settings] ➞ **[Maintenance]** ➞ **[Customer events]** ➞ **[Customer event 2]** to **[Customer event 5]**

About This Menu

Identical to **[Customer event 1]** CE1– menu , page 425.

[Config Warning 2] CCA2 to [Config Warning 5] CCA5

Configuration of customer warning 2 to ***Configuration of customer warning 5***.

[Counter limit 2] CCL2 to [Counter limit 5] CCL5

Configuration counter limit 2 to ***Configuration counter limit 5***.

[Counter Source 2] CCS2 to [Counter Source 5] CCS5

Configuration counter Source 2 to ***Configuration counter Source 5***.

[Time counter 2] CC2 to [Time counter 5] CC5

Time counter 2 to ***Time counter 5***.

[Date Time Warn 2] CDT2 to [Date Time Warn 5] CDT5 ★

Date time warning 2 to ***Date time warning 5***.

NOTE: This parameter is only accessible with the graphic display terminal.

[Customer events] CUEV– Menu

Access

[Complete settings]➞ [Maintenance]➞ [Customer events]

[Warning Clearing] CAR

Customer warning clearing.

Setting ( )	Code / Value	Description
[No Warn Clearing]	NO	No warning clearing **Factory setting**
[Clear Event 1 Warn]	RA1	Clear event 1 warning
[Clear Event 2 Warn]	RA2	Clear event 2 warning
[Clear Event 3 Warn]	RA3	Clear event 3 warning
[Clear Event 4 Warn]	RA4	Clear event 4 warning
[Clear Event 5 Warn]	RA5	Clear event 5 warning

[Fan management] FAMA– Menu

Access

[Complete settings] ➞ **[Maintenance]** ➞ **[Fan management]**

About This Menu

Fan speed and **[Fan Operation Time]** FPBT are monitored values.

An abnormal reduction of the speed of the fan trigger a warning **[Fan Fdbk Warn]** FFDA. As soon as **[Fan Operation Time]** FPBT reach the predefined value of 45,000 hours, a warning **[Fan Counter Warn]** FCTA is triggered.

[Fan Operation Time] FPBT counter can be set to 0 by using the **[Counter Reset]** RPR parameter.

[Fan mode] FFM

Fan activation mode.

NOTE: This parameter is forced to **[Standard]** STD if:

- Drives power is more than 90Kw.

Setting	Code / Value	Description
[Standard]	STD	The operation of the fan is enabled when the motor is running. According to the drive rating, this could be the only available setting **Factory setting**
[Always]	RUN	The fan is always activated
[Economy]	ECO	The fan is activated only if necessary, according to the internal thermal state of the drive

[Maintenance] CSMA– Menu

Access

[Complete settings] ➞ [Maintenance]

[Counter Reset] RPR

NOTE: The list of possible values depends on the product size.

Setting ( )	Code / Value	Description
[No]	NO	No **Factory setting**
[Reset Run Time]	RTH	Run time reset
[Reset Pw On Time]	PTH	Power ON time reset
[Reset Fan Count]	FTH	Reset fan counter
[Reset Start Count]	NSM	Clear number of motor starts
[Efficiency MAX]	EFYK	Efficiency max
[Efficiency MIN]	EFYJ	Efficiency min
[Flow Rate MAX]	FS1K	Flow rate max
[Flow Rate MIN]	FS1J	Flow rate min
[Reset Total Qtity]	FS1C	Reset total quantity

[HVAC functions] HVAC

[PID controller] PID – Menu

Access

[Complete settings] ➞ **[HVAC functions]** ➞ **[PID controller]**

About This Menu

Identical to **[Pump functions]** – **[PID controller]**– Menu, page 242.

[AI threshold detection] AITD — Menu

Access

[Complete settings]➞ [HVAC functions]➞ [AI threshold detection]

About This Menu

This menu allows the configuration of drive actions triggered by a user-defined analog input signal. User can specify the target analog channel and a corresponding activation threshold; once the input value reaches this setpoint, the drive executes a pre-selected response, such as:

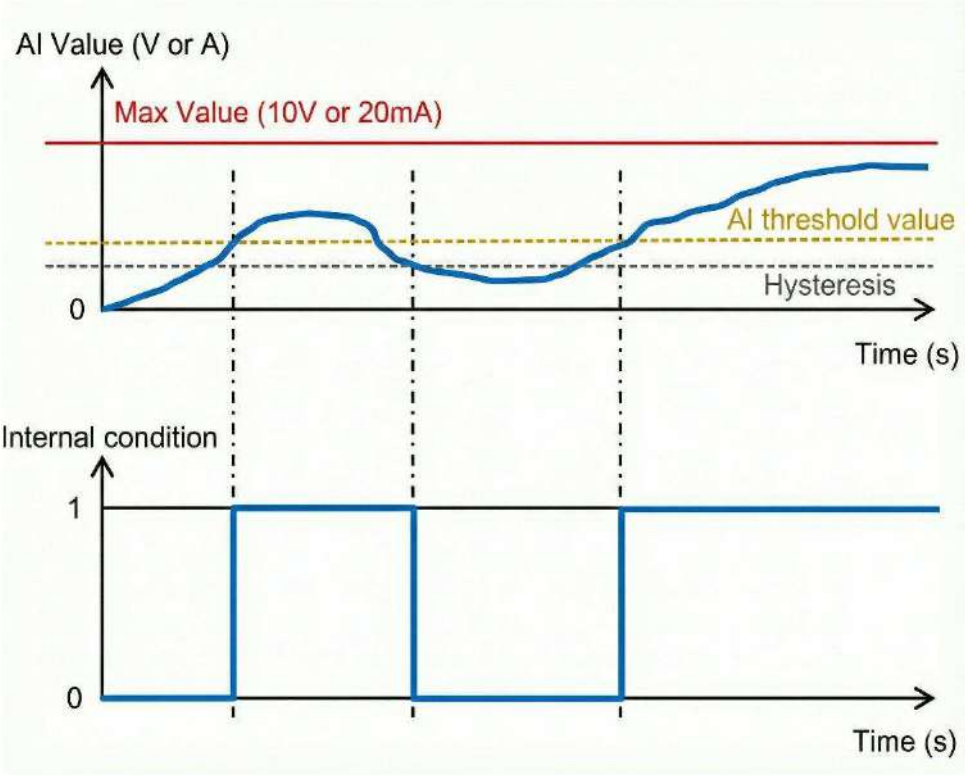
- **[PID]**: Switching from PID to Speed Control
- **[Run Permissive]**: Initiating a Run/Stop command.
- Triggering a Warning or an Error
- Activating a physical Relay

The system's threshold detection is equipped with a configurable Hysteresis parameter, which defaults to 5% of the Analog Input Maximum value. This parameter establishes a stability zone to prevent rapid oscillation when the input value fluctuates near the setpoint.

The internal condition is determined by the following logic:

- **Activation (State 1):** The internal condition transitions to **1** when the Analog Input value exceeds the user-defined **Threshold**.
- **Deactivation (State 0):** The internal condition transitions to **0** only when the value drops below the **Lower Limit** (defined as: *T*hreshold – Hysteresis).
- **State Maintenance:** If the input value remains between the Threshold and the Lower Limit, the internal condition remains **unchanged**. The system maintains its current state until a boundary is fully breached.

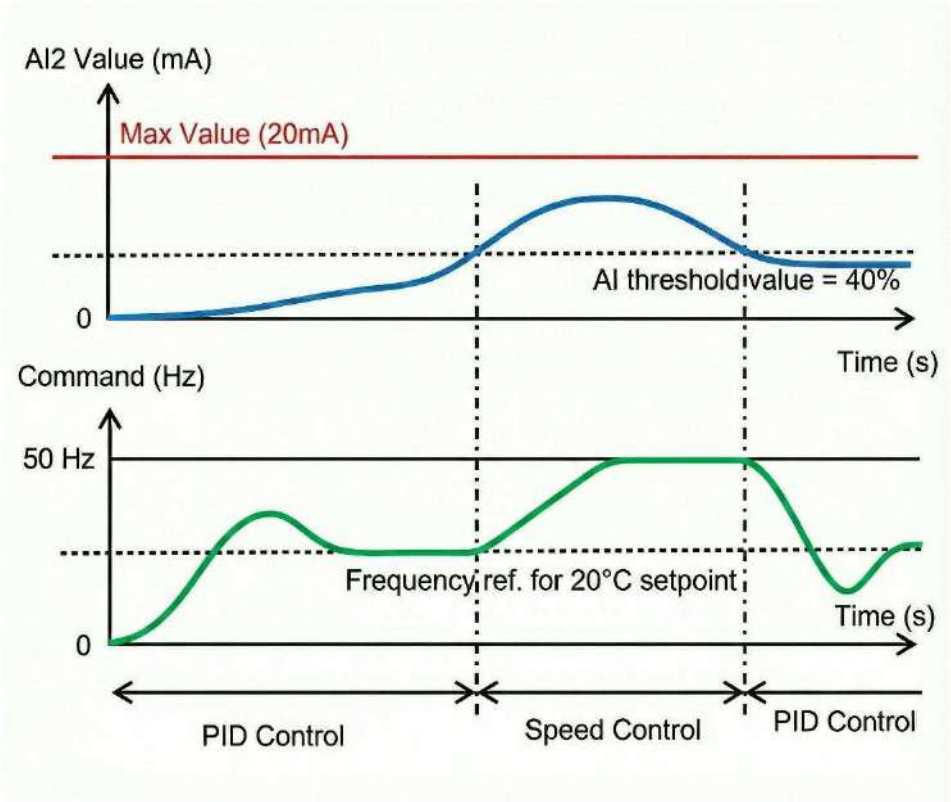
The following figure is a general case demonstration of the function:



The following table is a step-by-step configuration of activating the function and setting it to PID mode:

Step	Action
1	Go to **[AI threshold detection]**.
2	Go to **[AI Threshold Assign]** and select the Analog Input.
3	Go to **[AI Threshold Mode]** and select **[PID]**.
4	Go to **[AI Threshold Value]** and select the threshold value that conforms to the application. (% of the Maximum analog input value)
5	Go to **[AI Threshold Hyst]** and select the hysteresis value that conforms to the application.
6	Set the speed value (speed control when switching off from PID) in **[AI Threshold Speed]**.

The following figure is the results of the step by step configuration on PID mode:



[AI Threshold Assign] TDA

This parameter determines which analog input is used for detection. The available options are listed in the table below.

Setting	Code / Value	Description
[No]	NO	Not assigned **Factory setting**
[AI1]...**[AI3]**	AI1...AI3	Analog Inputs AI1...AI3
[AI4]...**[AI5]**	AI4...AI5	Analog Inputs AI4...AI5 if VW3A3203 I/O extension module has been inserted.
[AI Virtual 1]... **[AI Virtual 3]**	AIV1...AIV3	Virtual Analog Inputs AIV1...AIV3

NOTE: It is advisable to set this function on an analog input that can be set on **[Current]** 0A and to set **[AI1 4-20mA loss]** LFL1 to a value different than **[Ignore]** NO, to detect cable disconnection.

[AI Threshold Mode] TDMO

This parameter provides the set of modes that determine the action executed upon activation of the internal condition :

Setting	Code / Value	Description
[PID]	PID	This mode allows to switch from PID control to Speed control at the value specified in **[AI Threshold Speed]** when the internal condition switches from 0 to 1. **NOTE:** If the internal condition switches back from 1 to 0, the drive will switch back to PID control. **NOTE:** This mode can only be configured if **[PID]** function is activated and well configured on the drive. **Factory settings**
[Run Permissive]	PERM	**This mode allows the function to act as a run-permissive interlock.** The logic is configured through the **[AI Threshold Logic]** parameter, which defines how the internal condition enables or inhibits motor operation. Available options: • **[Negative]** — Negative logic ◦ Internal condition = **1** ➡ Run permitted; if a run command is present, the drive ramps the motor. ◦ Internal condition changes to **0** ➡ Motor stops in freewheel; if the condition returns to **1** and no stop command is active, ramp-up resumes. • **[Positive]** — Positive logic ◦ Internal condition = **0** ➡ Run permitted; if a run command is present, the drive ramps the motor. ◦ Internal condition changes to **1** ➡ Motor stops in freewheel; if the condition returns to **0** and no stop command is active, ramp-up resumes.
[Warning] /[Error]	ALARM/FAULT	**If [Warning]** : The alarm is activated (internal condition = **1**) when the value reaches . It resets automatically (internal condition = **0**) when the value falls below the activation zone (threshold – hysteresis). **If [Error]** : As above, the alarm activates at and resets when the value falls below the threshold. If the alarm remains active longer than **[AI Threshold Timeout]**, the fault is triggered and the drive trips in freewheel. When the fault clears (internal condition = **0**): • If **[Auto Fault Reset]** ATR = **[Yes]** , an automatic restart is performed (duration defined by **[Fault Reset Time]** TAR). • Otherwise, a manual or general reset is required.
[Relay]	RELAY	This mode activates a relay when the internal condition is 1 and turns it off when it is 0. The specific relay can be selected in **[AI Threshold Relay]**.

[AI Threshold Value] TDT

This parameter configures the threshold value that initiates the function.

Setting	Description
0...1000	Select the threshold upon which the function will trigger **Factory setting**: 500 Unit: 0.1 % of UIHx if Aix is in V / 0.1 % of CRHx if Aix is in mA

[AI Threshold Hyst] TDH

This parameter configures the hysteresis value.

Setting	Description
0...1000	Select the threshold upon which the function will trigger **Factory setting**: 500 Unit: 0.1 % of UIHx if Aix is in V / 0.1 % of CRHx if Aix is in mA

[AI Threshold Speed] TDSP

This parameter specifies the speed of the drive when switching from PID control to speed control.

Setting	Description
0.0...500.0	Select the speed of the drive after switching from PID control to speed control. **Factory setting**: LSP Unit: 0.1 Hz

[AI Threshold Logic] TDPR

This parameter specifies the interlock logic for the run permissive behavior. The following table explains the options :

Setting	Code / Value	Description
[Negative]	NEG	Selecting this option leads to the following two scenarios: • Internal condition = **1** ➡ Run permitted; if a run command is present, the drive ramps the motor. • Internal condition changes to **0** ➡ Motor stops in freewheel; if the condition returns to **1** and no stop command is active, ramp-up resumes.
[Positive]	POS	Selecting this option leads to the following two scenarios: • Internal condition = **0** ➡ Run permitted; if a run command is present, the drive ramps the motor. • Internal condition changes to **1** ➡ Motor stops in freewheel; if the condition returns to **0** and no stop command is active, ramp-up resumes.

[AI Threshold Timeout] TDFD

This parameter specifies the delay to wait before triggering the fault

Setting	Description
0.0...3000	Select the time delay before triggering the fault. **Factory setting**: 100 Unit: 0.1 s

[AI Threshold Relay] TDR

This parameter assigns the actionable Relay upon the use of the **[Relay]** Mode in **[AI Threshold Mode]**. The following table presents the possible relay affectations:

Setting	Code / Value	Description
[No]	NO	Not assigned **Factory setting**
[R2]...**[R3]**	R2...R3	Relay output R2...R3
[R4]...**[R6]**	R4...R6	Relay output R4...R6 if VW3A3204 relay output option module has been inserted
[DQ11]... **[DQ12]**	DO11...DO12	Digital output DQ11...DQ12 if VW3A3203 I/O extension module has been inserted

[Run permissive] RPRV – Menu

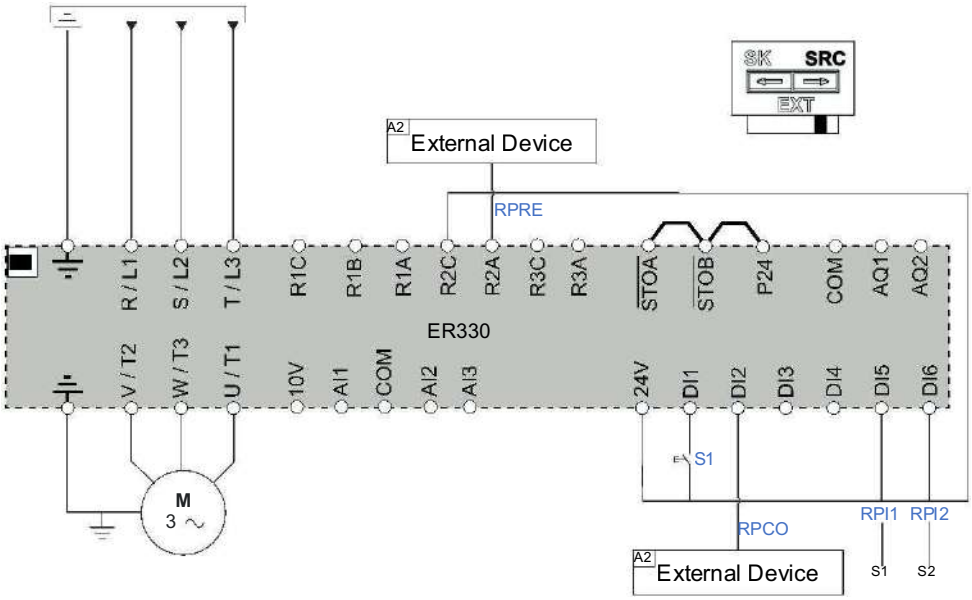
Access

[Complete settings] → **[HVAC functions]** → **[Run permissive]**

About This Menu

Run Permissive is a mechanism that prevents the motor from starting unless specific conditions are met.
The Run Permissive function prevents the drive from running the motor until validation from an external device is received.

Example Of Wiring Diagram Of The Function:



Example of configuration :

- **[Run Perm Assign]** RPCO is assigned to **[DI2]** LI2.
- **[Run Perm Int 1 Assign]** RPI1 is assigned to **[DI5]** LI5.
- **[Run Perm Int 2 Assign]** RPI2 is assigned to **[DI6]** LI6.
- **[Run Perm Out Assign]** RPRE is controlled via relay output **[R2]**R2.

1. When configured, run order will not run the motor but it will activate the digital output selected with **[Run Perm Out Assign]** RPRE.
2. Then this digital output will activate an external device depending on the wiring.
3. This external device will send a confirmation to a dedicated DI chosen with **[Run Perm Assign]** RPCO.
4. When all conditions are met (RPCO. RPI1, RPI2 and external conditions), the drive shall run the motor to the active setpoint.

Step by step on how to configure Run Permissive:

Step	Action
1	Configure run permissive function: • Go to **[Run Perm Enable]** RPEN parameter. • Select the option **Yes**.
2	Choose the output for run permissive request: • Go to **[Run Perm Out Assign]** RPRE parameter.

Step by step on how to configure Run Permissive : (Continued)

Step	Action
3	Choose the digital input for run permissive confirmation : • Go to **[Run Perm Assign]** RPCO parameter.
4	Select the stop mode : • Go to **[Run Perm Stop Mode]** RPST parameter.
5	Select the input switch for run permissive interlock : • Go to **[Run Perm Int 1 Assign]** RPI1 and **[Run Perm Int 2 Assign]** RPI2 parameters.
6	Choose the tag : • Go to **[Run Perm Tag]** RPT0 parameter.
7	Choose the Interlock tags : • Go to **[Run Perm Int 1 Tag]** RPT1 and **[Run Perm Int 2 Tag]** RPT2 parameters.

[Run Perm Enable] RPEN

Configure run permissive.

Setting	Code / Value	Description
[No]	NO	Run permissive not configured. **Factory settings**
[Yes]	YES	Run permissive configured.

⚠WARNING

UNANTICIPATED EQUIPMENT OPERATION

- Take into account that the motor's run command may be delayed as long as the start conditions are not fully met.
- Verify that this behavior does not result in unsafe conditions.

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

Note:

- Damper Control function is incompatible with Run Permissive function.

[Run Perm Assign] RPCO

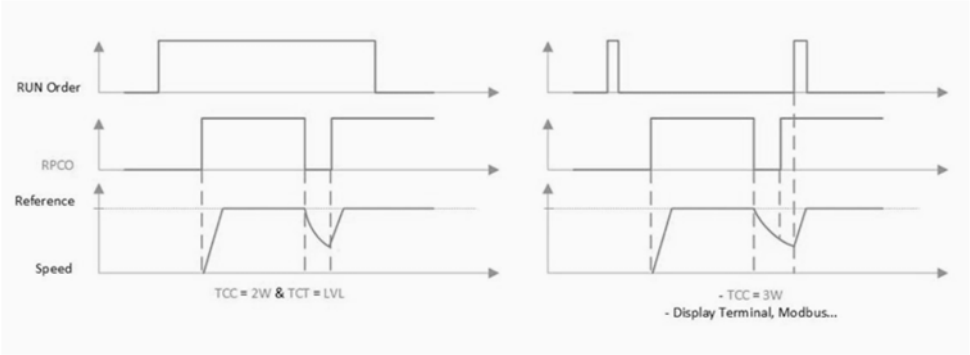
Configure digital source for run permissive confirmation.

This parameter is accessible only if **[Run Perm Enable]** RPEN and **[Run Perm Out Assign]** RPRE are not assigned to **[No]**NO.

Value range	Code / Value	Description
[Not Assigned]	NO	Not assigned **Factory setting**
[DI1]...**[DI6]**	LI1...LI6	Digital input DI1...DI6
[DI11]...**[DI16]**	LI11...LI16	Digital input DI11...DI16 if VW3A3203 I/O extension module has been inserted
[CD00]... **[CD10]**	CD00...CD10	Virtual digital input CMD.0...CMD.10 in **[I/O profile]** IO configuration
[CD11]... **[CD15]**	CD11...CD15	Virtual digital input CMD.11...CMD.15 regardless of configuration

Note :

- In the event of a confirmation loss while running, a stop is triggered based on the configuration of the **[Run Perm Stop Mode]** RPST parameter.
- In case of :
  - Command by terminal, 2 wire control, and **[2-wire type]** TCT set to **[Level]** LEL, the drive returns to **[Wait Confirm]** PERM status.
  - Command by terminal, 2 wire control, and **[2-wire type]** TCT set to **[Transition]** TRN, a new run order is required to return to **[Wait Confirm]** PERM status.



[Run Perm Out Assign] RPRE

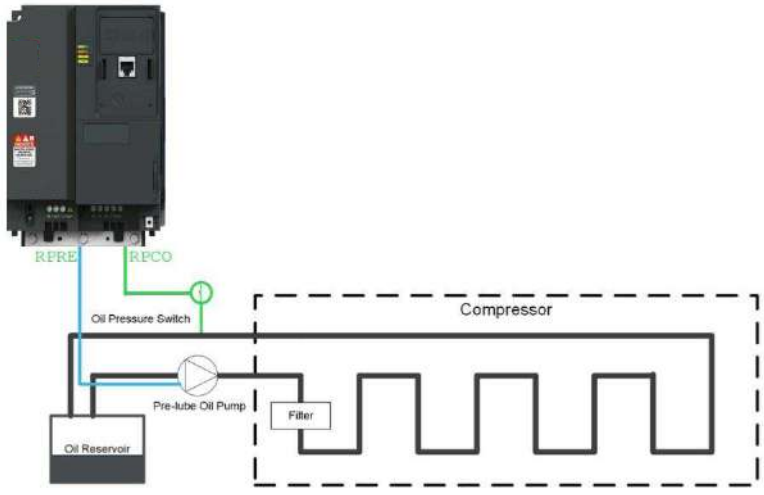
Select the digital output for run permissive request.

Setting	Code / Value	Description
[No]	NO	Not assigned **Factory setting**
[R2]...**[R3]**	R2...R3	Relay output R2...R3
[R4]...**[R6]**	R4...R6	Relay output R4...R6 if VW3A3204 relay output option module has been inserted
[DQ11]... **[DQ12]**	DO11...DO12	Digital output DQ11...DQ12 if VW3A3203 I/O extension module has been inserted

Note:

- When this digital output becomes active, the drive enters the status **[Wait Confirm]** PERM.
- Use outputs on high level to detect accidental disconnection of the output cable.

Example Of Configuration Of The Parameter:



For example, the **[Run Perm Out Assign]** RPRE input can be used to activate a pre-lubrication pump that delivers oil to the compressor. Once the oil has filled all the passages and sufficient pressure is reached, a feedback signal from the oil pressure sensor can be used as the **[Run Perm Assign]** RPCO input, allowing the drive to start the motor.

[Run Perm Stop Mode] RPST

Select the stop mode when run permissive signal is lost.

Setting	Code / Value	Description
[Freewheel Stop]	YES	Device trips is stopped in FREEWHEEL **Factory setting**
[Fallback Speed]	LFF	Fallback speed
[Ramp stop]	RMP	Ramp stop
[Fast stop]	FST	Fast stop.

Depending on the type of command, the restart of the connected motor will be allowed under different conditions. In 2-wire terminal command mode:

- Regardless of the RPST parameter setting, the restart will be allowed as soon as the start condition input becomes active.
- If the RPST parameter is set to any value other than Freewheel Stop, the restart will be allowed as soon as the start condition input becomes active.

In all other command types, including fieldbus:

- If the RPST parameter is set to Freewheel Stop, the restart will not be allowed when the start condition input becomes active. To allow a restart, a new run command sequence (1) must be applied.

⚠WARNING

UNANTICIPATED EQUIPMENT OPERATION

- Ensure that allowing automatic restart without applying a new run command sequence (1) does not result in unsafe conditions..

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

(1) By switching the run command OFF and then ON again.

: To change the assignment of this parameter, press OK key and display a safety message, then press YES button again.

[Run Perm Int 1 Assign] RPI1

Select run permissive interlock 1 source.

This parameter is accessible only if **[Run Perm Enable]** RPEN is not assigned to **[No]**NO.

Value range	Code / Value	Description
[Not Assigned]	NO	Not assigned **Factory setting**
[DI1]...**[DI6]**	LI1...LI6	Digital input DI1...DI6
[DI11]...**[DI16]**	LI11...LI16	Digital input DI11...DI16 if VW3A3203 I/O extension module has been inserted

Value range	Code / Value	Description
[CD00]... **[CD10]**	CD00...CD10	Virtual digital input CMD.0...CMD.10 in **[I/O profile]** IO configuration
[CD11]... **[CD15]**	CD11...CD15	Virtual digital input CMD.11...CMD.15 regardless of configuration

[Run Perm Int 2 Assign] RPI2

Select run permissive interlock 2 source.

This parameter is accessible only if **[Run Perm Enable]** RPEN is not assigned to **[No]**NO.

Value range	Code / Value	Description
[Not Assigned]	NO	Not assigned **Factory setting**
[DI1]...**[DI6]**	LI1...LI6	Digital input DI1...DI6
[DI11]...**[DI16]**	LI11...LI16	Digital input DI11...DI16 if VW3A3203 I/O extension module has been inserted
[CD00]... **[CD10]**	CD00...CD10	Virtual digital input CMD.0...CMD.10 in **[I/O profile]** IO configuration
[CD11]... **[CD15]**	CD11...CD15	Virtual digital input CMD.11...CMD.15 regardless of configuration

[Run Perm Tag] RPT0

Run permissive tag.

This parameter is accessible only if **[Run Perm Out Assign]** RPRE is configured and **[Run Perm Enable]** RPEN is not assigned to **[No]** NO.

Setting	Code / Value	Description
[Run Permissive]	RUNPMS	Run Permissive. **Factory setting**
[Damper Closed]	DPNDSW	Damper End Switch
[Valve Opened]	VLVOPN	Valve open.
[Pre-Lube Cycle]	PRLUCY	Pre-lube cycle.

[Run Perm Int 1 Tag] RPT1

Configure Interlock 1 tags.

This parameter is accessible only if **[Run Perm Int 1 Assign]** RPI1 is configured and **[Run Perm Enable]** RPEN is not assigned to **[No]**NO.

Setting	Code / Value	Description
[Interlock Opened]	INLKOP	Interlock Open. **Factory setting**
[Overpres-sure]	OVPUE	Overpressure.
[Vibration]	VIBRAT	Vibration.

Setting	Code / Value	Description
[Freeze Stat]	FRESTA	Freeze stat.
[Motor Disconnected]	MTDISC	Motor disconnected.
[Low Suction Pressure]	LSPRE	Low suction pressure.

[Run Perm Int 2 Tag] RPT2

Configure Interlock 2 tags.

This parameter is accessible only if **[Run Perm Int 2 Assign]** RPI2 is configured and **[Run Perm Enable]** RPEN is not assigned to **[No]**NO.

Setting	Code / Value	Description
[Interlock Opened]	INLKOP	Interlock Open. **Factory setting**
[Overpressure]	OVPUE	Overpressure.
[Vibration]	VIBRAT	Vibration.
[Freeze Stat]	FRESTA	Freeze stat.
[Motor Disconnected]	MTDISC	Motor disconnected.
[Low Suction Pressure]	LSPRE	Low suction pressure.

[Fire modes] FMOR– Menu

Access

[Complete settings] → **[HVAC functions]** → **[Fire modes]**

NOTE: The **[Fire modes]** menu is only visible if the **[Application Selection]** is set to **[Generic Fan Ctrl]**.

About This Menu

In rare cases, the monitoring functions of the device may be unwanted because they impede the purpose of the application. A typical example is a smoke extractor fan operating as a part of a fire protection system. If a fire occurs, the smoke extractor fan should operate as long as possible, even if, for example, the permissible ambient temperature of the device is exceeded. In such applications, damage to or destruction of the device may be acceptable as collateral damage, for example, to keep other damage from occurring whose hazard potential is assessed to be more severe.

A setting for the digital inputs is provided to disable certain monitoring functions in such applications so that automatic error detection and automatic error responses of the device are no longer active. You must implement alternative monitoring functions for disabled monitoring functions that allow operators and/or master control systems to adequately respond to conditions which correspond to detected errors. For example, if overtemperature monitoring of the device is disabled, the device of a smoke extractor fan may itself cause a fire if errors go undetected. An overtemperature condition can be, for example, signaled in a control room without the device being stopped immediately and automatically by its internal monitoring functions.

⚠ DANGER

MONITORING FUNCTIONS DISABLED, NO ERROR DETECTION

- Only set **[Mode Selection]** FMM to **[Not Forced]** or **[Forced]** after a thorough risk assessment in compliance with all regulations and standards that apply to the device and to the application.
- Implement alternative monitoring functions for disabled monitoring functions that do not trigger automatic error responses of the drive but allow for adequate, equivalent responses by other means in compliance with all applicable regulations and standards as well as the risk assessment.
- Commission and test the system with the monitoring functions enabled.
- During commissioning, verify that the drive and the system operate as intended by performing tests and simulations in a controlled environment under controlled conditions.

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

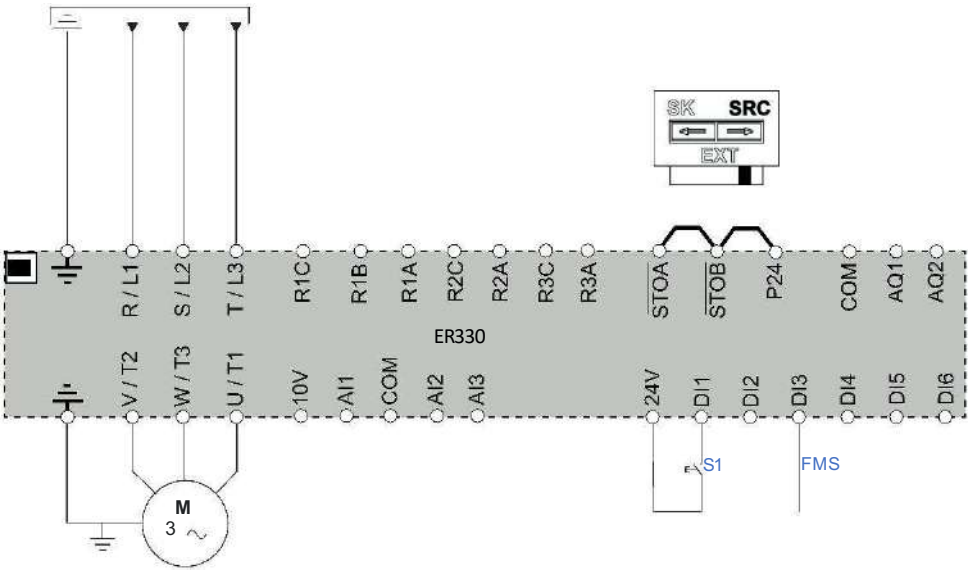
The **[Fire modes]** FMOR menu includes two selectable modes:

- **[Not Forced]** FIRE Mode: The drive ignores the **inhibitable** errors and continues on the basic control command as its main frequency control setpoint.
- **[Forced]**FORCE Mode: The drives ignores the **inhibitable** errors. The drive overrides the basic control command with the selected preset control mode.

While these modes are designed to be mostly used in the event of fire, smoke or heat purge, it can be used in any other application that requires ignoring the **inhibitable** errors that normally triggers the power drive system.

We present an example of the wiring diagram of the function and a step-by-step guide to configure the function for a scenario where we need to run the motor on a maximum speed on the fire trigger signal:

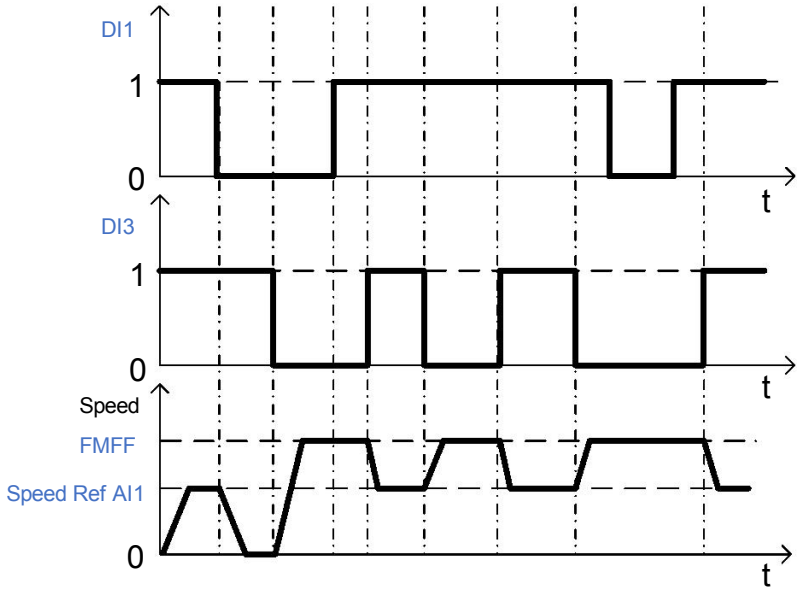
- **[Fire Mode Assign]** FMS is assigned to **[DI3]** LI3.
- **[2-wire type]** TCT is assigned to **[Level]** LEL.
- **[Forward]** FRD is assigned to **[DI1]**LI1, and can be controlled using the **S1** interrupter.



The following table presents a step by step example on how to configure the Fire Mode function:

Step	Action
1	Go to the Fire Modes Menu.
2	Activate **[Forced]** Mode: • Go to **[Mode Selection]** FMM and select **[Forced]** FORCE. • Go to **[Fire Mode Assign]** FMS and select **[DI3]**LI3.
3	Set the activation of the function to be **[FM On Level]**: • Go to **[Fire Mode Activation]** FMTN parameter. • Select **[FM On Level]** LEL.
4	Set the control logic to be on a setpoint frequency controlled by **[Forced Mode Freq]** : • Go to **[Forced Mode Select]** FMFS. • Select **[Constant Freq Ref]** CST. • Set **[Forced Mode Freq]** FMFF.
5	**Optional**: • The error response behavior can be changed from the **[Stop]** factory setting, by going and choosing one of the options in **[Fire Mode ErrorResp]** FMFB. • Fire Mode parameters can be locked to prevent changes during the activation of the function by going to **[Forced Settings Lock]** FML and selecting **[Yes]**.
6	You can check the status of the function by going to**[Fire Mode Status]** FMST.

The following figure presents the behavior of the system (Wiring diagram + step-by-step configuration):



TCC= 2 wire and TCT=Level

[Mode Selection] FMM

The parameter **[Mode Selection]** FMM is used to select the desired operating mode. The process requires a double confirmation to avoid unintended selection of the function.

Only one mode can be selected at a time:

Setting	Code / Value	Description
[No]	NO	Fire mode and force mode unselected **Factory setting**
[Not Forced]	FIRE	Fire mode selected / Force mode unselected
[Forced]	FORCE	Force mode selected / Fire mode unselected

⚠ DANGER

MONITORING FUNCTIONS DISABLED, NO ERROR DETECTION

- Only set **[Mode Selection]** FMM to **[Not Forced]** or **[Forced]** after a thorough risk assessment in compliance with all regulations and standards that apply to the device and to the application.
- Implement alternative monitoring functions for disabled monitoring functions that do not trigger automatic error responses of the drive but allow for adequate, equivalent responses by other means in compliance with all applicable regulations and standards as well as the risk assessment.
- Commission and test the system with the monitoring functions enabled.
- During commissioning, verify that the drive and the system operate as intended by performing tests and simulations in a controlled environment under controlled conditions.

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

During **[Forced]** FORCE Mode, parameter monitoring via fieldbus communication remains active(It is always possible to disable the monitoring of the fieldbus by the parameters **[Modbus Error Resp]** SLL, **[Fdbus Interrupt Resp]** CLL. Additionally, pass-through I/O points-including analog outputs, relay outputs, and

digital inputs controlled via field bus-continue to function normally, allowing data to pass through the drive without interruption.

NOTE: Pass-through I/O refers to free I/O points not assigned to internal drive functions. These can be accessed and controlled via communication protocols, such as by an upstream PLC, and used as additional I/O resources.

When the Fire Mode function is set to **[Forced]** FORCE mode, any Stop command coming from the fieldbus or the display terminal is ignored.

⚠WARNING

LOSS OF CONTROL

- Verify that this behavior does not result in unsafe conditions.

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

These functions and actions have priority over **[Forced]** FORCE Mode:

- STO (Safety Torque Off)
- **[Device Lock]** LES
- Power off or **[Product restart]** RP
- Deactivating Force Mode if **[FM On Level]** LEL is selected.
- Damper control :
  - If damper control is configured, it will have priority over Force Mode for a maximum **[Damper Opening time]** DCOT (or less in case feedback mode is configured and is activated before using **[Damper Input Assign]** DCFI)
  - This means the motor can start with a delay with force mode, but it will eventually start after **[Damper Opening time]** DCOT time even if the damper is not opened.

NOTE: [Mode Selection] is not compatible with **[Disable Error Detect]** INH:

- If **[Disable Error Detect]** INH is set to a value different than NO, then **[Mode Selection]** is locked to the NO value.
- If **[Mode Selection]** FMM is set to a value different from NO, then **[Disable Error Detect]** INH is locked to the NO value.

[Fire Mode Assign] FMS

The trigger of the Fire Modes function is done with the **[Fire Mode Assign]** FMS parameter. The user can set the external condition to be activated on high or low level digital signal, for example:

- If **[DI3 (Low level)]** L3L is selected then the function will activate if the signal is low. (Which can be used to detect accidental disconnection of the cable connected to the digital input)
- if **[DI3]** LI3 is selected then the function will activate if the signal is high. When **[Fire Mode Assign]** is set to a digital at High level, accidental disconnection of the cable connected to the digital input is not detected.

⚠WARNING

LOSS OF CONTROL

- Verify that the setting of this parameter does not result in unsafe conditions.
- Select a digital input active at Low Level if you want to detect accidental disconnection of the cable connected to the digital input.

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

The following table presents the possible assignations:

Value range	Code / Value	Description
[Not Assigned]	NO	Not assigned **Factory setting**
[DI1]...**[DI6]**	LI1...LI6	Digital input DI1...DI6 (Active on High Level)
[DI11]...**[DI16]**	LI11...LI16	Digital input DI11...DI16 if VW3A3203 I/O extension module has been inserted (Active on High Level)
[DI1 (Low level)]...**[DI6 (Low level)]**	L1L...L6L	Digital input DI1...DI6 (Active on Low Level)
[DI11 (Low level)]...**[DI16 (Low level)]**	L11L...L16L	Digital input DI11...DI16 if VW3A3203 I/O extension module has been inserted (Active on Low Level)

NOTE: [Fire Mode Assign] FMS cannot be assigned to the same value as **[2 Configurations]** CNF1 or **[3 Configurations]** CNF2.
If **[2 Configurations]** CNF1 or **[3 Configurations]** CNF2 is assigned to a digital input DI●, then **[Fire Mode Assign]** FMS cannot be assigned to the same digital input at low level DI●L.

NOTE: While **[Fire Mode Activation]** = **[FM On Level]**:

- If the assigned input is on Low Level:
  - **0**: Fire modes is enabled.
  - **1**: Fire modes is disabled.
- If the assigned input is on High Level:
  - **0**: Fire modes is disabled.
  - **1**: Fire modes is enabled.

While **[Fire Mode Activation]** = **[FM On Transition]**, only High Level DI can be affected to **[Fire Mode Assign]** FMS:

- if the Digital Input transitions from **0** to **1**:
  - Fire Modes is enabled and it cannot be deactivated except by a Power off (Transition from **1** to **0** doesn't do anything).

⚠WARNING

UNANTICIPATED EQUIPMENT OPERATION

- After assigning a digital input to the parameter **[Fire Mode Assign]** FMS, verify that the setting of the parameter **[Fire Mode Activation]** FMTN is appropriate for your application.
- Depending on the configuration of **[Fire Mode Activation]** FMTN, the function may be activated either by a transition or by a level signal. Verify that it does not result in unsafe conditions by performing extensive commissioning tests.

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

NOTE: If **[Not Forced]** FIRE Mode is configured, and the drive is not running, triggering the function will not start the drive and make it run. However, if **[Forced]** Mode is configured, the trigger signal will lead the drive to start and run.

[Forced Mode Select] FMFS

On the activation of **[Forced]**FORCE Mode and after the assignation of **[Fire Mode Assign]** FMS the drive uses a predefined control configuration that overrides the

basic control command. The table below outlines the various configuration options available in **[Forced Mode Select]** FMFS for defining Force Mode behavior

Setting	Code / Value	Description
[Constant Freq Ref]	CST	Forced at a constant speed level and adjusted by the parameter **[Forced Mode Freq]** **Factory settings**
[Max Freq Forward Ref]	FWD	Forced forward at maximum speed (HSP).
[Max Freq Reverse Ref]	REV	Forced reverse at maximum speed (HSP).
[Analog Input Ref]	FAI	Forced to an analog input, that can be assigned in **[Forced Mode AI]**.
[Forced To Stop]	STP	Forced to Stop according to the chosen behavior in **[Fire Stop Mode]**.
[Preset Speed Ref]	LVL	Forced at preset levels in **[Generic functions]** → **[Preset speeds]**.
[+/- Speed Ref]	REG	Forced at +/- speed function.
[PID Ref]	PID	Forced at PID controller. This setting is available only if **[PID feedback Assign]** PIF is configured.

[Fire Mode Activation] FMTN

If **[Forced]** FORCE Mode was selected, **[Access Level]** LAC was set to **[Expert]** EPR and an input was assigned to **[Fire Mode Assign]** FMS, then the **[Fire Mode Activation]** FMTN Menu will appear. It allows the user to choose the type of activation of **[Forced]** FORCE Mode:

Setting	Code / Value	Description
[FM On Level]	LEL	Sets the option to validate the input on the change of level. **Factory settings**
[FM On Transition]	TRN	Sets the option to validate the input on the transition, so **once activated only a power off can stop the drive.**

NOTE: [FM On Transition] TRN cannot be activated if the user chose low level DI input to activate the function.

[Forced Mode Freq] FMFF

Select the force mode frequency when **[Forced Mode Select]** FMFS is set to **[Constant Freq Ref]** CST and **[Mode Selection]** FMM is set to **[Forced]** FORCE and **[Fire Mode Assign]** FMS is activated.

Setting	Description
–500.0Hz....500.0Hz	Setting range **Factory setting**: 50.0Hz

NOTE: If the picked value is:

- In this range [-500.0 Hz ... 0 Hz]:
  - The minimum value of this parameter is (-**[High Speed]** HSP)
  - The maximum value of this parameter is (-**[Low Speed]** LSP)
- In this range [0.0 Hz ... 500.0 Hz]:
  - The minimum value of this parameter is (**[Low Speed]** LSP)
  - The maximum value of this parameter is (**[High Speed]** HSP)

[Forced Mode AI] FMFA

Select the analog source when **[Forced Mode Select]** FMFS is set to **[Analog Input Ref]** FAI and **[Mode Selection]** FMM is set to **[Forced]** FORCE and **[Fire Mode Assign]** FMS is activated..

Setting	Code / Value	Description
[No]	NO	Not assigned **Factory setting**
[AI1]...**[AI3]**.	AI1...AI3	Assigned to analog input.
[AI4]...**[AI5]**.	AI4...AI5	Assigned to analog input if VW3A3203 I/O extension module has been inserted.
[AI Virtual 1] ... **[AI Virtual 3]**.	AIV1...AIV3	Assigned to virtual analog input.

[Fire Stop Mode] FMSB

Select the stop mode for fire function when **[Forced Mode Select]** FMFS is set to **[Forced To Stop]**STP and **[Mode Selection]** FMM is set to **[Forced]** FORCE and **[Fire Mode Assign]** FMS is activated..

Setting	Code / Value	Description
[Freewheel Stop]	FWL	Freewheel stop. **Factory settings**
[Ramp Stop]	RMP	Ramp stop.
[Configured Stop]	STT	Stop according to **[Type of stop]** STT parameter but without tripping. In this case, the detected error relay does not open and the drive is ready to restart as soon as the detected error has been removed, according to the restart conditions of the active command channel.
[Fallback Speed]	LFF	Fallback speed.

[Fire Mode ErrorResp] FMFB

Errors can be divided into two groups in the case of Fire Modes function:

- **Inhibitable errors**: These errors are ignored both in **[Forced]**FORCE and **[Not Forced]** FIRE Modes, they are presented as the codes listed in the **second** and **fifth** rows of the error codes table, page 534.
- **Non-inhibitabe errors**: These errors require a power reset to be cleared and they are listed in the **first, third** and **fourth** row of the error codes table, page 534.

The **[Fire Mode ErrorResp]** FMFB parameter allows the user to configure up to three error response modes for Fire Modes:

Setting	Code / Value	Description
[Test]	TEST	• In this Mode errors are handled according to standard drive behavior. • This Mode is intended for testing Fire Mode functionality without enabling error inhibition, reducing the risk of drive damage. • On this Mode, the status of the function is still well monitored. **NOTE:** The test mode setting is not saved across power cycles (ON/OFF). At each device restart, the mode is automatically reset to: **[Stop]** STOP
[Restart]	RESTART	• In this Mode **inhibitable** errors are ignored, and warnings are reset automatically. • In the event of a **non-inhibitable** error, the drive triggers, then automatically resets the error and attempts to restart. • The restart process continues in a loop until the function is manually disabled. **NOTE:** • The user cannot select **[Restart]**RESTART if the **[Fire Mode Activation]** FMTN parameter is set to **[FM On Transition]** TRN • The Restart setting does not run again the motor in Forced mode, it is necessary to trigger again the Forced mode by Digital input set for the parameter **[Fire Mode Assign]** FMS.
[Stop]	STOP	• In this Mode **inhibitable** errors are ignored, and their warnings are automatically reset when they occur. • If a **non-inhibitable** error (e.g. short circuit) occurs, the drive triggers and stops. To restart the drive, Fire Mode must be disabled, and a power reset is required. **Factory setting**

NOTE:

- If **[Fire Mode ErrorResp]**FMFB is set to **[Restart]** RESTART, the **[Extended Fault Reset]** HRFC is forced to **[Yes]** YES.
- Changing the value of **[Fire Mode ErrorResp]**FMFB from **[Restart]** RESTART to another value, resets the value of **[Extended Fault Reset]** HRFC to factory setting : **[No]** NO

[Forced Settings Lock] FML

Select whether the parameters settings have to be locked or not during Force mode.

Setting	Code / Value	Description
[No]	NO	Parameters settings not locked during force mode. **Factory settings**
[Yes]	YES	Parameters settings locked during force mode.

[Forced Settings Lock] FML Lock the Fire mode function settings once it is activated.

[Fire Mode Status] FMST

The current mode status is reflected by the **[Fire Mode Status]** FMST parameter, which updates according to the following conditions:

Note:

- If **[Fire Mode Assign]** FMS is triggered and **[Mode Selection]** FMM is set to **FORCE**, then **[Fire Mode Status]** FMST is set to **FORCE**.

- If **[Fire Mode Assign]** FMS is triggered and **[Mode Selection]** FMM is set to **FIRE**, then **[Fire Mode Status]** FMST is set to **FIRE**.

Setting	Code / Value	Description
[Fire Mode Disabled]	NONE	Fire mode not configured
[Fire Mode Ready]	READY	Fire function is configured but not running
[Fire Mode Active]	FIRE	Fire mode running (Fire mode function is running)
[Forced Mode Active]	FORCE	Force mode running (Force Fire mode function is running)

[Damper control] DMC– Menu

Access

[Complete settings] ➞[HVAC functions] ➞[Damper control]

NOTE: This menu can be accessed if **[Application Selection]** APPT is set to **[Generic Fan Ctrl]** FAN

About This Menu

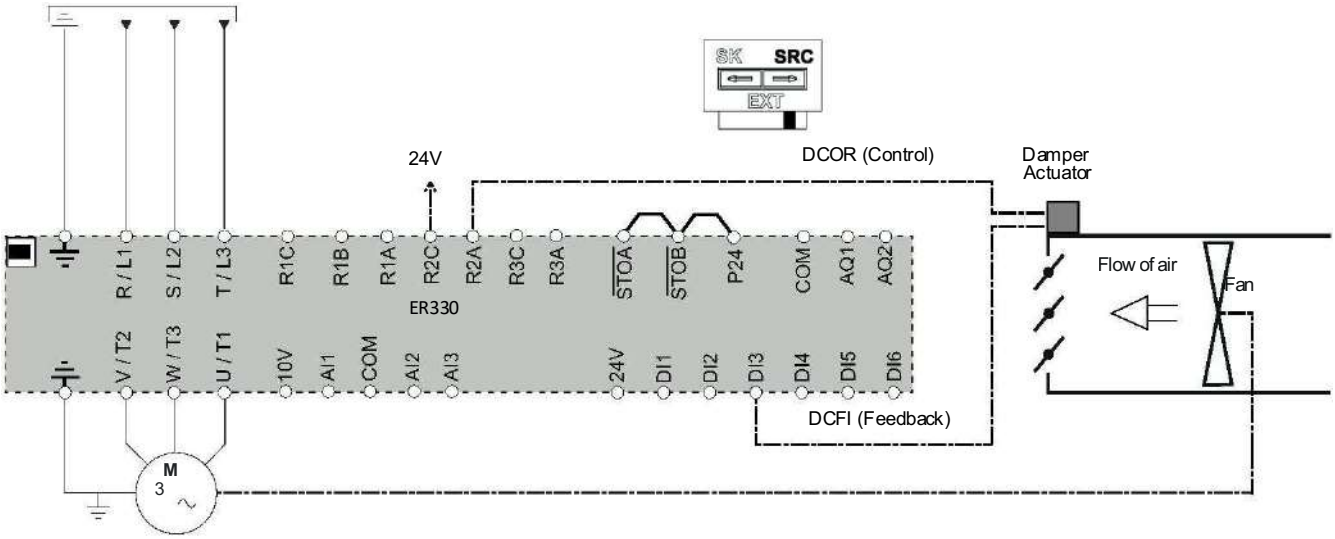
The Damper Control function allows the HVAC system to automatically manage airflow by opening or closing dampers, which act like valves inside air ducts. Before the fan starts operating, the system helps to ensure the damper is in the correct position. This helps:

- **Direct air efficiently** to the right areas
- **Prevent damage** to the system by avoiding airflow blockages
- **Improve energy efficiency** by only using airflow where it's needed

In short, this function helps to ensure your ventilation system works smoothly and safely by preparing the airflow path before the fan starts.
It can operate in two modes:

- **No feedback Mode**: The drive waits a fixed time before starting the fan.
- **Feedback Mode**: The drive waits for a confirmation signal from the damper before starting the fan.

The following figure is an example of the wiring of the function in case of a feedback signal:



- **[Damper Input Assign]** DCFI is assigned to **[DI3]** LI3.
- **[Damper Out Assign]** DCOR is assigned to **[R2]** R2 to give the signal to the Damper Actuator.

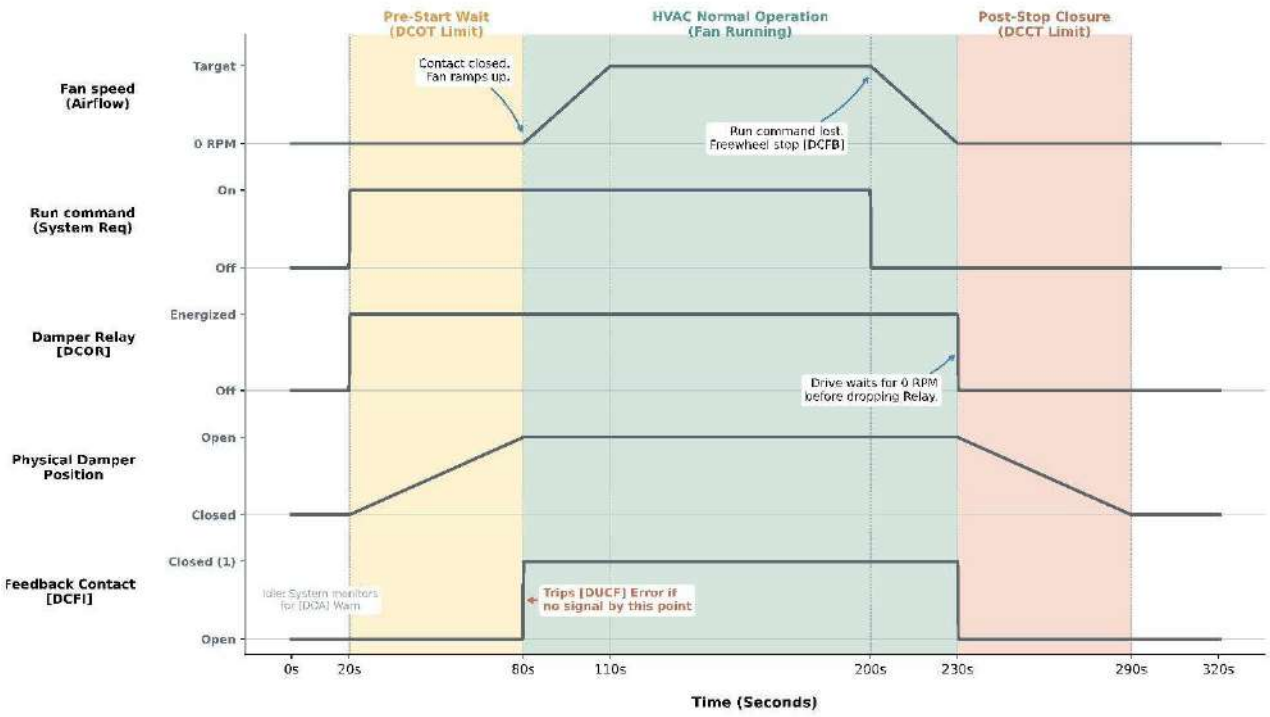
Step by step on how to configure Damper Control:

Step	Action
1	Configure Output Relay for Damper Control • Go to **[Damper Out Assign]** DCOR parameter. • Select the digital output or relay that will control the damper.
2	Choose Feedback Mode (Optional) • Go to **[Damper Input Assign]** DCFI parameter.
3	Set Damper Opening and Closing Times

Step by step on how to configure Damper Control: (Continued)

Step	Action
	• **[Damper Opening time]** DCOT: Time allowed for damper to open • **[Damper Closing Time]** DCCT: Time allowed for damper to close
4	Define Error Behavior • Go to **[Damper ErrorResp]** DCFB parameter.
5	Activate the Function • Ensure the selected output relay is active when a run command is issued. • The drive will: ◦ Wait for the damper to open (based on time of feedback) ◦ Start the fan only when damper is confirmed open or time expires
6	Monitor Errors and Warnings • **[Damper Control Warn]** DOA: Damper unwillingly open • **[Damper Control Error]** DUCF: Damper unwillingly closed
7	Fire Mode Override (if applicable) • Fire mode can override the **[Damper Control Error]** DUCF

The following figure presents the level diagram of a control sequence of the damper:



[Damper Out Assign] DCOR

Configure the output relay for damper control

If the parameter **[Damper Input Assign]** DCFI is set to No, the motor will start after the delay defined in the parameter **[Damper Opening time]** DCOT has elapsed.

⚠WARNING

UNANTICIPATED EQUIPMENT OPERATION

- Make sure your wiring diagram accounts for potential failures, such as an unintended disconnection of the output assigned to **[Damper Out Assign]** DCOR. These failures must be properly managed to prevent the motor from starting when the damper status is incorrect.
- Verify that this behavior does not result in unsafe conditions. Whenever possible, prefer using an input assigned to the parameter **[Damper Input Assign]** DCFI.

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

Setting	Code / Value	Description
[No]	NO	Not assigned **Factory setting**
[R2]...**[R3]**	R2...R3	Relay output R2...R3
[R4]...**[R6]**	R4...R6	Relay output R4...R6 if VW3A3204 relay output option module has been inserted
[DQ11]... **[DQ12]**	DO11...DO12	Digital output DQ11...DQ12 if VW3A3203 I/O extension module has been inserted

[Damper Input Assign] DCFI

Configure the feedback mode

This parameter can be accessed if **[Damper Out Assign]** DCOR is assigned to a relay or digital output.

Setting	Code / Value	Description
[Not Assigned]	NO	Not assigned **Factory setting**
[DI1]...**[DI6]**	LI1...LI6	Digital input DI1...DI6
[DI11]...**[DI16]**	LI11...LI16	Digital input DI11...DI16 if VW3A3203 I/O extension module has been inserted
[CD00]... **[CD10]**	CD00...CD10	Virtual digital input CMD.0...CMD.10 in **[I/O profile]** IO configuration
[CD11]... **[CD15]**	CD11...CD15	Virtual digital input CMD.11...CMD.15 regardless of configuration

[Damper Opening time] DCOT & [Damper Closing Time] DCCT

Set damper opening & closing time

These parameters can be accessed if **[Damper Out Assign]** DCOR is assigned to a relay or digital output.

Setting	Description
1...300 s	Setting range **Factory setting**: 60 s

[Damper ErrorResp] DCFB

Configure error response

This parameter can be accessed if **[Damper Out Assign]** DCOR is assigned to a relay or digital output.

Setting	Code / Value	Description
[Not Assigned]	NO	Ignore
[Freewheel Stop]	YES	Freewheel stop **Factory setting**
[Ramp stop]	RMP	Stop on ramp

[Broken belt detection] BBDT– Menu

Access

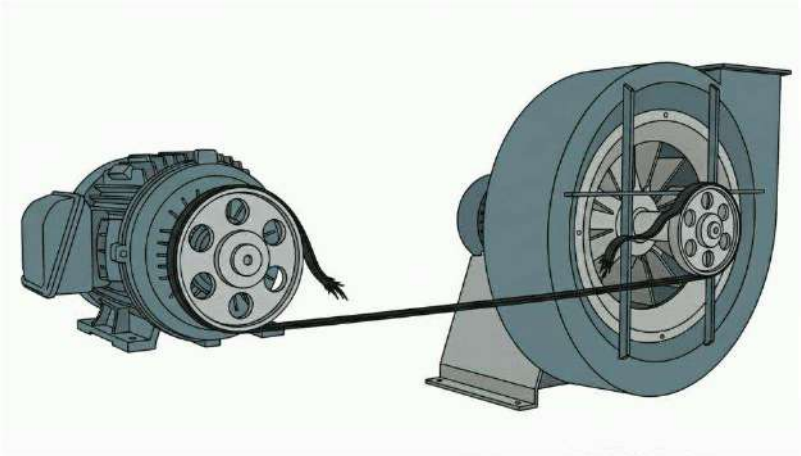
[Complete settings]➡[HVAC functions]➡[Broken belt detection]

NOTE: This menu can be accessed if **[Application Selection]** APPT is set to **[Generic Fan Ctrl]** FAN.

About This Menu

The Broken Belt Detection function is designed for HVAC systems where a fan or pump is belt-driven. It detects if the belt is broken or slipping by monitoring the motor's torque and speed, without requiring external sensors.
It works by defining an underload detection envelope (torque vs. frequency curve). If the motor operates below this envelope, it indicates a potential belt issue:

- **Slipping belt** triggers the warning **[Broken Belt Warn]** BBA
- **Broken belt** triggers the error **[Broken Belt Error]** BRBF



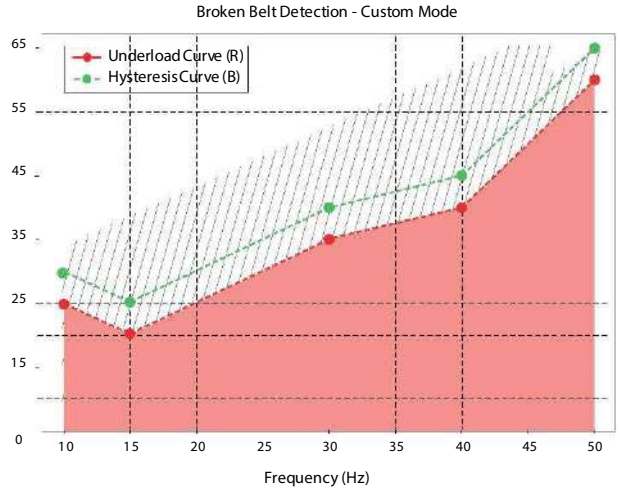
Step by step on how to configure Broken Belt Detection:

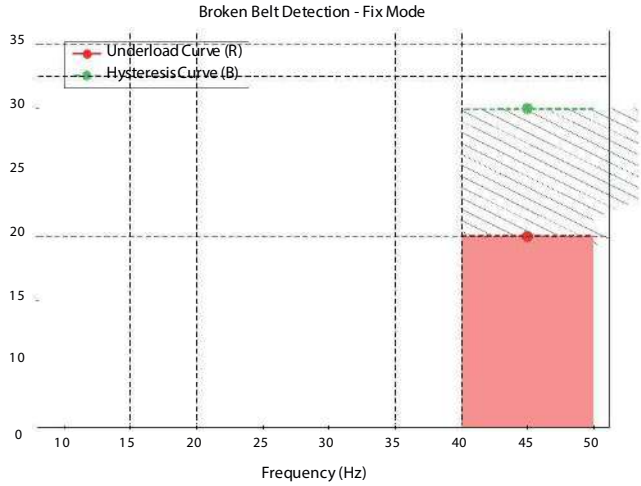
Step	Action
1	Activate the function • Go to **[Broken Belt Activation]** BBAC parameter. • Select one of the available modes
2	Configure the Detection Curve In **[Fixed Mode]**: • Set **[Broken Belt Freq 1]** (Hz) • Set **[Broken Belt Torque 1]** (% of **[Nom Motor torque]**) • Set **[Broken Belt Hyst]** (% hysteresis)
	In **[Fan Mode]**: • Set **[Broken Belt Coeff]** • Frequencies and torques are auto-calculated ◦ **Broken Belt Frequency X** = LSP + (**X**-1) * ((HSP-LSP) / 4) For **[Broken Belt Freq 1]**, **X** = 1 For **[Broken Belt Freq 3]**, **X** = 3 ◦ **Broken Belt Torque X** = **[Broken Belt Coeff]*** **(Broken Belt Frequency X)²** For **[Broken Belt Torque 1]**, **X** = 1 For **[Broken Belt Torque 3]**, **X** = 3
	In **[Custom Mode]**: • Set **[Broken Belt Freq 1]** to **[Broken Belt Freq 5]** (Hz, increasing order)

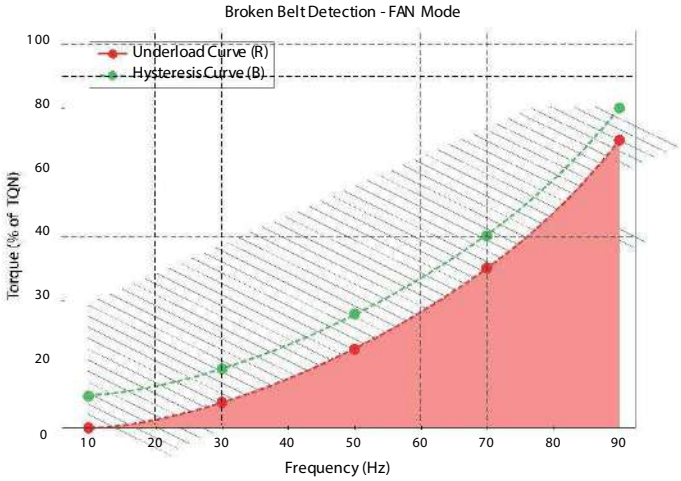
Step by step on how to configure Broken Belt Detection: (Continued)

Step	Action
	• Set **[Broken Belt Torque 1]** to **[Broken Belt Torque 5]** (% of **[Nom Motor torque]**) • Set **[Broken Belt Hyst]** (% hysteresis)
3	Set error delay • The **[Broken Belt Warn]** warning is triggered as soon as the system enters the underload / hysteresis area. • Go to **[Broken Belt Timeout]**, set the time (in seconds) the system must remain in the underload / hysteresis area before triggering **[Broken Belt Error]**.
4	Monitor Status • Go to **[Broken Belt Status]** BBS parameter.

The following figures display the Detection Curve as it s a a combination of the setting of the Underload Curve and the Hysteresis Curve.







[Broken Belt Activation] BBAC

Activate the function

Setting	Code / Value	Description
[No]	NO	Broken Belt detection not configured **Factory setting**
[Fixed Mode]	FIX	Broken Belt detection is configured in fix point mode
[Fan Mode]	FAN	Broken Belt detection is configured in quadratic torque envelope mode for fan applications
[Custom Mode]	CUSTOM	Broken Belt detection is configured in custom mode

[Broken Belt Freq 1] BBF1...[Broken Belt Freq 5] BBF5

Configure the load frequencies from 1 to 5

This parameter can be accessed only if **[Broken Belt Activation]** is set to **[Fixed Mode]** or **[Custom Mode]**.

[Broken Belt Freq 2] to **[Broken Belt Freq 5]** are only accessible in **[Custom Mode]**.

Setting	Description
0.0 ...50.0 Hz	Setting range **Factory setting**: • 0.0 Hz for **[Broken Belt Freq 1]** • 10 Hz for **[Broken Belt Freq 2]** • 20 Hz for **[Broken Belt Freq 3]** • 30 Hz for **[Broken Belt Freq 4]** • 40 Hz for **[Broken Belt Freq 5]**

[Broken Belt Torque 1] BBT1...[Broken Belt Torque 5] BBT5

Configure the load torques from 1 to 5

This parameter can be accessed only if **[Broken Belt Activation]** is set to **[Fixed Mode]** or **[Custom Mode]**.

[Broken Belt Torque 2] to **[Broken Belt Torque 5]** are only accessible in **[Custom Mode]**.

Setting	Description
0.0 %... 100 % of **[Nom Motor torque]** TQN	Setting range **Factory setting**: 20 %

[Broken Belt Hyst] BBLB

Configure the load band for the hysteresis on the envelope

This parameter can be accessed only if **[Broken Belt Activation]** is set to **[Fixed Mode]** or **[Custom Mode]** or **[Fan Mode]**.

Setting	Description
0.0 %... 50 % of **[Nom Motor torque]** TQN	Setting range **Factory setting**: 10 %

[Broken Belt Coeff] BBTC

Configure the coefficient for the quadratic evolution in **[Fan Mode]**

This parameter can be accessed only if **[Broken Belt Activation]** is set to **[Fan Mode]**.

Setting	Description
0.00 ... 1.00	Setting range **Factory setting**: 0.01

[Broken Belt Timeout] BBFD

Set the time delay after which **[Broken Belt Error]** BRBF error is triggered

This parameter can be accessed only if **[Broken Belt Activation]** is set to **[Fixed Mode]** or **[Custom Mode]** or **[Fan Mode]**.

Setting	Description
0.0 ... 300.0 s	Setting range **Factory setting**: 30.0 s

[Broken Belt Status] BBS

Monitor the status of the function

This parameter can be accessed only if **[Broken Belt Activation]** is set to **[Fixed Mode]** or **[Custom Mode]** or **[Fan Mode]**.

Setting	Code / Value	Description
[Not Configured]	NONE	Broken Belt Detection not configured.
[Belt OK]	OK	Broken Belt Detection function is well configured and the belt is OK.
[Belt Slipping]	SLIPPG	**[Broken Belt Warn]** warning triggered. Belt may be slipping. The warning should be assigned to a warning group in **[Warn groups config]** AGCF to be visible when triggered. Refer to Warning Codes, page 529.
[Belt Broken]	BROKEN	**[Broken Belt Error]** error triggered. Belt likely broken.

[Compressor functions] SC – Menu

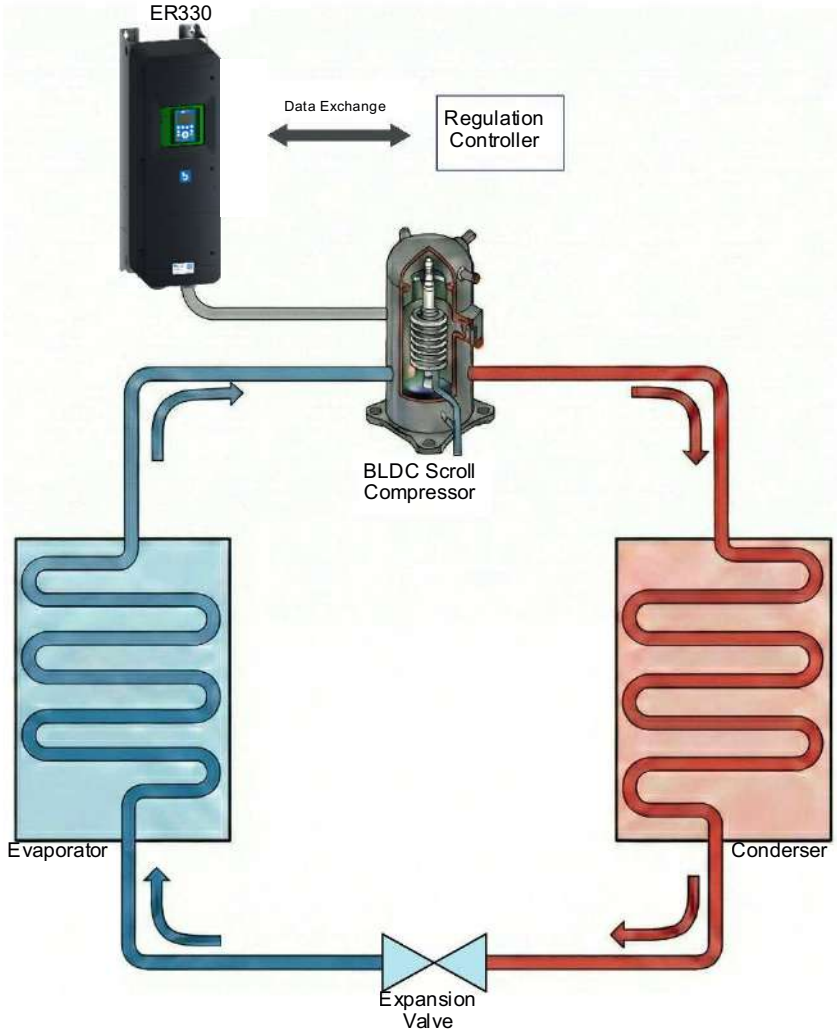
Access

[Complete settings]➞ [HVAC functions]➞ [Compressor functions]

NOTE: This menu can be accessed if **[Application Selection]** APPT is set to **[Generic Comp Control]** COMP.

About This Menu

This menu provides access to five compressor functions designed to support compressor control (e.g. BLDC Scroll Compressors...), management, and monitoring. These functions allow the drive to control and monitor the compressor in collaboration with the regulation controller of the system as shown in the following figure.



[Prestart management] PM – Menu

Access

[Complete settings] ➞ **[HVAC functions]** ➞ **[Compressor functions]** **[Prestart management]**

> **NOTE:** The menu can be accessed if **[Application Selection]** APPT is set to **[Generic Comp Control]** COMP.

About This Menu

The Pre-Start Management function helps protect the mechanical installation at each run request. Upon a RUN order, the drive must reach a low-limit speed **[Prestart Low Speed]** and then a pre-start speed **[Prestart Speed]** within configurable delays (**[Prestart Low Delay]** & **[Prestart Delay]**). If any condition is not met within the expected time windows, the error **[Prestart Speed Error]** is triggered, a freewheel stop is executed, and the drive performs an automatic restart after a preset delay **[Prestart Restart Delay]**.

> **NOTE:** The motor will start after the Automatic Restart only if **[2/3-Wire Control]** TCC is on **[2-Wire Control]** 2C, and **[2-wire type]** TCT is on **[Level]** LEL.

Step by step on how to configure Pre-Start Management:

Step	Action
1	Activate the function • Go to **[Prestart Activation]** PMAC parameter. • Select the option **Yes**.
2	Define the low-limit threshold and its delay • Set **[Prestart Low Speed]** • Set **[Prestart Low Delay]**
3	Define the pre-start phase • Set **[Prestart Speed]** • Set **[Prestart Delay]**
4	Define delay before error restart • Set **[Prestart Restart Delay]**
5	Monitor Errors • **[Prestart Speed Error]** PSMF error triggers if at RUN order : ◦ the drive doesn't reach **[Prestart Low Speed]** within **[Prestart Low Delay]** ◦ the drive reaches **[Prestart Low Speed]** in time, but doesn't reach **[Prestart Speed]** within **[Prestart Delay]**

[Prestart Activation] PMAC

Setting	Code / Value	Description
[No]	NO	Pre-start Management is not activated **Factory setting**
[Yes]	YES	Pre-start Management is activated

[Prestart Low Speed] PMLF

This parameter can be accessed if **[Prestart Activation]** is set to **[Yes]**.

Setting	Description
[Low Speed]...**[Prestart Speed]**	Setting range **Factory setting**: **[Low Speed]**

[Prestart Low Delay] PMLD

This parameter can be accessed if **[Prestart Activation]** is set to **[Yes]**.

Setting	Description
0...10	Setting range **Factory setting**: 2 Unit: 1 s

[Prestart Speed] PMPS

This parameter can be accessed if **[Prestart Activation]** is set to **[Yes]**.

Setting	Description
[Prestart Low Speed]...**[Max Frequency]**	Setting range **Factory setting**: 30.0 Unit: 0.1 Hz

[Prestart Delay] PMPD

This parameter can be accessed if **[Prestart Activation]** is set to **[Yes]**.

Setting	Description
0...600	Setting range **Factory setting**: 10 Unit: 1 s

[Prestart Restart Delay] PMRD

This parameter can be accessed if **[Prestart Activation]** is set to **[Yes]**.

Setting	Description
0...120	Setting range **Factory setting**: 3 Unit: 1 s

[Oiling management] OM – Menu

Access

[Complete settings]➞[HVAC functions]➞[Compressor functions]➞ [Oiling management]

NOTE: The menu can be accessed if **[Application Selection]** APPT is set to **[Generic Comp Control]** COMP.

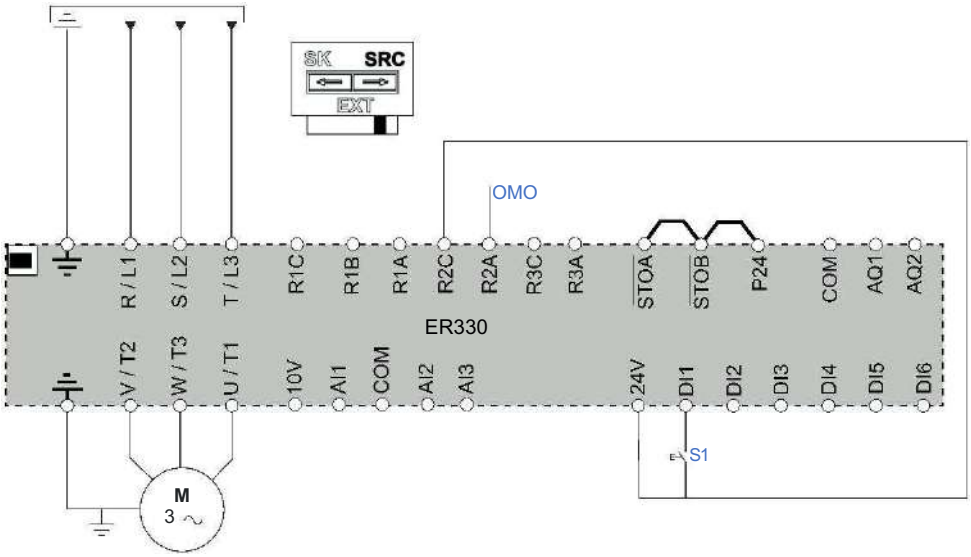
About This Menu

The Oiling Management function handles the lubrication of the scroll pump which directly affects its efficiency, reliability and lifespan.

To activate the function, the parameter **[Oiling Mode]** OMM needs to be any option other than **[No]**

The function can be used to control the electrovalve and/or the drive speed that allows oil injection into the scroll pump and it can be activated on different conditions, and it can control the lubrication cycle. The electrovalve can be controlled by assigning the **[Oiling Output Assign]** OMO to either a Digital Output or to a relay output, in the case of a self-lubricating scroll compressor then this parameter can be set to **[No]**.

The following figure presents an example where OMO is wired to the relay **[R2]**:

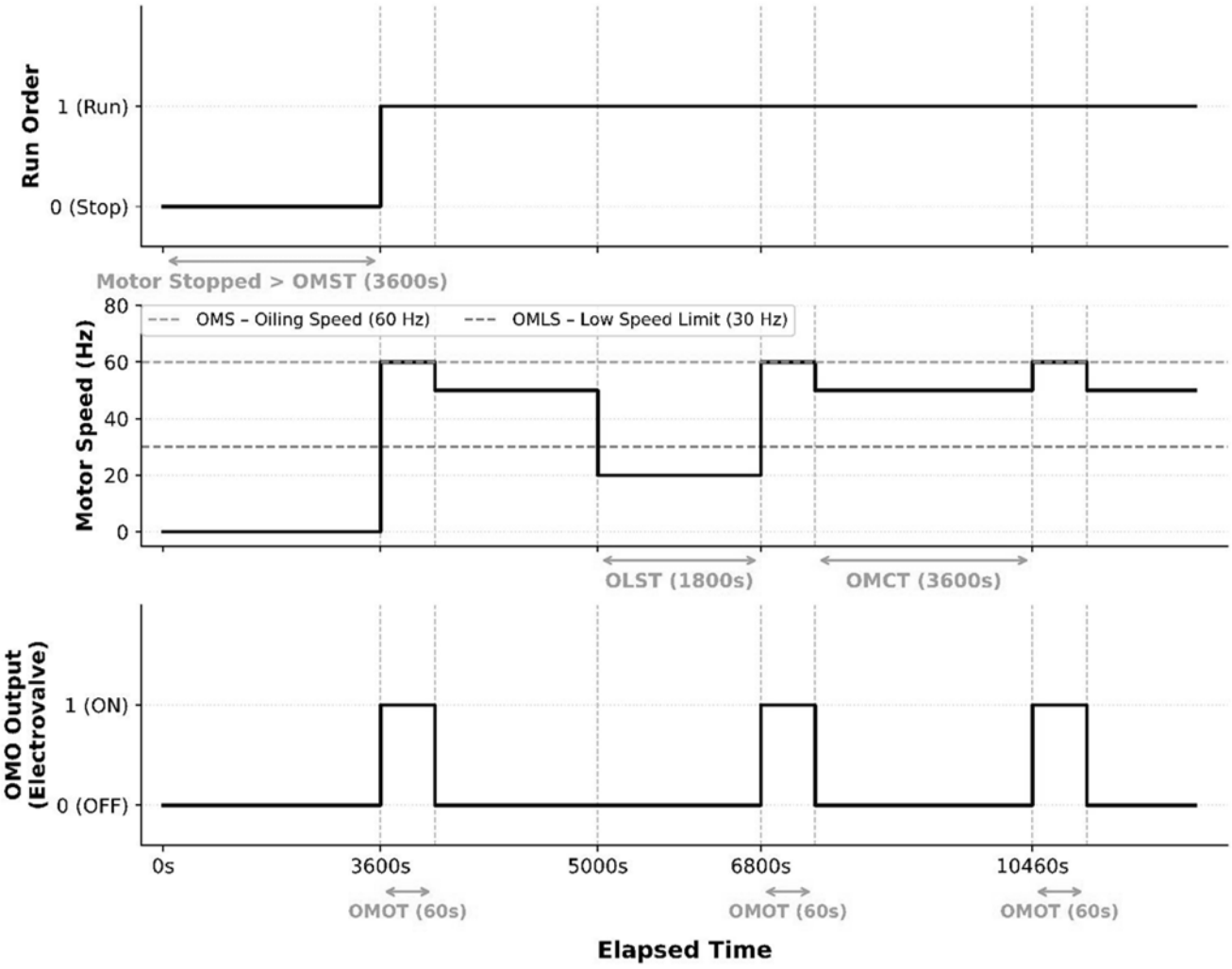


The following table presents a step-by-step configuration of the Oiling Management function on multiple OR conditions option:

Step	Action
1	Activate the function: • Go to **[Oiling Mode]** OMM parameter. • Select the option **[Multiple]** OR.
2	Assign the Output to the Relay R2: • Go to **[Oiling Output Assign]** OMO • Select **[R2]** R2.
3	Define the oiling speed: • Set **[Oiling Speed]** OMS. **NOTE:** The high limit is **[High Speed]** HSP.
4	Set the timer value to activate Oiling after sleep time condition: • Set **[Oiling Sleep Delay]** OMST.
5	Set the low speed and delay to activate Oiling low speed condition:

Step	Action
	• Set **[Oiling Low Spd]** OMLS. **NOTE:** The parameter is limited by HSP and LSP. • Set **[Oiling Low Spd Delay]** OLST.
6	Set the timer delay to activate Oiling after defined time condition: • **[Oiling Periodic Time]** OMCT
7	Set the oiling cycle time: • **[Oiling Periodic Time]** OMCT

The following figure presents the behavior of the function:



[Oiling Mode] OMM

The **[Oiling Mode]** parameter is responsible for the activation of the function and the selection of the Oiling Management Mode.

Setting	Code / Value	Description
[No]	NO	Oiling Management is not activated **Factory setting**
[Sleep]	SLEEP	Oiling Management is activated on Sleep Mode. **NOTE:** • If the motor has not run for a duration longer than the value defined by OMST, the next run order will automatically trigger a **lubrication cycle**, executed **after** the **[Prestart management]** function (which has priority if configured).

Setting	Code / Value	Description
		• The non-running time must be **consecutive**; any motor activity resets the timer. • Since timing cannot be tracked while the product is **powered OFF**, a lubrication cycle will also be triggered automatically upon the next run order after power-up, following **[Prestart management]** (If configured).
[Low Speed]	LOW	Oiling Management is activated on Low Speed Mode. • If the motor's speed is below **[Oiling Low Spd]** OMLS for more than **[Oiling Low Spd Delay]** OLST, then a lubrication cycle is requested.
[Periodic]	TIME	Oiling Management is activated on a periodic timing (defined time):. • If the motor runs for a longer time than **[Oiling Periodic Time]** OMCT, then a lubrication cycle is requested
[Multiple]	OR	Oiling Management is activated if any condition of the above are met. **NOTE:** • If one of the conditions is met and once the lubrication cycle is performed. All timers are reset.

NOTE: Completion of lubrication cycle or a fault reset, resets all the cycle conditions.

[Oiling Output Assign] OMO

The **[Oiling Output Assign]** parameter is responsible for the control of the electrovalve. The following table presents the different choices possible:

This parameter can be accessed if **[Oiling Mode]** OMM is not set to **[No]** NO.

Setting	Code / Value	Description
[No]	NO	Not assigned **Factory setting**
[R2]...[R3]	R2...R3	Relay output R2...R3
[R4]...[R6]	R4...R6	Relay output R4...R6 if VW3A3204 relay output option module has been inserted
[DQ11]... [DQ12]	DO11...DO12	Digital output DQ11...DQ12 if VW3A3203 I/O extension module has been inserted

[Oiling Speed] OMS

This parameter sets the motor speed that allows oil injection into the scroll pump.

This parameter can be accessed if **[Oiling Mode]** OMM is not set to **[No]** NO.

Setting	Description
LSP...HSP	Setting range **Factory setting**: HSP Unit: 0.1 Hz

NOTE: If the defined speed is not reached during **[Oiling Time]** OMOT, then **[Oiling Speed Err]** OIMF is triggered.

[Oiling Sleep Delay] OMST

This parameter sets the sleep time limit.

This parameter can be accessed if the modes **[Sleep]** or **[Multiple]** were selected.

Setting	Description
0...16384	Setting range **Factory setting**: 3600 Unit: 1 s

NOTE: This timer starts when the motor speed is 0 Hz and resets if any other value. Changing the value of **[Oiling Mode]** resets the internal timer. (**[Oiling Mode]** is a configuration parameter and it cannot be changed at run time)

[Oiling Low Spd] OMLS

This parameter sets the Low speed threshold to activate the **[Oiling Low Spd Delay]** in case of using the **[Low Speed]** or the **[Multiple]** Modes.(Can be accessed if one of those Modes is selected)

Setting	Description
LSP...HSP	Setting range **Factory setting**: 30.0 Unit: 0.1 Hz

[Oiling Low Spd Delay] OLST

This parameter sets the Time Delay which is activated if the motor runs **consecutively** below**[Oiling Low Spd]** in case of using the **[Low Speed]** or the **[Multiple]** Modes.(Can be accessed if one of those Modes is selected)

Setting	Description
60...6000	Setting range **Factory setting**: 1800 Unit: 1 s

NOTE: The delay only starts after the **[Prestart management]** function has finished. And it is rest if the low speed condition is no longer valid (Speed< – 0.1 Hz or 0.1 Hz<Speed) or if the run order transitions from 1 to 0.

[Oiling Periodic Time] OMCT

This parameter sets the Periodic Timer threshold that triggers the lubrication cycle when motor run time exceeds the specified value, in case of using the **[Periodic]** or the **[Multiple]** Modes.(Can be accessed if one of those Modes is selected)

Setting	Description
0...16384	Setting range **Factory setting**: 3600 Unit: 1 s

NOTE: The timer only starts after the **[Prestart management]** function has finished. A transition of the run order from 1 to 0 resets the timer

[Oiling Time] OMOT

This parameter sets the oiling cycle time (The duration of the lubrication process)

This parameter can be accessed if **[Oiling Mode]** OMM is not set to **[No]** NO.

Setting	Description
0…6000	Setting range **Factory setting**: 60 Unit: 1 s

[Overload monitoring] SP – Menu

Access

[Complete settings] ➞[HVAC functions] ➞[Compressor functions] ➞ [Overload monitoring]

NOTE: This menu can be accessed if **[Application Selection]** APPT is set to **[Generic Comp Control]** COMP.

About This Menu

The Overload Monitoring function is designed to help prevent damage of the scroll compressors due to overload, which are commonly used in HVAC systems like refrigeration units, heat pumps, and chillers.

This function activates only out of the acceleration phase of the motor. It monitors:

- Motor speed (frequency)
- Motor current

If the motor is running below a defined speed threshold **[Overload Freq Thld]** and the current exceeds a set limit **[Overload Current]** for longer than a configured delay **[Overload Timeout]**, the drive will:

- Stop the motor in freewheel
- Trigger **[Overload Error]** SPOF

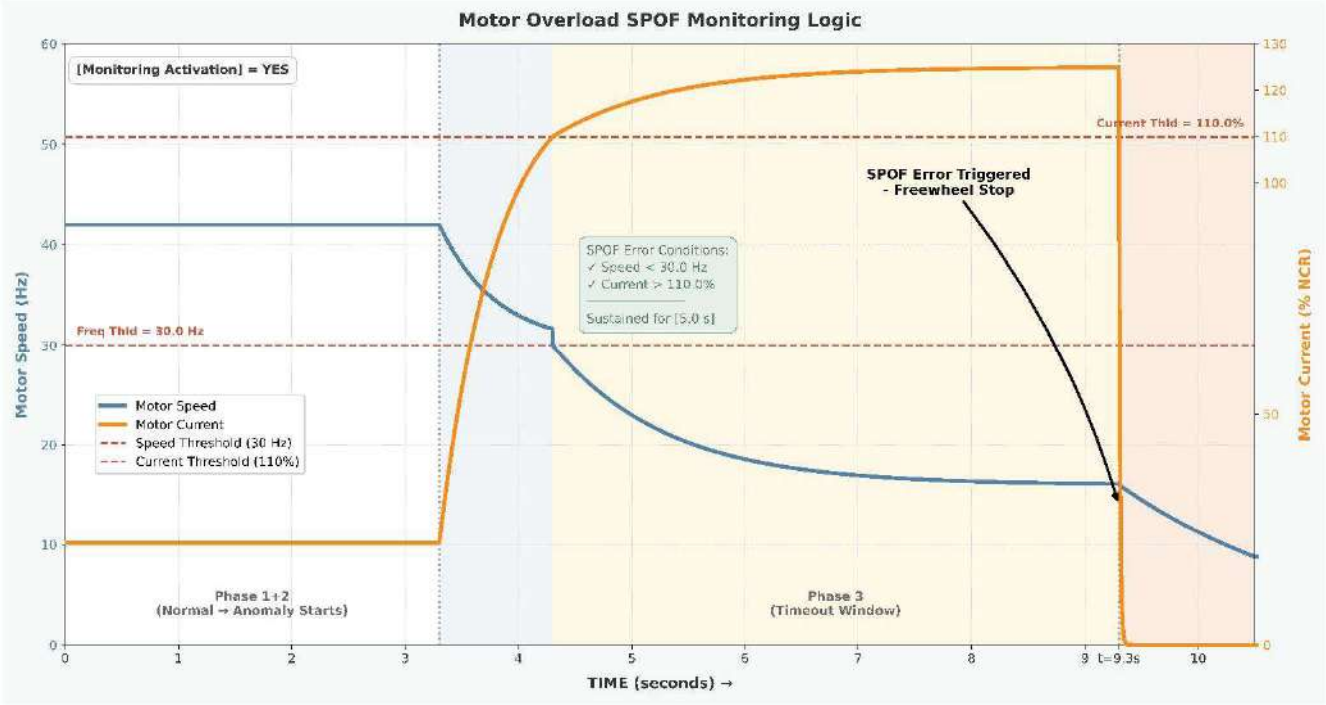
This monitoring helps ensure the scroll compressor is not subjected to damaging conditions during normal operation.

Step by step on how to configure Overload Monitoring:

Step	Action
1	Activate the function • Go to **[Monitoring Activation]** SPA parameter. • Select the option **Yes**.
2	Set the threshold frequency • Set **[Overload Freq Thld]** Defines the minimum motor speed below which monitoring is triggered.
3	Set the current limit • Set **[Overload Current]** Defines the maximum allowable motor current.
4	Configure the overload delay • Set **[Overload Timeout]** Time the system waits before triggering **[Overload Error]** SPOF error if both conditions (low speed + high current) persist.
5	Monitor Errors **[Overload Error]** SPOF error is triggered when all three of the following conditions are met for more than the time set in **[Overload Timeout]**: • The motor is no longer in the acceleration phase • The motor speed (frequency) is below the configured threshold **[Overload Freq Thld]** • The motor current exceeds the configured limit **[Overload Current]**

The following figure presents a level diagram showing the behavior of the function on these conditions:

- **[Overload Freq Thld]** set to 30.0 Hz
- **[Overload Current]** set to 110.0%
- **[Overload Timeout]** set to 5.0s
- **[Overload errorResp]** set to **[Freewheel Stop]**



[Monitoring Activation] SPA

Setting	Code / Value	Description
[No]	NO	Overload monitoring is not activated **Factory setting**
[Yes]	YES	Overload monitoring is activated

[Overload Freq Thld] SPTF

This parameter can be accessed if **[Monitoring Activation]** is set to **[Yes]**.

Setting	Description
[Low Speed]...**[High Speed]**	Setting range **Factory setting**: 30.0 Unit: 0.1 Hz

[Overload Current] SPCL

This parameter can be accessed if **[Monitoring Activation]** is set to **[Yes]**.

Setting	Description
10.0...110.0% of the rated motor current. (**[Nom Motor Current]** NCR)	Setting range **Factory setting**: 110.0% of the rated motor current. (**[Nom Motor Current]** NCR)

[Overload Timeout] SPOD

This parameter can be accessed if **[Monitoring Activation]** is set to **[Yes]**.

Setting	Description
0.0...30.0	Setting range **Factory setting**: 5.0 Unit : 1 s

[Overload errorResp] SPFB

This parameter can be accessed if **[Monitoring Activation]** is set to **[Yes]**.

Setting	Code / Value	Description
[Ignore]	NO	Detected error ignored and **[Overload warning]** SPOA is triggered.
[Freewheel Stop]	YES	Freewheel stop **Factory setting**

[Crankcase heating] CH – Menu

Access

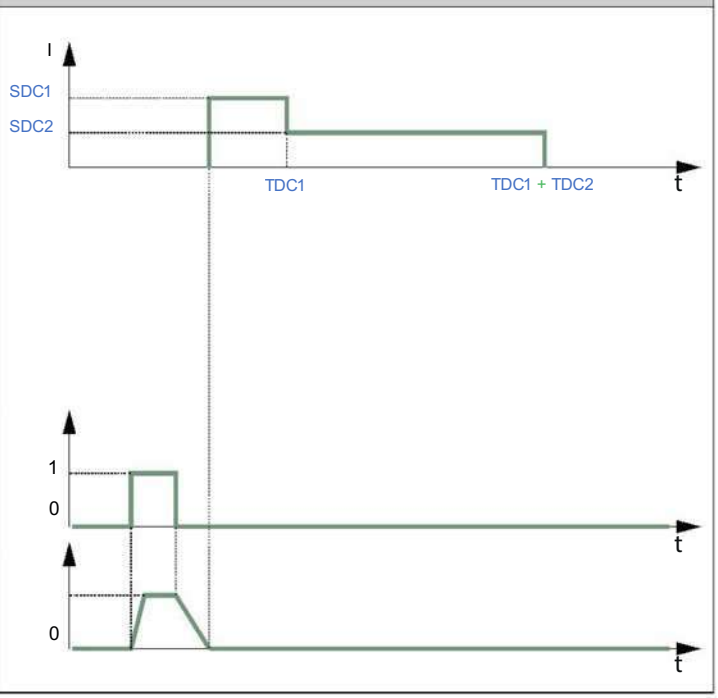
[Complete settings] ➞ **[HVAC functions]** ➞ **[Compressor functions]** ➞ **[Crankcase heating]**

NOTE: The menu can be accessed if **[Application Selection]** APPT is set to **[Generic Comp Control]** COMP.

About This Menu

This menu presents a usage of the Auto DC injection function for the Scroll Compressors. Keeping the motor slightly warm avoids moisture accumulation, which can lead to corrosion or insulation degradation. Injecting DC current to the motor generates heat which removes the need for external heaters.

This function controls the mode of injection, time and quantity of current injected. The following Table presents an overview of the **[Crankcase heating]** CH function:

ADC	SDC1	SDC2	Description	Operation
YES	x	x	The **[Auto DC inj Level 1]** SDC1 is injected during **[Auto DC Inj Time 1]** TDC1 and **[Auto DC inj Level 2]** SDC2 during **[Auto DC Inj Time 2]** TDC2 .	
CT	x	≠ 0	The **[Auto DC inj Level 1]** SDC1 is injected during TDC1 and then **[Auto DC inj Level 2]** SDC2 is injected.	
CT	x	= 0	Injection of **[Auto DC inj Level 1]** SDC1	
Run command				
Speed				

NOTE: Changing the settings of this function will change the settings of the **[Auto DC injection]** ADC function.

[Auto DC Injection] ADC

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

If the parameter **[Auto DC Injection]** ADC is set to **[Continuous]** CT, DC injection is always active, even if the motor does not run.

- Verify that using this setting does not result in unsafe conditions.

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

⚠ WARNING

UNINTENDED MOVEMENT

- Do not use DC injection to generate holding torque when the motor is at a standstill.
- Use a holding brake to keep the motor in the standstill position.

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).

Setting	Code / Value	Description
[No]	NO	No injection **Factory setting**
[Yes]	YES	Time Limited DC injection
[Continuous]	CT	Continuous standstill injection

[Auto DC inj Level 1] SDC1 ★

NOTICE

OVERHEATING

Verify that the connected motor is properly rated for the DC injection current to be applied in terms of amount and time.

Failure to follow these instructions can result in equipment damage.

Level of standstill DC injection current.

This parameter can be accessed if:

- **[Auto DC Injection]** ADC is not set to **[No]** NO

Setting	Description
0...1.1 In (1)	Setting range **Factory setting**: 0.7 In (1)
(1) In corresponds to the rated drive current indicated in the Installation Manual and on the drive nameplate.	

[Auto DC Inj Time 1] TDC1 ★

NOTICE

OVERHEATING

Verify that the connected motor is properly rated for the DC injection current to be applied in terms of amount and time.

Failure to follow these instructions can result in equipment damage.

This parameter can be accessed if

- **[Auto DC Injection]** ADC is not set to **[No]** NO.

Setting	Description
0.1...30.0 s	Setting range **Factory setting**: 0.5 s

This parameter is not applicable when the **[Auto DC Injection]** ADC is set to **[Continuous]** CT and **[Auto DC inj Level 2]** SDC2 value is 0.

[Auto DC inj Level 2] SDC2 ★

NOTICE

OVERHEATING

Verify that the connected motor is properly rated for the DC injection current to be applied in terms of amount and time.

Failure to follow these instructions can result in equipment damage.

Second level of standstill DC injection current.

This parameter can be accessed if:

- **[Auto DC Injection]** ADC is not set to **[No]** NO.

Setting	Description
0...1.1 In (1)	Setting range **Factory setting**: 0.5 In (1)
(1) In corresponds to the rated drive current indicated in the Installation Manual and on the drive nameplate.	

[Auto DC Inj Time 2] TDC2 ★

NOTICE

OVERHEATING

Verify that the connected motor is properly rated for the DC injection current to be applied in terms of amount and time.

Failure to follow these instructions can result in equipment damage.

Second standstill injection time.

This parameter can be accessed if:

- **[Auto DC Injection]** ADC is set to **[Yes]** YES.

Setting	Description
0.0...30.0 s	Setting range **Factory setting**: 0.0 s

[Freewheel Stop] NST

The motor stops in freewheel when the assigned input or the bit changes to 0. If the input returns to state 1 and the run command is still active, the motor will only restart if **[2/3-Wire Control]** TCC is set to **[2-Wire Control]** 2C and if **[2-wire type]** TCT is set to **[Level]** LEL or **[Level With Fwd Priority]** PFO. If not, a new run command must be applied.

Setting	Code / Value	Description
[Not Assigned]	NO	Not assigned **Factory setting**
[CD00]...**[CD10]**	CD00...CD10	Virtual digital input CMD.0...CMD.10 in **[I/O profile]** IO configuration
[CD11]...**[CD15]**	CD11...CD15	Virtual digital input CMD.11...CMD.15 regardless of configuration
[DI1 (Low level)]...**[DI6 (Low level)]**	L1L...L6L	Digital input DI1...DI6 used at low level
[DI11 (Low level)]...**[DI16 (Low level)]**	L11L...L16L	Digital input DI11...DI16 used at low level if VW3A3203 I/O extension module has been inserted

[Discharge gas] DG – Menu

Access

[Complete settings] ➞**[HVAC functions]** ➞**[Compressor functions]** **[Discharge gas]**

NOTE: The menu can be accessed if **[Application Selection]** APPT is set to **[Generic Comp Control]** COMP.

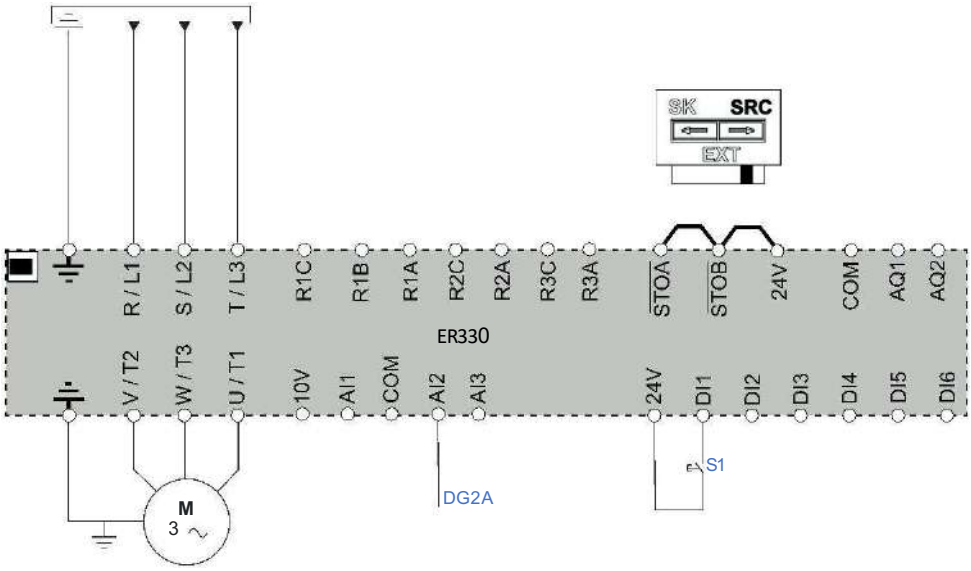
About The Menu

Overpressure and overheating in the refrigerant loop can be very degrading to the system. This function can be used to help prevent it by regulating the pressure and/or temperature.

The system monitors the current sensor value (representing pressure or temperature) against two user-defined limits: the **[Disch Warn Threshold]** DGWT and the **[Disch Error Threshold]** DGET; should the Current Sensor Value exceed the **[Disch Warn Threshold]** DGWT but stay below the Error Threshold, a **[Disch Warning]** DGW warning is activated, and a Cooling Cycle is initiated for **[Disch Cooling Time]** While the drive runs at **[Disch Cooling Freq]**, but if the Current Sensor Value meets or surpasses the **[Disch Error Threshold]** DGET, the **[Disch High Error]** DGOF error is triggered, resulting in an immediate **[Freewheel Stop]** of the motor, followed by an automatic **[Restart]** after **[Disch Restart Delay]** DGRT.

NOTE: The function is active at every new run order and while the run order is kept on.

The following table and figure present an example to regulate the temperature inside a scroll compressor:

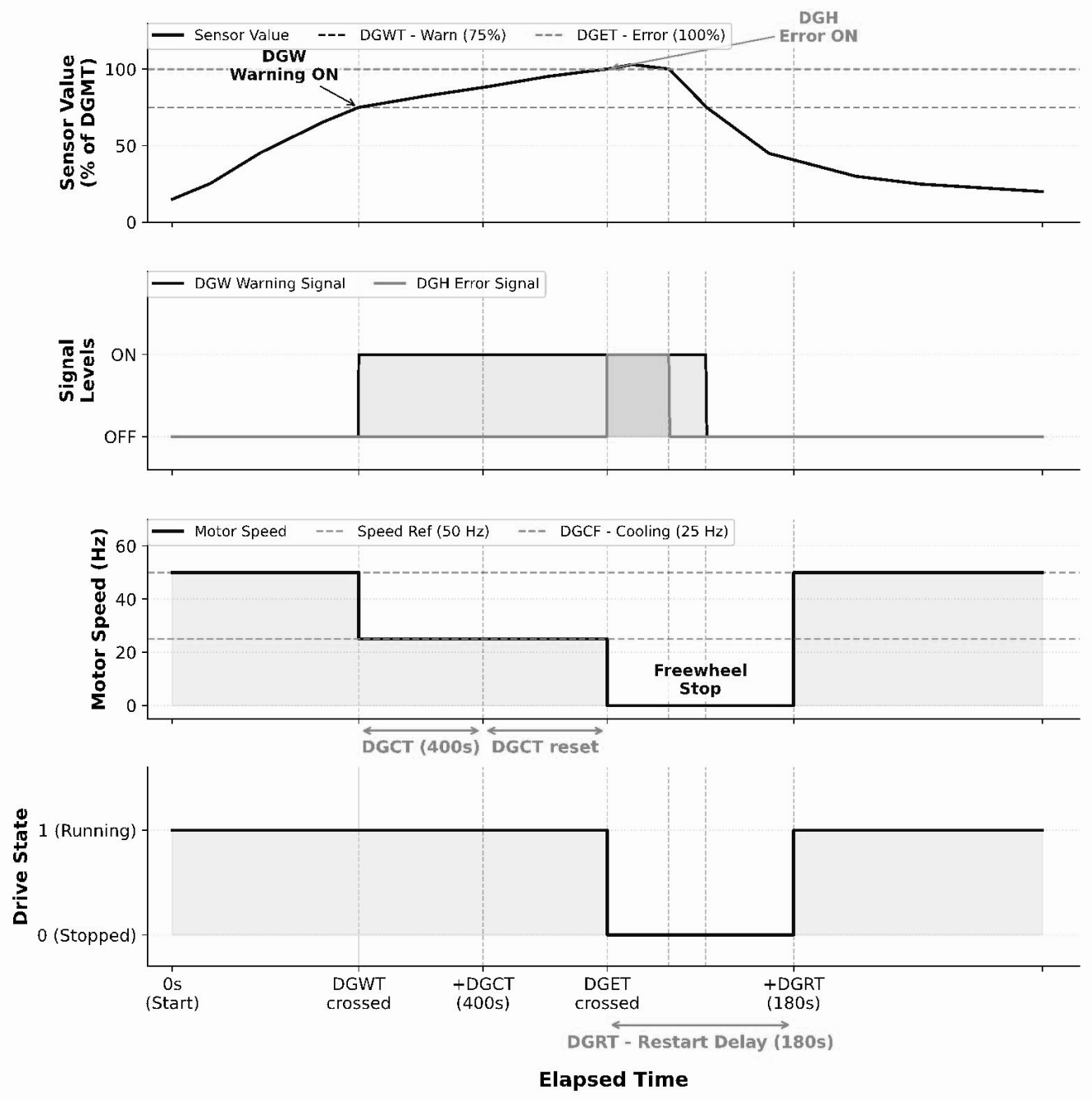


In the following example, we are using a temperature sensor with a range of (40° C-100°C):

Step	Action
1	Activate the function: • Go to **[Disch Temp Assign]** DG2A parameter. • Select the Analog input: **[AI2]**.
2	Configure the Sensor: • Go to **[DischTemp AI2 conf]** DGT2 Menu. • Select The appropriate sensor type: .**[Current]** 0A.

Step	Action
	• Select the current upper and lower limits: ◦ Set **[AI2 Min. Value]** CRL2 to 40. (we are using a 4–20mA sensor to detect potential cable damage) ◦ Set **[AI2 Max Value]** CRH2 to 200. • Set the **[AI2 Lowest Process]** AI2J parameter to : 40 (C°) • Set the **[AI2 Highest Process]** AI2K parameter to : 100 (C°)
3	Set the Maximum Discharge Temperature: • Set **[Disch Max Temp]** DGMT to 90 (C°)
4	Configure the process limits for warning alert and emergency alert activation: • To configure the warning limit, set **[Disch Warn Threshold]** DGWT to 75.0% • To configure the emergency stop limit, set **[Disch Error Threshold]** DGET to 100.0%
5	Configure the cooling frequency and time: • To configure the cooling frequency set **[Disch Cooling Freq]** DGCF to 25.0 Hz • To configure the cooling time set **[Disch Cooling Time]** DGCT to 400.0 s
7	Configure the minimum time before automatic restart: • Set **[Disch Restart Delay]** DGRT to 180.0s

The following figure presents a level diagram of this setup:



[Disch Pres Assign] DG1A & [Disch Temp Assign] DG2A

These parameters are used to activate the function and choose the analog source for feedback for pressure and/or temperature.

Setting	Code / Value	Description
[No]	NO	Discharge Temperature and/or pressure are not activated **Factory setting**
[AI1]...[AI3]	AI1...AI3	Analog inputs AI1...AI3
[AI4]...[AI5]	AI4...AI5	Analog inputs AI4...AI5 if VW3A3203 I/O extension module has been inserted
[AI Virtual 1]...[AI Virtual 3]	AIV1...AIV3	Virtual analog inputs AIV1...AIV3

[DischPres AI1 conf] DGP1 to [DischPres AI5 conf] DGP5

Access

[Complete settings]➞[HVAC functions]➞[Compressor functions]➞[Discharge gas]

NOTE: The menu can be accessed if **[Application Selection]** APPT is set to **[Generic Comp Control]** COMP.

About This Menu

These Menus are responsible for configuring the sensors for the application.

Access to these Menus depend on the selected Analog input in **[Disch Pres Assign]** DG1A, for example **[DischPres AI3 conf]** DGP3 will appear only if we select **[AI3]** AI3.

[AIx Type] AIxT

Example: ***Configuration of AI1***.

Setting	Code / Value	Description
[Voltage]	10U	0-10 Vdc **Factory setting**
[Current]	0A	0-20 mA
[PTC]	PTC	1 to 6 PTC (in serial)
[KTY]	KTY	1 KTY84
[PT100]	1PT2	1 PT100 connected with 2 wires
[PT1000]	1PT3	1 PT1000 connected with 2 wires

Note:

- The settings PTC, KTY, 1PT2 and 1PT3 can only be displayed when the function **Thermal monitoring** is activated.

[AIx Min. Value]

For example: ***AI2 voltage scaling parameter of*** **0%**.

This parameter can be accessed if **[AI2 Type]** AI2T is set to **[Voltage]** 10U.

Setting	Description
0.0...10.0 Vdc	Setting range **Factory setting**: 0.0 Vdc

[AIx Max Value] UIHx

For example: ***AI2 voltage scaling parameter of*** **100%**.

This parameter can be accessed if **[AI2 Type]** AI2T is set to **[Voltage]** 10U.

Setting	Description
0.0...10.0 Vdc	Setting range **Factory setting**: 10.0 Vdc

[AIx Min. Value] CRLx

For example: ***AI3 current scaling parameter of*** **0%**.

This parameter can be accessed if **[AI3 Type]** AI3T is set to **[Current]** 0A.

Setting	Description
0.0...20.0 mA	Setting range **Factory setting**: 0.0 mA

[AIx Max Value] CRHx

For example: ***AI3 current scaling parameter of*** **100%**.

This parameter can be accessed if **[AI3 Type]** AI3T is set to **[Current]** 0A.

Setting	Description
0.0...20.0 mA	Setting range **Factory setting**: 20.0 mA

[AIx Lowest Process] AIxJ

For example: ***AI4 lowest process***.

Setting	Description
-32,767...32,767	Setting range. The Unit depend on the setting of **[P sensor unit]** SUPR. **Factory setting**: 0

NOTE: Cannot be set higher than **[AIx Highest Process]**.

[AIx Highest Process] AIxK

AI5 lowest process.

Setting	Description
-32,767...32,767	Setting range. The Unit depend on the setting of .**[P sensor unit]** SUPR **Factory setting**: 0

[DischTemp AI1 conf] DGT1 to [DischTemp AI5 conf] DGT5

Access

[Complete settings]➞ [HVAC functions] ➞[Compressor functions] ➞ [Discharge gas]

NOTE: The menu can be accessed if **[Application Selection]** APPT is set to **[Generic Comp Control]** COMP.

About This Menu

These Menus are responsible for configuring the sensors for the application.

Access to these Menus depend on the selected Analog input in **[Disch Temp Assign]** DG2A, for example **[DischTemp AI3 conf]** DGT3 will appear only if we select **[AI3]** AI3.

[AIx Type] AIxT

Example: ***Configuration of AI1***.

Setting	Code / Value	Description
[Voltage]	10U	0-10 Vdc **Factory setting**
[Current]	0A	0-20 mA
[PTC]	PTC	1 to 6 PTC (in serial)
[KTY]	KTY	1 KTY84
[PT100]	1PT2	1 PT100 connected with 2 wires
[PT1000]	1PT3	1 PT1000 connected with 2 wires

Note:

- The settings PTC, KTY, 1PT2 and 1PT3 can only be displayed when the function **Thermal monitoring** is activated.

[AIx Min. Value]

For example: ***AI2 voltage scaling parameter of*** **0%**.

This parameter can be accessed if **[AI2 Type]** AI2T is set to **[Voltage]** 10U.

Setting	Description
0.0...10.0 Vdc	Setting range **Factory setting**: 0.0 Vdc

[AIx Max Value] UIHx

For example: ***AI2 voltage scaling parameter of*** **100%**.

This parameter can be accessed if **[AI2 Type]** AI2T is set to **[Voltage]** 10U.

Setting	Description
0.0...10.0 Vdc	Setting range **Factory setting**: 10.0 Vdc

[AIx Min. Value] CRLx

For example: ***AI3 current scaling parameter of*** **0%**.

This parameter can be accessed if **[AI3 Type]** AI3T is set to **[Current]** 0A.

Setting	Description
0.0...20.0 mA	Setting range **Factory setting**: 0.0 mA

[AIx Max Value] CRHx

For example: ***AI3 current scaling parameter of*** **100%**.

This parameter can be accessed if **[AI3 Type]** AI3T is set to **[Current]** 0A.

Setting	Description
0.0...20.0 mA	Setting range **Factory setting**: 20.0 mA

[AIx Lowest Process] AIxJ

For example: ***AI4 lowest process***.

Setting	Description
-32,767...32,767	Setting range. The Unit depend on the setting of .**[Temperature unit]** SUTP. **Factory setting**: 0

NOTE: Cannot be set higher than **[AIx Highest Process]**.

[AIx Highest Process] AIxK

AI5 lowest process.

Setting	Description
-32,767...32,767	Setting range. The Unit depend on the setting of .**[Temperature unit]** SUTP. **Factory setting**: 0

[Discharge gas] DG – Menu

Access

[Complete settings]➡ [HVAC functions] ➡[Compressor functions] [Discharge gas]

NOTE: The menu can be accessed if **[Application Selection]** APPT is set to **[Generic Comp Control]** COMP.

[Disch Pressure Value] DG1V & [Disch Temp Value] DG2V

These parameters allow the user to monitor the configured sensor :

Setting	Description
–32767...32767	Setting range. The unit depend on the setting of **[P sensor unit]** SUPR or**[Temperature unit]** SUTP. **Factory setting**: _

[Disch Max Pressure] DGMP & [Disch Max Temp] DGMT

These parameters serve to configure the maximum process value for the system:

These parameters are available if **[Disch Press Assign]** DG1A or **[Disch Temp Assign]** DG2A are assigned.

Setting	Description
0...32767	Setting range. The unit depend on the setting of **[P sensor unit]** SUPR or**[Temperature unit]** SUTP. **Factory setting**: 0

[Disch Warn Threshold] DGWT

Configure the process limit for warning alert activation:

These parameters are available if **[Disch Press Assign]** DG1A or **[Disch Temp Assign]** DG2A are assigned.

Setting	Description
10.0...100.0	Setting range **Factory setting**: 80.0 Unit: 0.1%

[Disch Error Threshold] DGET

Configure the process limit for error activation:

These parameters are available if **[Disch Press Assign]** DG1A or **[Disch Temp Assign]** DG2A are assigned.

Setting	Description
[Disch Warn Threshold]...100.0	Setting range **Factory setting**: 100.0 Unit: 0.1%

NOTE: This threshold cannot be lower than **[Disch Warn Threshold]**.

[Disch Cooling Freq] DGCF

Configure the cooling frequency for the refrigerant loop:

These parameters are available if **[Disch Press Assign]** DG1A or **[Disch Temp Assign]** DG2A are assigned.

Setting	Description
LSP...HSP	Setting range **Factory setting**: 20.0 Unit: 0.1 Hz

NOTE: If **[Disch Cooling Freq]** DGCF is higher than the speed reference, then speed reference is maintained.

[Disch Cooling Time] DGCT

These parameters are available if **[Disch Press Assign]** DG1A or **[Disch Temp Assign]** DG2A are assigned.

Configure the cooling time for the refrigerant loop:

Setting	Description
60.0...600.0	Setting range **Factory setting**: 300.0 Unit: 0.1 s

NOTE: If the sensor value is still above the **[Disch Warn Threshold]** at the end of the timer, the timer will reset and reactivate for the same duration.

NOTE: If **[Disch Warning]** DGW is triggered too quickly after **[Disch Cooling Time]** DGCT delay, increase the value of this parameter.

[Disch Restart Delay] DGRT

These parameters are available if **[Disch Press Assign]** DG1A or **[Disch Temp Assign]** DG2A are assigned.

Configure the restart time for the refrigerant loop:

Setting	Description
0.0...1800.0	Setting range **Factory setting**: 180.0 Unit: 0.1 s

[Summing feedback] PIFD – Menu

Access

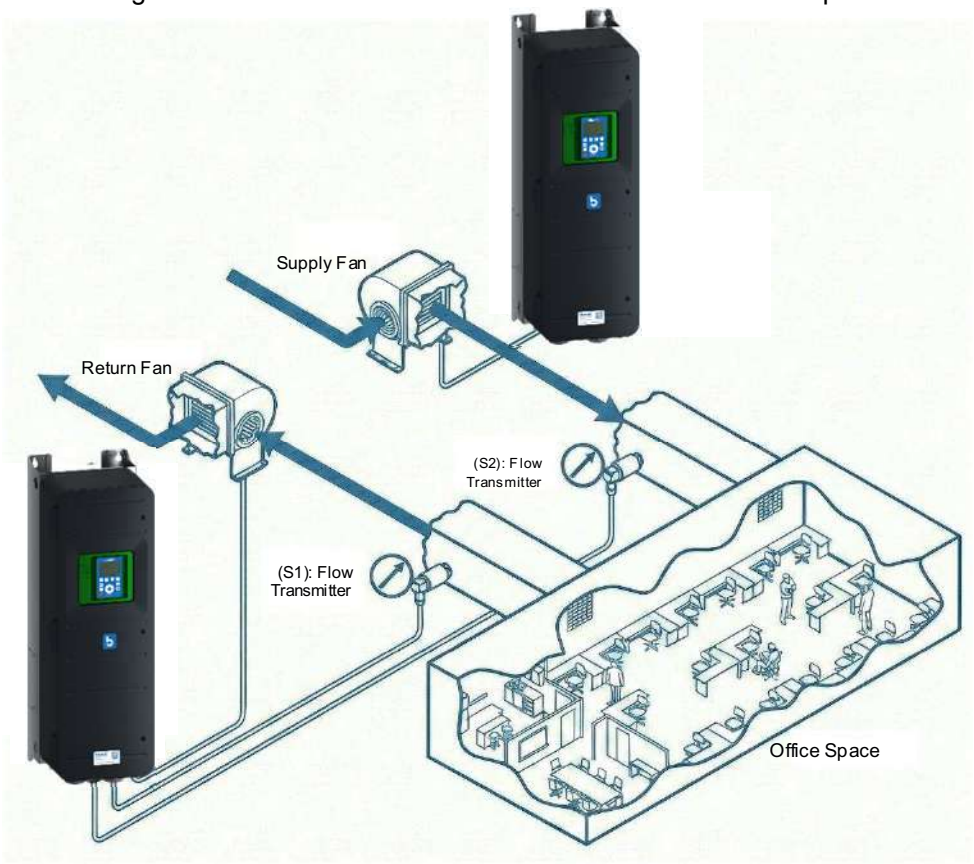
[Complete settings]➞ [HVAC functions] ➞[Summing feedback]

About This Menu

The purpose of this menu is to provide dual process variable regulation, allowing the controller to combine two measured values into a single control signal. The function gives access to multiple combination modes—Sum, Difference, Minimum, or Average— and apply either linear or square root scaling to adapt to process characteristics.

NOTE: The feedback of the PID controller is fully managed by this function.

In the following figure we provide an example using 2 flow sensors and the ER330 to regulate the return fan on the air flow difference of the office space:



The supply flow measurement is assigned to **[AI2]** (**S2**) and the return flow measurement is assigned to **[AI3]** (**S1**). The following table presents a step-by-step configuration of the proposed setup of the drive managing the return fan:

Step	Action
1	• Go to **[HVAC functions]** and select **[PID controller]**. • Configure the PID for **[Flow]** control and use **[AI3]** as a feedback signal. (**S1**)
2	• go to **[Summing feedback]** and then to **[Sum Fdbk Assign]** SFF1. • select **[AI2]** as the second feedback signal. (**S2**)
3	Set **[Sum Fdbk Choice]** SFCH to the desired control logic. (ex: **[Difference]** to regulate the difference of the two signals based on the reference specified while the PID configuration).

[Sum Fdbk Assign] SFF1

Setting	Code / Value	Description
[Not Configured]	NOTCNF	Not assigned **Factory setting**
[AI1]...**[AI3]**	AI1...AI3	Analog Inputs AI1...AI3
[AI4]...**[AI5]**	AI4...AI5	Analog Inputs AI4...AI5 if VW3A3204 relay output option module has been inserted
[AI Virtual 1]... **[AI Virtual 3]**	AIV1...AIV3	Virtual Analog Inputs AIV1...AIV3

NOTE: It is advisable to set this function to an analog input that can be set to **[Current]** 0A and to set **[AI1 4-20mA loss]** LFL1 to a value different than **[Ignore]** NO, to detect cable disconnection.

[Sum Fdbk Type 1] SFS1 & [Sum Fdbk Type 2] SFS2

These two parameters are responsible for the scaling of the feedback signals **S1** and **S2** respectively. They allow choosing between two modes as presented in the following table:

Setting	Description
[Linear] LIN	Linear mode is selected. **Factory setting**
[Square Root] SQR	Square root mode selected.

[Sum Fdbk Choice] SFCH

This parameter allows choosing the feedback signal for the PID regulator. The following table presents the possible options:

Setting	Description
[Sensor 1] S1	The feedback is given by **S1** **Factory setting**
[Sensor 2] S2	The feedback is given by **S2**
[Sum] SUM	The feedback is given by **S1**+S2
[Difference] DIFF	The feedback is given by **S1–S2**
[Average] AVG	Feedback is given by the mean of **S1** and **S2**.
[Maximum] MAX	The feedback is given by the maximum of **S1** and **S2**.
[Minimum] MIN	The feedback is given by the minimum of **S1** and **S2**.

[Additional PIDs] CPID– Menu

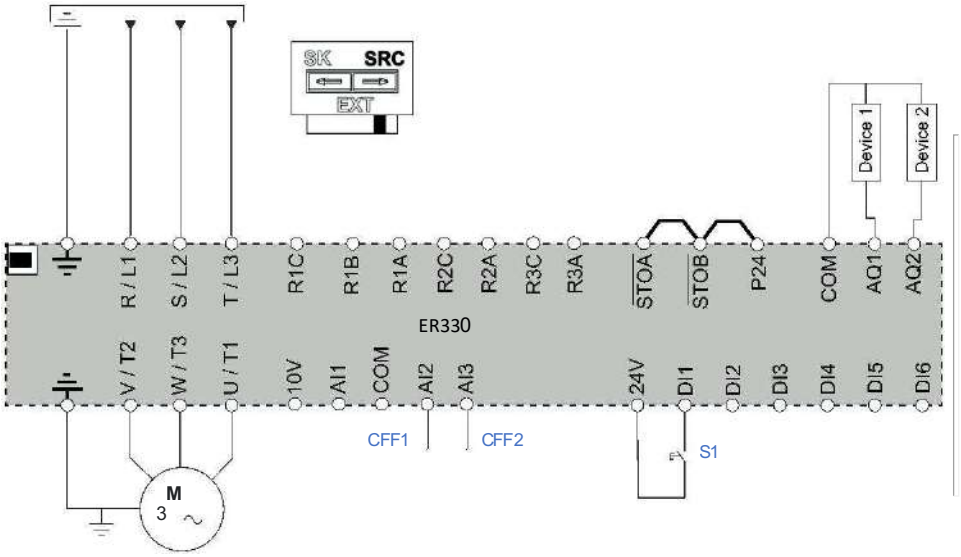
Access

[Complete settings]➞ [HVAC functions]➞ [Additional PIDs]

About This Menu

Provide two additional PID regulator for regulation of water or air flow or a pressure with an external sensor.

Example Of Wiring Diagram Of The Function:



- **[Free PID 1 Assign]** CFF1 is assigned to **[AI2]** AI2.
- **[Free PID 1 Output]** PO1 is assigned to **[AQ1 configuration]** AO1.

Step by step on how to configure Additional PIDs Function:

Step	Action
1	Configure the feedback: • Go to **[Free PID 1 Assign]** CFF1 parameter. • Select the assignment **[AI2]**AI2. • Set **[Free PID 1 Assign]** CFF1 Complementary PID Min feedback • Set **[Free PID 1 Max Fdbk]**CF21 Complementary PID Max feedback • Set the value of **[Free PID 1 Low Warn]** FL1 • Set the value of **[Free PID 1 High Warn]** FH1 • Set the value of **[Free PID 1 P Gain]** RPG1 • Set the value of **[Free PID 1 I Gain]** RIG1 • Set the value of **[Free PID 1 D Gain]** RDG1
2	Assign **[Free PID 1 Output]** PO1 to an output.
3	To see the monitoring feedback: • Go to **[Free PID 1 Feedback]** CPF1 parameter. and see the value.

[Free PID 1 Feedback] CPF1 & [Free PID 2 Feedback] CPF2

Feedback monitoring.

Setting	Description
—	PID feedback monitoring value **Factory setting**: —

[Free PID 1 Output] PO1 & [Free PID 2 Output] PO2

Monitoring the output for the PID.

Setting	Description
0...10000	PID output monitoring value **Factory setting**: 0

[Free PID 1 Setpoint] CPI1 & [Free PID 2 Setpoint] CPI2

Configure the setpoint.

Setting	Description
0...32767	Setting range **Factory setting**: 100

The setpoint is entered with limited value respectively between **[Free PID 1 Min Fdbk]** CF11/ **[Free PID 1 Max Fdbk]** CF21 and **[Free PID 2 Min Fdbk]** CF12/ **[Free PID 1 Max Fdbk]**CF22.

[Free PID 1 Assign] CFF1 & [Free PID 2 Assign] CFF2

Configure the feedback.

Setting	Code / Value	Description
[No]	NO	Not assigned **Factory setting**
[AI1]...**[AI3]**.	AI1...AI3	Assigned to analog input.
[AI Virtual 1]...**[AI Virtual 2]**.	AIV1...AIV2	Assigned to virtual analog input.

[Free PID 1 Min Fdbk] CF11 & [Free PID 2 Min Fdbk] CF12

Configure the **[Free PID 1 Min Fdbk]** CF11 & **[Free PID 2 Min Fdbk]** CF12.

Setting	Description
0...32767	Setting range **Factory setting**: 100

This parameter defines the range of the feedback measured in the application.

Note

- The **[Free PID 1 Low Warn]** CFL1 & **[Free PID 2 Low Warn]** CFL2 warnings are raised if the value of **[Free PID 1 Feedback]** CPF1 & **[Free PID 2 Feedback]** CPF2 are below the value respectively of **[Free PID 1 Low Warn]** FL1 & **[Free PID 2 Low Warn]** FL2.
- The maximum value of **[Free PID 1 Min Fdbk]**CF11 and **[Free PID 2 Min Fdbk]**CF12 will be limited by **[Free PID 1 Max Fdbk]**CF21 and **[Free PID 2 Max Fdbk]** CF22.

[Free PID 1 Max Fdbk] CF21 & [Free PID 2 Max Fdbk] CF22

Configure the **[Free PID 1 Max Fdbk]** CF21 & **[Free PID 1 Max Fdbk]** CF22.

Setting	Description
0...32767	Setting range **Factory setting**: 1000

This parameter defines the range of the feedback measured in the application.

Note

- The **[Free PID 1 High Warn]** CFH1 & **[Free PID 2 High Warn]** CFH2 warnings are raised if the value of **[Free PID 1 Feedback]** CPF1 & **[Free PID 2 Feedback]** CPF2 are above the value respectively of **[Free PID 1 High Warn]** FH1 & **[Free PID 2 High Warn]** FH2.
- The minimum value of **[Free PID 1 Max Fdbk]** CF21 and **[Free PID 2 Max Fdbk]** CF22 will be limited by **[Free PID 1 Min Fdbk]** CF11 and **[Free PID 2 Min Fdbk]** CF12.

[Free PID 1 Inversion] PIC1 & [Free PID 2 Inversion] PIC2

This parameter is used to determine the computation of the PID error.

Setting	Code / Value	Description
[No]	NO	PID error not inverted. **Factory settings**
[Yes]	YES	PID error inverted.

[Free PID 1 P Gain] RPG1& [Free PID 2 P Gain] RPG2

These parameters are used to determine the proportional computation of the PID error.

Setting	Description
0,01...100,00	Setting range **Factory setting**: 1,00

[Free PID 1 I Gain] RIG1 & [Free PID 2 I Gain] RIG2

These parameter are used to determine the computation of the PID error.

Setting	Description
0,01...100,00	Setting range **Factory setting**: 1,00

[Free PID 1 D Gain] RDG1 & [Free PID 2 D Gain] RDG2

These parameters are used to determine the derivative computation of the PID error.

Setting	Description
0...100,00	Setting range **Factory setting**: 0,00

[Free PID 1 Ramp] PRP1 & [Free PID 2 Ramp] PRP2

Configure the ramp for the setpoint.

Setting	Description
0...99,9 s	Setting range **Factory setting**: 0,0

NOTE: Set this parameter to the minimum permitted by the mechanism for a smooth operation.

[Free PID 1 Low Warn] FL1

Configure the threshold value of low alarm .

Setting	Description
0...32767	Setting range **Factory setting**: 100

Note

- The **[Free PID 1 Low Warn]**FL1 maximum value is limited by **[Free PID 1 Max Fdbk]** CF21 and **[Free PID 1 Low Warn]**FL1 minimum value is limited by **[Free PID 1 Min Fdbk]** CF11.

[Free PID 1 High Warn] FH1

Configure the threshold value of high alarm .

Setting	Description
0...32767	Setting range **Factory setting**: 1000

Note

- The **[Free PID 1 High Warn]** FH1 maximum value is limited by **[Free PID 1 Max Fdbk]** CF21 and **[Free PID 1 High Warn]** FH1 minimum value is limited by **[Free PID 1 Min Fdbk]** CF11.

[Free PID 2 Low Warn] FL2

Configure the threshold value of low alarm .

Setting	Description
0...32767	Setting range **Factory setting**: 100

Note

- The **[Free PID 2 Low Warn]** FL2 maximum value is limited by **[Free PID 2 Max Fdbk]** CF22 and **[Free PID 2 Low Warn]** FL2 minimum value is limited by **[Free PID 2 Min Fdbk]** CF12.

[Free PID 2 High Warn] FH2

Configure the threshold value of high alarm .

Setting	Description
0...32767	Setting range **Factory setting**: 1000

Note

- The **[Free PID 2 High Warn]** FH2 maximum value is limited by **[Free PID 1 Max Fdbk]** CF21 and **[Free PID 2 High Warn]** FH2 minimum value is limited by **[Free PID 1 Min Fdbk]** CF11.

Cybersecurity Operating

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Overview

All the features listed in this chapter can be configured by using the ER330 DTM. Refer to ER330 DTM Online Help on SoMove for more information about the detailed settings available.

Login

The user access control can be configured by using the ER330 DTM Admin tab on SoMove according to table below.

When enabled, the username and associated authentication factor will be requested.

Access	Authentication factor	Settings	Default setting
Display terminal	User Pin code	ON/OFF	OFF
Commissioning tools	User password		ON

Brute Force Mitigation

Secure account policy defines the maximum wrong password attempts before locking the account during login on the different accesses. The secure account lockout settings are defined in table below and configurable with the ER330 DTM Admin tab on SoMove. The secure account lockout settings can be set individually on each individual access from Commissioning tools

Parameter	Settings	Settings
Max login attempts	Disable or 1...99 wrong attempts	5
Lock duration	1...86400 seconds (24h)	240s
Password attempt timer (Time between 2 wrong attempts)	60...1800s (30min)	180s

NOTE: To unlock a temporarily locked user due to too many wrong attempts, either:

- Wait until the end of the lock duration time (240s as factory setting), or
- Restart the product, or
- An ADMIN or SecADMIN, manual locks and then manual unlocks the user.

Security Banners

The security banners are warning messages displayed on login interface for system use notification.

The displayed message can be customized by authorized people in the DTM Admin options screen in the limit of 800 characters.

Logout

Manual Logout

For security reasons, it is recommended to logout after any operation on the ER330 .

- On the graphic display terminal, by pressing **ESC** and **HOME** Keys.
- On the Plain Text display terminal, by pressing **ESC** and **OK** Keys.
- On the ER330 DTM on SoMove by disconnecting.

Auto logout

Auto logout defines the maximum time the user is connected without activity before his session is automatically closed. The auto logout settings are defined in table below and configurable with the ER330 DTM Admin tab on SoMove.

Parameter	Settings	Default setting
Timeout session	Disabled or 60...5940s	900s

The timeout is applied on the Display Terminal and commissioning tools connections. A setting defined for each channel.

The timeout is not applied when the DTM control panel is enabled

Account Management

Administration Functions

The following administration functions are available for ADMIN and SecAdmin users in the ER330 DTM Admin tab on SoMove:

- Create/Delete users

  NOTE: It is recommended to restart the product after deleting a user.

- Lock/Unlock users

  NOTE: Locked users can be Unlocked at any time. The assigned password, pin code and role are retained.

- Configure users
- Assign a role to users
- Assign/Reset/Request Change password and pincode
- Configure the password policy
- Configure session timeout on inactivity

NOTE: The ER330 is limited to 10 users per device.

When a user is created, a login policy is applied. This policy is not customizable. Here are the rules:

- All printable characters are allowed, except the following: “ [ ] : ; | = + * ? < > / \ ,
- The period character “.” is allowed, but can’t be the final character
- Non-printable characters are not allowed. This includes all characters with ASCII code less than 32 in decimal. The delete control character, with ASCII code 127 in decimal is not allowed too.
- Identifier is not case sensitive. Username is stored in Upper case in the data base.
- Username size is between 4 and 32 characters.
- A username shall not have “NONE”, “ADMIN”, “ROOT”, nor “VIEWER”.
- The username must be unique and not related to your personal information.

Roles and Rights

The ER330 operations are protected by Role-Based Access Control (RBAC) concept. The roles are assigned with pre-defined rights. The users accounts are then created upon those roles with granted rights which are associated with the corresponding roles.

The following table provides an overview of the roles and their associated rights. The rights of the role cannot be changed from default.

Roles	Default account name (Non-case sensitive)	Rights
Engineer	Defined at user creation	Engineer can perform control actions, update device firmware, change settings, retrieve fault records and upload download the device configuration.
SecAdmin	Defined at user creation	In addition of Engineer rights, SecAdmin can change setting rules and backup retrieve the security configuration & device image.
Admin	ADMIN	In addition of SecAdmin rights, can perform a secure decommissioning of the device.

NOTE: ADMIN user is the system root user.

Roles vs access rights

Rights	ADMIN	SecAdmin	Engineer
Configuration change	✓	✓	✓
Configuration read	✓	✓	✓
Configuration of factory settings	✓	✓	✓

Rights	ADMIN	SecAdmin	Engineer
Control	✓	✓	✓
Upload/Download device configuration	✓	✓	✓
Device monitoring	✓	✓	✓
Read security logs	✓	✓	
Read application logs	✓	✓	
Read error/ warning logs	✓	✓	
Read device security settings	✓	✓	
Write device security settings	✓	✓	
Port hardening	✓	✓	
Create/Delete/ Update/Lock users	✓	✓	
Export/Import security settings	✓	✓	
Backup/Restore device backup image	✓	✓	
Firmware update	✓	✓	✓
Firmware verify	✓	✓	✓
Secure decommissioning	✓		
ADMIN password reset	✓		

Password

Change Password

The individual user password can be changed from the DTM. See the ER330 DTM Online Help on SoMove for more details.

Reset Password

The ER330 stores password in a secure non-reversible format. It is impossible to retrieve a password that has been lost by his user.

For ADMIN user, a special operation is available with the display terminal to reset the ADMIN password to a default value unique to the device.

To reset the ADMIN password:

Step	Action
1	Navigate to the menu **[Device Management]** ➞ **[Cybersecurity]**
2	Scroll to the parameter **[Reset Password]** and press **OK**
3	The default password is visible on the display terminal in **[Default Password]** for the duration of 1min.

Upon first use, the commissioning tools will request the user to change this password prior to connecting. The cybersecurity policy does not change when the password is reset.

Other users shall rely on the ADMIN or SecAdmin users to request a reset of their individual password via the ER330 DTM Admin options screen on SoMove.

Password Policy

By default, the password policy of the ER330 complies with IEEE 1686–2013 as following:

- 8 characters minimum with ASCII [32 to 122] characters
- At least one digit (0-9)
- At least one special character (@ % + ‘ ! # “ $ ^ ? : , ( ) [ ] ~ _ . ; = & / \ – [SPACE])

In addition, for password changes, the password history is saved and prevents the reuse of a password that has been set at least once in the last 5 times by default.

The password policy can be customized or totally disabled to match with password policy defined in the system of which the device is part.

The following settings are available:

- Password policy: enabled/disabled. If disabled, a password is requested as authentication factor but there is no specific rule defined regarding the password robustness
- Password history: No restriction, Exclude last 3, Exclude last 5
- Special character required: YES/NO
- Numeric character required: YES/NO
- Alphabetic character required: YES/NO
- Minimum password length: any value between 6 and 20

This password policy customizing can only be done with the ER330 DTM on SoMove or EcoStruxure Control Expert. Please refer to ER330 DTM Online Help on SoMove for more details.

PIN Code

PIN Code Access Activation

By default, the PIN code protection of the local display terminal is not enabled. ADMIN or SecADMIN users can decide to activate this security feature with the ER330 DTM Admin options screen on SoMove.

Once enabled, a login and PIN code will be requested to any user operating with the display terminal. The pin code shall be set up with the ER330 DTM Admin options screen on SoMove for each individual user. Users with no PIN code preset will not be able to operate with the display terminal

Change PIN Code

The user PIN code can be changed from the ER330 DTM Admin options screen on SoMove. Refer to ER330: DTM, page 15 for more details.

Reset PIN Code

The ER330 stores the PIN code in a secure non-reversable format. It is impossible to retrieve a PIN code that has been lost by its user.

Users can request on the ADMIN or SecADMIN users to change their individual PIN code via the ER330 DTM Admin options screen on SoMove. See ER330: DTM, page 15 Online Help for more details.

Admin Credentials Recovery

In the situation, where the ADMIN user loses both the password and the PIN code, a special operation needs to be executed. The execution of this operation is limited to the ADMIN user only.

NOTE: A local display terminal is required to complete the procedure.

Upgrades Management

When the blemo HVAC ER330 firmware and option fieldbuses are upgraded, security configuration remains the same until changed, including usernames and passwords. Refer to **[Firmware update]** FWUP– Menu, page 507 for more information.

It is recommended that security configuration is reviewed after an upgrade to analyze rights for new or changed device features and revoke or apply them according to your company's policies and standards.

Save & Restore a Security Policy

The device cybersecurity policy can be saved on Display Terminal (depending on the Graphic Display Terminal version). The user has to ensure that the “source” drive and “destination” drive shall have the same topology (same option card if used, and same firmware).

This menu provides the parameters to backup and restore the cybersecurity policy.

Access path: **[Device Management]** **[Cybersecurity]**

HMI label	Setting	Factory setting
[Save security policy] SSE	–	–
This parameter can be used to save the actual cybersecurity policy into the Display Terminal.		
Display Terminal	Number of configuration files store up	File name configurable
Plain text	1	No
Graphic	16	Yes
[Load security policy] OSE	–	–
This parameter can be used to select a cybersecurity policy configuration previously stored in the Display Terminal and apply it to the drive.		

Managing a security policy can also be done by connecting the drive to the ER330 DTM on SoMove and by saving/loading a ***.secp** file on your PC.

Please refer to the ER330 DTM for more information.

Port Hardening

It is possible to disable a communication port or a specific protocol from ER330 DTM Admin tab on SoMove with the ADMIN or SecADMIN rights.

The table below gives an overview of the physical ports that can be disabled :

Interface / Port	Settings	Default
Modbus Serial Ports		
RJ45/HMI	ON / OFF(1)	ON
RJ45/Network	ON / OFF(1)	ON
BACNet MS/TP Port		
RJ45/Network	ON / OFF	ON
Communication Option Modules		
BACNet IP	ON / OFF	ON

(1) Either RJ45/HMI port or RJ45/Network port is always available to keep local access for Graphic Display Terminal, commissioning access or ports and service configuration.

NOTE: A change in configuration of the ports above is considered after a power cycle.

NOTE: RJ45/Network port is the same physical port for both Modbus Serial and BACnet MS/TP

BACnet IP Services

BACnet IP Services	Settings
Modbus TCP	ON / OFF

Security Functionality Verification

When the cybersecurity policy and functionalities have been configured, it is strongly recommended to verify that the following functions are working as intended.

Human User Access Control

The user access control can be individually tested on each interface of the ER330. Please reproduce the following steps for each individual ER330 interface:

Interface	Step	Action	✓
• Commissioning tools connected on the Modbus Serial interface • Commissioning tools connected on the option module.	1	Try to connect to the selected interface	
	2	Confirm the security banner is displayed prior authentication is requested	
		Confirm security banner message is in conformity with the message to be displayed for your organization.	
	3	Try to log in to ER330 with no password or wrong password. **Result:** access denied.	
	4	Try to login with more than the MaxLoginAttempts (Default value: 5) with wrong password **Result:** The account is locked during Lock Duration (Default value 240s)	
		Confirm the account is locked as well on other interfaces (SoMove (DTM))	
	5	During this Lock Duration, connect another account with the right password. **Result:** access granted.	
Display Terminal access control (if enabled)	1	Try to log in to the Display Terminal with no PIN code or a wrong PIN code **Result:** access denied.	
	2	Try to log in with more than the MaxLoginAttempts (Default value: 5) with wrong PIN code **Result:** The account is locked during Lock Duration (Default value: 240s)	
	3	During this Lock Duration, connect another account with the right password. **Result:** access granted.	

Confirm that access control is in conformity with the access control configuration requested for your installation.

Password & PIN code Policy

Step	Action	✓
1	Connect to SoMove with your own account	
2	Try to modify your own password	
	Confirm that the password policy displayed is in conformity with the password policy expected for your installation.	
	Change your password, confirm that the selected password is accepted only if it's compliant with the password policy.	

Step	Action	✓
3	Try to modify your own PIN code.	
	Confirm that the PIN code policy displayed is in conformity with the PIN code policy expected for your installation.	
	Change your PIN code, confirm that the selected PIN code is accepted only if compliant with the PIN code policy.	

Timeout Session

Step	Action	✓
1	Connect to DTM or the Display Terminal with right credentials	
2	Do nothing during the time defined in timeout tab for the specific channel. **Result:** The session is automatically disconnected	

Audit

Step	Action	✓
1	After some or all the preceding tests, access the logging page of SoMove (ADMIN or SecADMIN account is requested)	
2	Download the log file	
3	Check that the user activity is correctly monitored in the system log files	

Firmware Update

Step	Action	✓
1	Connect to SoMove	
2	Verify the version of each individual firmware version of the ER330 and option module.	
3	Confirm that the versions are as expected	
4	Try to perform a firmware update	
5	Select a random file	

Disabling Communication Ports

Step	Action	✓
1	For each individual port disabled by configuration	
2	Confirm the ports are no longer usable	
	No data flow detected as output and no data accepted as input	
3	For each individual port disabled by configuration, confirm the protocol refuses communication according to the column verification of chapter Port Hardening, page 496	

Clear Device / Secure Decommissioning

The device security policy can be totally erased. This operation is part of the device secure disposal use case executed during clear device operation. This operation can be done by ADMIN user and with Display Terminal only.

Upon execution, security settings are totally erased from the device, including any internal backup, usernames, passwords, Ports and services, Brute force mitigation, Session timeout.

For security reasons, it is strongly recommended to perform this operation while removing the device from its intended environment.

To erase the device security policy go to one of those menu on the display terminal:

- **[Device Management]**→ scroll to **[Clear device]**
- **[Device Management]** → **[Save/Load]** and scroll to **[Clear device]**

This parameter is visible in expert mode only. To active the expert mode go to the menu **[My preferences]** **[Parameter access]** and set **[Access Level]** to **[Expert]**.

NOTE: When the Security Policy is set to Advanced, only an Admin user can perform a secure decommissioning.

[Communication] COM–

Introduction

[Communication] COM– menu presents the fieldbus submenus.

What is in This Chapter?

This chapter contains the following topics inside **[Comm parameters]** CMP– submenu:

Menu	Description	Related manual
[Modbus SL] MSL– ➡ **[Modbus Fieldbus]** MD1–	This menu is related to the Modbus serial communication port at the bottom of the control block.	JPS89286
[Modbus SL] MSL– ➡ **[Modbus HMI]** MD2–	This menu is related to the Modbus serial communication port on the front of the control block. It is used by default for the Display Terminal. The Display Terminalis only compliant with the following settings (factory settings): **[Modbus 2 baud rate]** TBR2 equal to **[19200 bps]** I9200, **[Term 2 word order]** TWO2 equal to **[ON]** HIGH and **[Modbus 2 format]** TFO2 equal to **[8-E-1]** 8E1.	–
[BACnet IP Config] BAIP–	This menu is related to the BACnet IP module (VW3A3726).	JPS89285
[BACnet MS/TP] BACM–	This menu is related to the embedded BACnet MS/TP.	JPS89285

NOTE:

- These menus can be accessed if the corresponding option has been inserted and if the firmware of the option module and the drive are compatibles. In addition of the fieldbus manuals, refer to the Instruction Sheet of the option modules (S1A45591) and the installation manual of the drive for more information.
- Access to the communication parameters to carry out searches (example: parameter address and format) and sort operations (JPS89292).
- The drive needs to be restarted to apply the modification of a communication parameters.

[Device Management] DMT–

What's in This Chapter

[Device Name] PAN– menu 501
[Identification] OID– menu 501
Device Configuration files 501
Save & Restore a device configuration.....502
Save & Restore a device image.....503
[Factory settings] FCS Menu 504
[Date & Time] DTO– menu.....506
[Firmware update] FWUP– Menu 507

[Device Name] PAN– menu

Access

[Device Management] ➡ [Device Name]

About This Menu

This menu allows the user to change the name of his device.

[Identification] OID– menu

Access

[Device Management] ➡ [Identification]

About This Menu

This menu displays the device information required for its identification.

Refer to **[Identification]** OID– menu .

Device Configuration files

In a drive, is called:

- A device configuration, a list of parameters settings in relation to the drive, the application, and the communication.
- A cybersecurity policy, containing all settings in relations with cybersecurity.
- A device image, regrouping the device configuration and cybersecurity policy.

Saving & Restoring Configuration, Backing up the device or doing a Factory settings will act differently on the drive configuration files.

Save & Restore a device configuration

The device configuration (without cybersecurity policy) can be saved on any Display Terminal. This function is used for cloning a drive or replacing a drive. The user has to ensure that the drive “source” and drive “destination” shall have the same product reference and the same topology (same option card if used, and same firmware).

Saving & restoring acts only on the device configuration file.

Access path: **[Device Management]** ➞ **[Save/Load]**

HMI label	Setting	Factory setting
[Copy From Device] SAF	–	–
This allows to store the actual drive configuration into the Display Terminal.		
Display Terminal	Number of configuration files store up	File name configurable
Plain text	1	No
Graphic	16	Yes
[Copy To The Device] OPF	–	–
This allows to select a device configuration previously stored in the Display Terminal and apply it to the drive. The device needs to be restarted after a configuration file transfer.		

Saving a device configuration can also be done by:

- connecting the drive to SoMove and by saving a ***.cfg** file on your PC hard disk.
- connect the Graphic Display Terminal to the PC and transfer data by copy/paste.

Save & Restore a device image

The function is similar to Save and restore a device configuration, but it includes in addition the cybersecurity policy.

The device image can be saved on a Display Terminal (depending on the Display Terminal version).

Access path: **[Device Management]➞ [Save/Load]**

HMI label	Factory setting
[Save backup image] SBK	–
This parameter can be used to save the actual product configuration and cybersecurity policy into the Display Terminal. Display Terminal: File name configurable Plain text: No Graphic: Yes	
[Load backup image] OBK	–
This parameter can be used to select a product configuration and cybersecurity policy configuration previously stored in the Display Terminal and apply it to the drive.	

Saving a device image can also be done by connecting the device to SoMove and by saving a ***.bki** file on your PC hard disk.

[Factory settings] FCS Menu

Access

[File management] ➞ **[Factory settings]**

About This Menu

This function is used to perform a factory setting of the drive or to restore the drive to a selected configuration. The following table shows an example of standard procedure to perform a factory setting or to restore a configuration.

Step	Description
1	To restore the drive to a selected configuration, select the customer parameter set to be restored with **[Config. Source]** FCSI, else verify **[Config. Source]** FCSI is set to **[Macro Config]** INI to perform a factory setting. **NOTE:** Before selecting the customer parameter set used to restore a configuration, customer parameters must have previously been saved on this set (using **[Save Configuration]** SCSI).
2	Select with **[Parameter group list]** FRY the menus to be restored or reset to factory setting. In case a configuration is restored, it is recommended to select **[All]** ALL.
3	Perform the factory setting or restore the configuration with **[Go to Factory Settings]** GFS. On the Display Terminal several screens to consider are displayed. **⚠WARNING** **UNANTICIPATED EQUIPMENT OPERATION** 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.**

[Config. Source] FCSI ★

Source configuration.

This parameter allows to select the configuration to restore in case of factory setting operation.

NOTE: Before selecting with this parameter the customer parameter set used to restore a configuration, customer parameters must have been saved on this set (using **[Save Configuration]** SCSI).

Setting	Code / Value	Description
[Macro Config]	INI	Factory setting parameter set **Factory setting**
[Config 1]	CFG1	Customer parameter set 1
[Config 2]	CFG2	Customer parameter set 2
[Config 3]	CFG3	Customer parameter set 3

[Parameter group list] FRY

Selection of menus to be restored when Go to Factory setting function is activated

Setting	Code / Value	Description
[All]	ALL	All parameters in all menus. **NOTE:** The following parameter list is not impacted by this selection: **[Motor Standard]** BFR and **[Dual rating]** DRT.
[Device Configuration]	DRM	All menus, except for **[My preferences]** MYP– menu, **[Communication]** COM– menu.
[Motor param]	MOT	**[Motor control]** DRC– menu parameters and **[Motor Th Current]** ITH parameter in **[Motor thermal monit]** THT– menu.
[Comm. menu]	COM	Restores **[Comm. menu]** COM– menu. It can only be selected if **[Config. Source]** FCSI is set to **[Macro Config]** INI.
[Display config.]	DIS	Restores **[Customization]** CUS– menu and **[Visibility]** VIS– menu. It can only be selected if **[Config. Source]** FCSI is set to **[Macro Config]** INI.
[Fieldbus Module]	NET	Restores parameters in the menus available only with the option module.

Note: In factory configuration and after a return to "factory settings", **[Parameter group list]** FRY will be empty.

[Go to Factory Settings] GFS

This function allows to perform a factory setting or to restore a previously saved configuration.

⚠ WARNING

UNANTICIPATED EQUIPMENT OPERATION

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.

It is only possible to revert to the factory settings if at least one group of parameters has previously been selected (**[Parameter group list]** FRY displayed above).

[Save Configuration] SCSI

This parameter allows to save configurations to be restored later.

The active configuration to be saved does not appear for selection. For example, if it is **[Config 0]** STR0, only **[Config 1]** STR1, **[Config 2]** STR2 and **[Config 3]** STR3 appear. The parameter changes back to **[No]** NO as soon as the operation is complete.

Setting	Code / Value	Description
[No]	NO	No **Factory setting**
[Config 0]	STR0	Store customer parameter set 0
[Config 1]	STR1	Store customer parameter set 1
[Config 2]	STR2	Store customer parameter set 2
[Config 3]	STR3	Store customer parameter set 3

[Date & Time] DTO– menu

This menu provides the parameters to set date and time. This information is used for the time stamping of all logged data.

Access path: **[Device Management]➞ [Date & Time]**

HMI label	Setting	Factory setting
[Set Date/Time] DTO	–	–
Date and time information should be available (time server available and configured and the internal battery is functional) at drive's power up to enable the time stamping of the logged data. Setting **[Set Date/Time]** gives access to the parameter **[Time Zone]**, which can be used to set the offset between reference time and local time (by 15mn step). **NOTE:** The time is displayed in the top right-hand corner of the display terminal.		
[Time Format] TIMF	–	**[24h]**
This parameter can be used to choose a time format to display on log file: • **[24h]**: Hour is displayed in a 24h format. • **[12h]**: Hour is displayed in a 12h format.		
[Date Format] DATF	–	**[yyyy/mm/dd]**
This parameter can be used to choose a date format to display on log file: • **[yyyy/mm/dd]**: Date is displayed as yyyy/mm/dd. • **[dd/mm/yyyy]**: Date is displayed as dd/mm/yyyy. • **[mm/dd/yyyy]** : Date is displayed as mm/dd/yyyy. • **[dd/mm/yy]**: Date is displayed as dd/mm/yy. • **[dd/mm]**: Date is displayed as dd/mm.		
[Battery Level] EBAL	**[No Battery]**...100%	–
Battery level Access path: **[Device Management]➞ [Date & Time]** Gives embedded battery level (updated by steps of 25%): • 0%: Embedded battery is extremely low. • 25%: Embedded battery is low. • 50%-75%: Embedded battery is correct. • 100%: Embedded battery is full. • **[No Battery]** : Embedded battery is flat, damaged or not present **NOTE:** In case of battery is empty or not present: • The device has not yet been powered off: the device runs normally, showing a warning inviting the user to change it. If the battery is replaced, time and date are lost. • The device has already been powered off once: the device runs normally; time and date are not valid. Warning for changing the battery is present. • Motor thermal monitoring: in case of powering off, the device considers the last saved thermal state. **NOTE:** In case of input power not present, if the battery is replaced, time and date are lost. The user will have to set time and date at next power ON. **NOTE:** Logged data will not be time stamped if battery level reaches 0%. **NOTE:** For the battery replacement, please refer to the installation manual, page 15.		

[Firmware update] FWUP– Menu

Access

[Device Management] ➞ **[Firmware update]**

About This Menu

This menu provides the parameters to monitor the update of the firmware of the drive.

The firmware can be updated directly via Ecostruxure Automation Device Maintenance (EADM) or SoMove.

The firmware update consists of 3 parts: transfer, apply and finalize the firmware update procedure.

⚠ WARNING

UNANTICIPATED EQUIPMENT OPERATION

Before transferring data to the device or its option module(s):

- Read the firmware package release notes.
- Verify that you are connected to the correct device, by using the visual localization function. Transferring data to the wrong device may result in unsafe conditions.
- In case of a downgrade operation, only continue after having verified that the older firmware version supports all functions needed in your application.

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

Note: Once the firmware update is initiated, no run command will be considered. The firmware update can be done only if the drive is stopped (RDY or NSTstate). The drive will not be operational until the firmware update procedure is completed.

Note: Verify that the parameter **[Forced Local Assign]** FLO is set to **[Not Assigned]** NO before the apply phase.

Preparing the drive for a firmware update

NOTE: Make sure that the latest version of the firmware and of the programming manual are used.

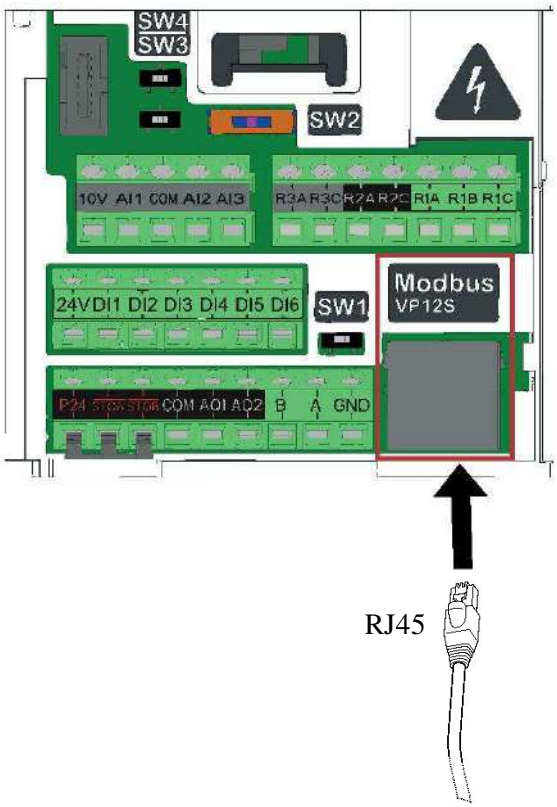
NOTE: Make sure that the drive is supplied.

NOTE: The product may fail to perform a firmware update if a line contactor is wired and configured.

Install on your PC either:

- EcoStruxure Automation Device Maintenance.
- Or SoMove and the DTM. Refer to SoMove, page 42

Connect the device to the PC. Use the following serial communication cable: VW3A8127 for Modbus VP12S connection.



NOTE: If **[Embedded Protocol]** COM was previously set to **[Bacnet MS/TP]** EBM, make sure to set it to **[Modbus]** MDB, then restart the product so the change can take effect.

For additional support, contact our Customer Care Center on:

www.blemo.com

You can also request the drive to check if there is a firmware available.

Follow this Access path: **[Device Management]** ➞ **[Firmware update]**

HMI label	Setting	Factory setting
[Check For Update] NFW	–	–
This parameter is used to know if a new firmware version is available for the device, the plugged fieldbus modules or the plugged Display Terminal. **NOTE: The update can take up to 20 minutes.**		

Proceed a firmware update

The firmware is done in 3 steps:

Step	Actions
1	Transfer: a firmware is transferred from the PC to the drive using the selected fieldbus. During this phase the drive remains operational.
2	Once the transfer is completed, the firmware package is accessible from **[Available Packages]** parameter. Follow this Access path: **[Device Management]➞ [Firmware update]** This parameter is used to know all available firmware versions, new or legacy, for the device, the plugged fieldbus modules or the plugged Display Terminal. It includes legacy, current and new firmware versions. **NOTE: The update can take up to 20 minutes.** **NOTE:** If the firmware update is not successful, do a power cycle before retrying the action.
3	Select one of available packages and apply it. **⚠ WARNING** **UNANTICIPATED EQUIPMENT OPERATION** Verify that the device is stopped (RDY or NSTstate). The device will not be operational until the firmware update procedure is completed. The relays, the analog and digital outputs may change state during the firmware update process. Depending on the wiring and the configuration of the device, this may result in immediate and unanticipated operation. Before applying the data previously transferred to the device or its option module: • Verify that the automation application controlling the device is stopped and that the device and its inputs and outputs, including communication channel(s) to external controller(s), cannot interact with your industrial process, and does not result in unsafe conditions. • Verify that the parameter **[Disable Error Detect]** INH is not assigned. In case of doubt, disconnect all analog and digital inputs and outputs of the device before applying the firmware update. **Failure to follow these instructions can result in death, serious injury, or equipment damage.** During this phase, the drive is in a **[Firmware Update]** state. No operations are permitted. Depending on the software used, Transfer and Application can be: • Manual: the user confirms a transfer and confirms an application in front of the device using the display terminal / EADM / SoMove. • Automatic: the user confirms a transfer and apply, which means once the firmware is transferred, it is automatically applied to the drive

[Identification] OID– menu

Access

[Device Management] ➞ **[Firmware update]** ➞ **[Identification]**

About This Menu

This menu displays the device information required for its identification.

Refer to **[Identification]** OID– menu.

[Package version] PFV– Menu

Access

[File management] ➞ **[Firmware update]** ➞ **[Package version]**

About This Menu

This menu presents the different information about the firmware package.

[Package Type] PKTP

Setting ( )	Code / Value	Description
[None]	NONE	No firmware package is transferred in the device
[Product]	PRD	The transferred firmware package is for the device firmware
[Module]	OPT	The transferred firmware package is for the option modules available for the device.
[Spare parts]	SPR	The transferred firmware package is for the device control block part
[Customized]	CUS	Customized package
[Indus]	IND	Firmware package destined for industrial device

[Package Version] PKVS

This parameter is available if **[Package Type]** PKTP value is different than **[None]** NONE.

This parameter displays the version reference of the transferred firmware package.

Setting	Description
0…65535 (value in hex)	The first bits from 0 to bit 7 of the displayed value give the evolution iteration of the version (IE) and bits 8 to bit 15 give the software version (V).

[Firmware update] FWUP– Menu

Access

[Device Management] ➞ **[Firmware update]**

[FW Upd Request] FWCD

This parameter allows to control the firmware update function.

Setting	Code / Value	Description
[No]	NONE	No firmware update requested.
[Apply FW]	APPLY	Apply the firmware.
[Clear]	CLEAR	Clear **[FW Update Status]** FWST.
[Check]	CHECK	Firmware update check.
[Pairing]	MCPAIR	Firmware MC pairing.
[Abort]	ABORT	Abort firmware update.

[FW Update Status] FWST

This parameter shows the status of the requested firmware update.

Setting	Code / Value	Description
[Inactive]	CHECK	The firmware update is inactive.
[PwrUpd in prog]	POWER	The power firmware update is inactive.
[PwrUpd Pending]	PEND	The power firmware update is processing.
[Ready]	RDY	The firmware package is ready to be applied.
[Inactive]	NO	The firmware update is inactive.
[Succeeded]	SUCCD	The firmware update has been successful.
[Update Error]	FAILED	The firmware update has failed.
[In Progress]	PROG	The firmware update is in progress.
[Warning]	SUCWR	The firmware update has succeeded with a warning.
[Saving conf]	SAVE	The current device configuration is being stored
[Post Script]	POST	The device is in post firmware update state.
[Reset Device Error]	RST	Firmware update requests a reset.
[UMAS Update]	UMSC	UMAS copying in progress.
[Restore Kpd Bdr]	RKBD	Restoring display terminal baudrate.

[FW Update Error] FWER

This parameter shows the possible errors during a firmware update.

Setting ( )	Code / Value	Description
[No Error]	NO	No error during the firmware update
[Lock Error]	LOCK	The device is locked
[Package Error]	MD5	**Package error**
[Package compatibility error]	COMP	The transferred package is not compatible with the device
[Ask error]	ASK	**Ask error**
[Reset Device Error]	RESET	**Reset device error**
[Conf Saving Warn]	SAVE	Device configuration saving warning
[Conf Loading Warning]	LOAD	Configuration loading warning.
[Post Script Warn]	SCP	**Post Script warning**
[Package Description Error]	DES	**Package Description error**
[Package not found] PKG	PKG	No transferred firmware package has been found
[Package error] IFO	IFO	Error with the firmware package version
[UMAS Trans Err] KPD	KPD	Display terminal UMAS transfer error
[Log Creation Error]	LOG	**Log creation error**
[No Package]	NA	**No available package**
[Opt Comm Error]	OPT	**Option communication error**

[My preferences] MYP–

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Introduction

[My preferences] MYP– menu presents the possible settings for the user-defined HMI and parameter access.

[LANGUAGE] LNG– Menu

Access

[My preferences] ➜ **[LANGUAGE]**

About This Menu

This menu allows to select the Graphic Display Terminal language.

[Customization]

[My menu config.] MYC– Menu

Access

[My preferences] ➞ **[Customization]** ➞ **[My menu config.]**

About This Menu

This menu allows to customize the **[My menu]** MYMN– menu.

[Parameter Selection] UMP

This menu shows the content of **[Complete settings]** CST– menu and it allows to:

- Select the parameters visible in **[My menu]** MYMN–, and
- Remove the selected visible parameters from **[My menu]** MYMN–.

No selection can be made if there are no parameters in the displayed current screen.

[Display Selection] MDP

This menu shows the content of **[Display]** MON– menu and it allows to:

- Select the parameters visible in **[My menu]** MYMN–, and
- Remove the selected visible parameters from **[My menu]** MYMN–.

No selection can be made if there are no parameters in the displayed current screen.

[Selected list] UML

This menu displays the parameters selected via **[Parameter Selection]** UMP and **[Display Selection]** MDP.

With the Graphic Display Terminal, this menu allows to sort and remove the selected parameters using the function keys (F1, F2 and F3).

NOTE: Up to 25 parameters can be selected to be displayed in the customized menu..

[My menu] MYMN

Used to define the name of the customized menu. (18 ASCII characters max)

[Display screen type] MSC– Menu

Access

[My preferences] ➞ [Customization] ➞ [Display screen type]

About This Menu

This parameter allows to select the type of display for the default screen.

[Display value type] MDT

HMI displayed value type.

Setting	Code / Value	Description
[Digital]	DEC	Digital values **Factory setting**
[Bar graph]	BAR	Bar graph
[List]	LIST	List of values
[Vu Meter]	VUMET	Vu meter

[Parameter Selection] MPC

Customized selection.

This view allows to select the parameters to display on the default screen.

[Bar Selection] PBS– Menu

Access

[My preferences] ➞ [Customization] ➞ [Bar Selection]

About This Menu

This view allows to select the parameters to display on the top line of the Graphic Display Terminal screen.

[Custom parameters] CYP– Menu

Access

[My preferences] ➞**[Customization]** ➞ **[Custom parameters]**

About This Menu

This menu allows to rename up to 15 parameters.

NOTE: This parameter is only accessible with the graphic display terminal VW3A1121.

[Parameter Selection] SCP

This view allows to select up to 15 parameters.

[Custom Selection] CPM

This view allows to set for each selected parameter:

- The name (13 ASCII characters max)
- The unit if relevant (a custom unit is available) (3 ASCII characters max)
- A multiplier (1...1000) if relevant
- A divisor (1...1000) if relevant
- An offset (-99.00...99.00) if relevant

[Service Message] SER– Menu

Access

[My preferences] ➞**[Customization]** ➞ **[Service Message]**

About This Menu

This menu allows to define a user-defined service message (5 lines, 23 digits per line).

This defined message is displayed in **[Diagnostics]** DIA– ➞**[Diag. data]** DDT– ➞**[Service Message]** SER– submenu , page 80.

[LINE 1] SML01 to [LINE 5] SML05

These elements are used to define line-by-line the content of the service message.

[Access Level] LAC– Menu

Access

[My preferences] ➞ [Access Level]

[Access Level] LAC

Access level: to define the level of access control.

Setting ( )	Code / Value	Description
[Basic]	BAS	Access to the **[Simply Start]** SYS–, **[Dashboard]** DSH–, **[Diagnostics]** DIA– , and **[My preferences]** MYP– menus only.
[Standard]	STD	Access to all menus including **[Display]** MON–, **[Complete settings]** CST–, **[Communication]** COM–, **[My preferences]** MYP– and **[File management]** FMT–. **Factory setting**
[Expert]	EPR	Access to all menus and to additional parameters.

[Functions key mgnt] FKG– Menu

Access

[My preferences] ➞ **[Functions key mgnt]**

About This Menu

This menu allows to assign functions to the Graphic Display Terminal function keys.

NOTE: This menu is only accessible with the graphic display terminal.

[F1 key assignment] FN1 to [F4 key assignment] FN4

Following possible assignments cannot be accessed in **[I/O profile]** IO configuration.

Setting	Code / Value	Description
[No]	NO	Not assigned **Factory setting**
[Preset Speed 1]	FNPS1	Function key preset speed 1 assignment
[Preset Speed 2]	FNPS2	Function key preset speed 2 assignment
[PID Ref Freq 1]	FNPR1	Function key preset PID 1 assignment
[PID Ref Freq 2]	FNPR2	Function key preset PID 2 assignment
[+speed]	FNUSP	Function key faster assignment
[-speed]	FNDSP	Function key slower assignment

[LCD settings] CNL– Menu

Access

[My preferences] ➞[LCD settings]

About This Menu

This menu allows to set the Graphic Display Terminal related parameters.

[Screen contrast] CRST

Screen contrast.

Setting	Description
0...100%	Setting range **Factory setting**: 50%

[Standby] SBY

NOTE: Disabling the automatic standby function of the display terminal backlight will reduce the backlight service time.

Setting	Description
NO...10 min	Automatic backlight OFF time **Factory setting**: 10 min

[Display Terminal locked] KLCK

Graphic Display Terminal key locked. Press **ESC** and **Home** keys to Lock manually & unlock the Graphic Display Terminal keys. The **Stop/OFF** key remains active when the Graphic Display Terminal is locked.

Setting	Description
NO...10 min	Setting range **Factory setting**: 5 min

[Red Backlight] BCKL ★

Graphic Display Terminal red backlight function disabeled in case or an error triggered.

NOTE: This parameter is only accessible with the graphic display terminal.

Setting	Code / Value	Description
[No]	NO	Red backlight disabled
[Yes]	YES	Red backlight enabled **Factory setting**

[Stop and Go] STG– Menu

Access

[My preferences] ➡ **[Stop and Go]**

About This Menu

This function is available for all drives excepted frame size 1 to 3.

This function can be used to save energy by managing the DC bus voltage. When this function is active, **[Device State]** HMIS is in **[Energy Saving]** IDLE mode and the DC bus voltage is no longer maintained at operational level.

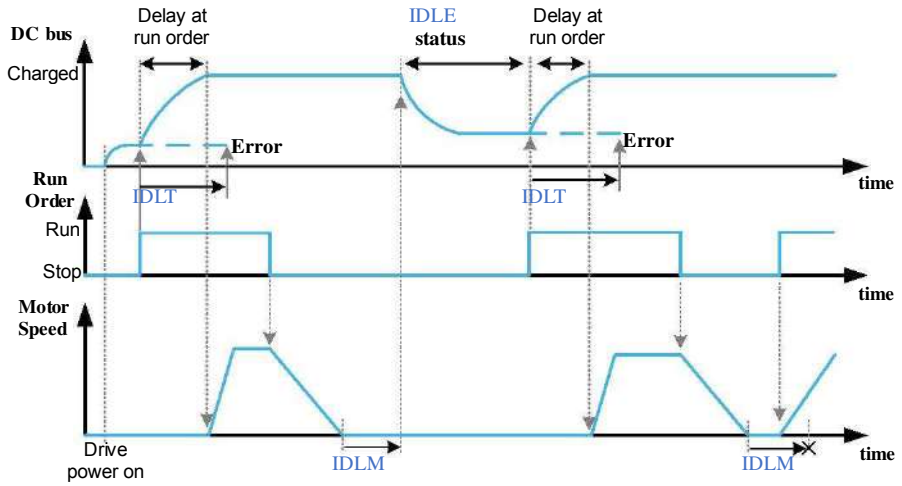
A run command has priority on energy saving mode: if this function is active when a run command is requested, the drive leaves the energy saving state, the DC bus charges then the motor runs.

The DC bus charges introduces a delay on the run of the motor. If the DC bus is not charged after **[Egy Saving Timeout]** IDLT has elapsed, **[Egy Saving Exit Error]** IDLF is triggered.

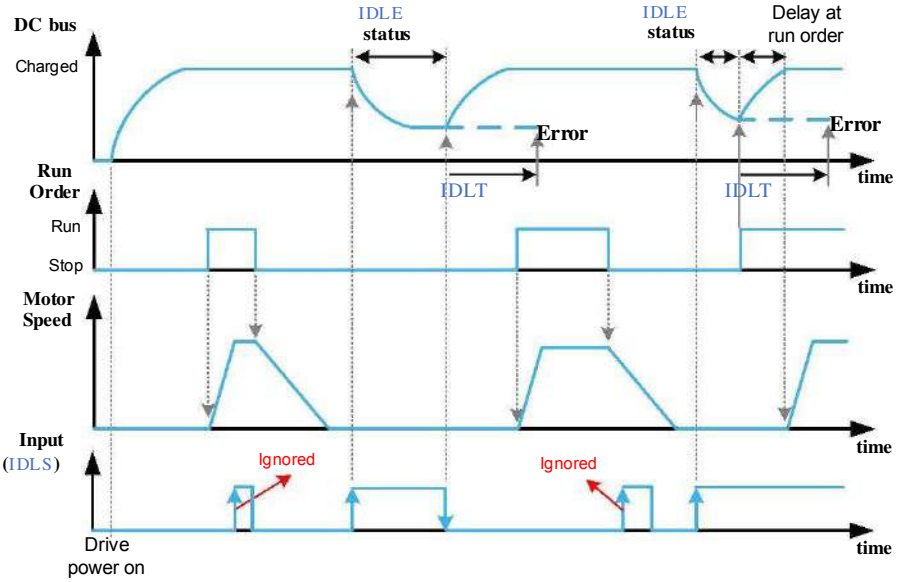
There are three different modes to activate the energy saving:

- **Automatic mode**: **[Energy Saving Delay]** IDLM configured,
  - At drive power on, the function is active: DC bus is not charged.
  - After the motor is stopped, the energy saving mode is active after **[Energy Saving Delay]** IDLM.

    NOTE: if a run command is requested during **[Energy Saving Delay]** IDLM, the DC bus is still charged: there is no delay applied on the run command.



- **Manual mode**: **[Energy Saving Assign]** IDLS assigned,
  - At drive power on, the function is not active: the DC bus charges.
  - At rising edge of the assigned input, the energy saving mode is active if the motor is stopped and if there is no run command active,
  - At falling edge, the energy saving is deactivated, the drive switches to normal operation. If a run command is requested long enough after the energy saving deactivation, the DC bus is charged: there is no delay applied on the run command. It can be used to anticipate a run command.



- **Semi-automatic mode: [Energy Saving Delay]** IDLM configured and **[Energy Saving Assign]** IDLS assigned,
  - At drive power on, the function is active: DC bus is not charged.
  - After the motor is stopped, the energy saving mode is active after **[Energy Saving Delay]** IDLM

    NOTE: if a run command is requested during **[Energy Saving Delay]** IDLM, the DC bus is still charged: there is no delay applied on the run command.
  - During **[Energy Saving Delay]** IDLM, a rising edge of the assigned input activates precociously the energy saving mode,
  - When the energy saving mode is active, a falling edge of the assigned input deactivates the energy saving mode: the drive switches to normal operation.

    NOTE: During **[Energy Saving Delay]** IDLM, the drive is not in energy saving mode: a falling edge has no impact. The drive still switches in energy saving mode at the end of the delay.

[Energy Saving Delay] IDLM

Wait time before going to energy saving mode after motor is stopped.

At drive power on, if **[Energy Saving Delay]** IDLM is configured, the DC bus is not charged: the drive goes directly to **[Energy Saving]** IDLE.

This parameter is forced to **[No]** NO if **[Mains contactor cmd]** LLC– function is enabled (i.e. **[Mains Contactor]** LLC is assigned to an output).

Setting	Code / Value	Description
[No]	NO	Function deactivated. **Factory setting**
0...32,400 s		Setting range

[Energy Saving Assign] IDLS

At rising edge, the drive switches to energy saving state if the motor is stopped without run command active.

A falling edge switch the drive to normal operation.

This parameter is forced to **[Not Assigned]** NO if **[Mains contactor cmd]** LLC– function is enabled (i.e. **[Mains Contactor]** LLC is assigned to an output).

Value range	Code / Value	Description
[Not Assigned]	NO	Not assigned **Factory setting**
[DI1]...**[DI6]**	LI1...LI6	Digital input DI1...DI6
[DI11]...**[DI16]**	LI11...LI16	Digital input DI11...DI16 if VW3A3203 I/O extension module has been inserted
[CD00]... **[CD10]**	CD00...CD10	Virtual digital input CMD.0...CMD.10 in **[I/O profile]** IO configuration
[CD11]... **[CD15]**	CD11...CD15	Virtual digital input CMD.11...CMD.15 regardless of configuration

[Egy Saving Timeout] IDLT

If the value of the parameter **[Egy Saving Timeout]** IDLT is increased, the run command can be delayed for the amount of time set by the parameter **[Egy Saving Timeout]** IDLT as long as the condition to leave **[Egy Saving Timeout]** IDLT state is not fullfilled (for example, but not limited to, undervolatge or overvolatge of the supply mains).

⚠WARNING

UNANTICIPATED EQUIPMENT OPERATION

Verify that the modification of the setting of this parameter does not result in unsafe conditions.

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

After **[Egy Saving Timeout]** IDLT time, if the drive is still in **[Energy Saving]** IDLE mode, the error **[Egy Saving Exit Error]** IDLF is triggered

Setting	Description
1...999 s	Setting range **Factory setting**: 5 s

[QR code] QRC– Menu

Access

[My preferences] ➞ [QR code]

About This Menu

This menu can only be accessed with the Graphic Display Terminal.

It gives access to 5 QR Codes:

- **[QR code]** QCC: scanning this QR code brings to a landing page on Internet with the information on the Technical product datasheet and a link for Blemo App available for services.
- **[My Link 1]** MYL1– to **[My Link 4]** MYL4: 4 QR codes customized with the commissioning software. By default, scanning these QR codes brings to the same landing page as **[QR code]** QCC. To customize these QR codes with SoMove, go to "**Device** > **HMI Personalization** > **QR codes**".

  NOTE: The name "My link x" can also be changed during the customization, within a limit of 15 characters.

  NOTE: The custumizable link is a string of a maximum of 154 characters.

  NOTE: This menu is only accessible with the graphic display terminal.

[Pairing password] PPI

Access

[My preferences] ➞ **[Pairing password]**

About This Menu

This function can only be accessed in Expert mode. This function is used to detect whenever an option module has been replaced or the software has been modified in any way. When a pairing password is entered, the parameters of the option modules currently inserted are stored. On every subsequent power-up, these parameters are verified and, in the event of a discrepancy, the drive locks in **[Boards Compat]** HCF. Before the drive can be restarted, it is necessary to revert to the original situation or reenter the pairing password.

The following parameters are verified:

- The type of option modules.
- The software version of the drive and the option modules.
- The serial number for the control block boards.

[Pairing password] PPI

Pairing password.

This parameter can be accessed if **[Access Level]** LAC is set to **[Expert]** EPR.

Setting	Description
[OFF] OFF...9,999	Setting range **Factory setting**: OFF

The **[OFF]** OFF value signifies that the pairing password function is inactive.

The **[ON]** ON value signifies that the pairing password function is active and that a password is required to start the drive in the event of a **[Boards Compat]** HCF detected error.

As soon as the password has been entered, the drive is unlocked and the code changes to **[ON]** ON.

Maintenance

Limitation of Warranty

The warranty does not apply if the product has been opened, except by Blemo Electric services.

Servicing

⚠⚠ 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.

The temperature of the products described in this manual may exceed 80 °C (176 °F) during operation.

⚠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 handling it.
- Verify that the heat dissipation is sufficient by performing a test run under maximum load conditions.

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

⚠WARNING

INSUFFICIENT MAINTENANCE

Verify that the maintenance activities described below are performed at the specified intervals.

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

Adherence to the environmental conditions must be ensured during operation of the device. In addition, during maintenance, verify and, if appropriate, correct all factors that may have an impact on the environmental conditions.

	Part concerned	Activity	Interval (1)
Overall condition	All parts such as housing, HMI, control block, connections, etc.	Perform a visual inspection	At least every year
Corrosion	Terminals, connectors, screws, EMC plate	Inspect and clean if required	
Dust	Terminals, fans, enclosures air inlets and air outlets, air filters of cabinet	Inspect and clean if required	
	Floor standing drives filter mats	Inspect	At least every year

	Part concerned	Activity	Interval (1)
		Change	At least every 4 years
Cooling	Wall mounting drives fan	Verify the fan operation	At least every year
		Replace the fan	After 3 to 5 years, depending on the operating conditions
	Floor standing drives fan for power part and eclosure door fan	hours or every 6 years blemo.com.	Every 35000 operating
Fastening	All screws for electrical and mechanical connections	Verify tightening torques	At least every year
(1) Maximum maintenance intervals from the date of commissioning. Reduce the intervals between maintenance to adapt maintenance to the environmental conditions, the operating conditions of the drive, and to any other factor that may influence the operation and/ or maintenance requirements of the drive.			

Spares and Repairs

Serviceable product. Please contact your Customer Care Center on:

www.blemo.com

Long Time Storage

If the drive was not connected to mains for an extended period of time, the capacitors must be 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 specified periods of time. (1)
- 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 first time 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.

(1) Period of time:

- 12 months at a maximum storage temperature of +50°C (+122°F)
- 24 months at a maximum storage temperature of +45°C (+113°F)
- 36 months at a maximum storage temperature of +40°C (+104°F)

If the specified procedure cannot be performed without a Run command 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.

Fan Replacement

It is possible to order a new fan for the drive maintenance, see the catalog numbers on www.blemo.com.

Customer Care Center

For additional support, you can contact our Customer Care Center on:

www.blemo.com

Diagnostics and Troubleshooting

What's in This Part

Warning Codes 529
Error Codes 532

Overview

This chapter describes the various types of diagnostics and provides troubleshooting assistance.

⚠⚠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.

Warning Codes

List of Available Warnings Messages

Setting	Code	Description
[No Warn stored]	NOA	No warning stored.
[Fallback Freq]	FRF	Reaction on event: Fallback frequency.
[Speed Maintained]	RLS	Reaction on event: Speed maintained.
[Type of stop]	STT	Reaction on event: Stop following **[Type of stop]** STT without triggering an error.
[Ref Freq Warn]	SRA	Frequency reference reached.
[Life Cycle Warn 1]	LCA1	Life cycle warning 1 , page 424.
[Life Cycle Warn 2]	LCA2	Life cycle warning 2 , page 424.
[Dry Run Warn]	DRYA	Dry run warning , page 284.
[Low Flow Warn]	LFA	Low flow warning , page 288.
[Low OutPres Warn]	OPLA	Low outlet pressure warning , page 294.
[High OutPres Warn]	OPHA	High outlet pressure warning , page 294.
[PumpCycle warning]	PCPA	Pumpcycle monitoring warning , page 281.
[Pump Low Flow]	PLFA	Pump low flow warning , page 288.
[LowPres Warn]	LPA	Low pressure warning.
[PID error Warn]	PEE	PID error warning , page 261.
[PID Fdbk Warn]	PFA	PID feedback warning , page 253.
[PID High Fdbck Warn]	PFAH	PID feedback high threshold reached , page 253.
[PID Low Fdbck Warn]	PFAL	PID feedback low threshold reached , page 253.
[Regulation Warn]	PISH	PID feedback monitoring warning , page 274.
[AI2 Th Warning]	TP2A	AI2 Thermal warning , page 169.
[AI3 Th Warning]	TP3A	AI3 Thermal warning , page 169.
[AI4 Th Warning]	TP4A	AI4 Thermal warning , page 169.
[AI5 Th Warning]	TP5A	AI5 Thermal warning , page 169.
[AI1 4-20 Warning]	AP1	AI1 4-20 mA loss warning , page 407.
[AI2 4-20 Warning]	AP2	AI2 4-20 mA loss warning , page 407.
[AI3 4-20 Warning]	AP3	AI3 4-20 mA loss warning , page 407.
[AI4 4-20 Warning]	AP4	AI4 4-20 mA loss warning , page 407.
[AI5 4-20 Warning]	AP5	AI5 4-20 mA loss warning , page 407.
[Device Th Warn]	THA	Drive overhearting warning.
[Therm Junction Warn]	TJA	IGBT thermal state warning.
[Fan Counter Warn]	FCTA	Fan counter speed warning , page 428.
[Fan Fdbk Warn]	FFDA	Fan feedback warning , page 428.
[Ext. Error Warn]	EFA	External error warning , page 403.
[UnderV Warn]	USA	Undervoltage warning , page 415.
[Preventive UnderV Active]	UPA	Controlled stop threshold is reached , page 415.
[Forced Run]	ERN	Drive in forced run , page 400.
[Mot Freq High Thd]	FTA	Motor frequency high threshold 1 reached.

Setting	Code	Description
[Mot Freq Low Thd]	FTAL	Motor frequency low threshold 1 reached.
[Mot Freq Low Thd 2]	F2AL	Motor frequency low threshold 2 reached.
[High Speed Reached]	FLA	High speed reached warning.
[Ref Freq High Thd reached]	RTAH	Reference frequency high threshold reached.
[Ref Freq Low Thd reached]	RTAL	Reference frequency low threshold reached.
[2nd Freq Thd Reached]	F2A	Motor frequency high threshold 2 reached.
[Cur Thd Reached]	CTA	Motor current high treshold reached.
[Low Cur Reached]	CTAL	Motor current low threshold reached.
[Proc Undld Warn]	ULA	Process underload warning , page 351.
[Proc Overload Warn]	OLA	Overload warning , page 354.
[Dev Th reached]	TAD	Drive thermal threshold reached, page 421.
[Motor Therm Thd reached]	TSA	Motor thermal threshold reached.
[Power High Thld]	PTHA	Power high threshold reached , page 90.
[Power Low Thld]	PTHL	Power low threshold reached , page 90.
[Cust Warning 1]	CAS1	Customer warning 1 active , page 425.
[Cust Warning 2]	CAS2	Customer warning 2 active , page 426.
[Cust Warning 3]	CAS3	Customer warning 3 active.
[Cust Warning 4]	CAS4	Customer warning 4 active.
[Cust Warning 5]	CAS5	Customer warning 5 active.
[Power Cons Warn]	POWD	Power consumption warning.
[Switch OutPres Warn]	OPSA	Outlet pressure high switch warning , page 294.
[MP Capacity Warn]	MPCA	Multipump available capacity warning , page 230.
[Lead Pump Warn]	MPLA	Lead pump not available warning , page 230.
[Temp Sens AI2 Warn]	TS2A	Temperature sensor AI2 warning (open circuit).
[Temp Sens AI3 Warn]	TS3A	Temperature sensor AI3 warning (open circuit).
[Temp Sens AI4 Warn]	TS4A	Temperature sensor AI4 warning (open circuit).
[Temp Sens AI5 Warn]	TS5A	Temperature sensor AI5 warning (open circuit).
[DC Bus Ripple Warn]	DCRW	DC Bus Ripple Warning , page 190.
[Fallback Channel]	AFFL	Automatic fallback behavior activated after a fieldbus communication interruption.
[Mot2 Therm Thd reached]	TS2	**Motor 2 thermal threshold reached.**
[Mot3 Therm Thd reached]	TS3	**Motor 3 thermal threshold reached.**
[Mot4 Therm Thd reached]	TS4	**Motor 4 thermal threshold reached.**
[Static Port/Serv Warn]	PSSA	**Static port/service warning.**
[Sys. Log. Warning]	SLGA	**System Log Warning.**
[Low Battery Warn]	RBLA	**Low Battery warning.**
[Free PID 1 Low Warn]	CFL1	**Free PID 1 low warning.**
[Config Recover Warn]	CBRA	**Configuration recovery warning.**
[Modbus Com Warn]	SLLA	**Modbus comm interruption warning.**
[Free PID 1 High Warn]	CFH1	**Free PID 1 high warning.**
[Damper Control Warn]	DOA	**Damper control warning.**
[Serv. Access Auth.]	SMSA	**After-Services Access Authorized.**

Setting	Code	Description
[Free PID 2 High Warn]	CFH2	**Free PID 2 high warning.**
[Overload warning]	SPOA	**Overload warning.**
[MS/TP Com Warn]	BLLA	**BACnet MS/TP comm interruption warning.**
[Fieldbus Com Warn]	CLLA	**Fieldbus comm interruption warning.**
[Inhibited Errors Warn]	INH	**Inhibited errors warning.**
[Broken Belt Warn]	BBA	**Broken belt warning.**
[No Battery Warn]	RBNA	**Battery not detected warning.**
[Invalid RTC Warn]	RTCA	**Invalid RTC warning.**
[Disch Warning]	DGW	**Discharge gas warning.**
[Free PID 2 Low Warn]	CFL2	**Free PID 2 low warning.**
[AI Threshold Warning]	TDW	**Analog input threshold warning.**

Error Codes

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Overview

Clearing the Detected Error

This table presents the steps to follow if intervention on the drive system is required:

Step	Action
1	Disconnect all power, including external control power that may be present.
2	Lock all power disconnects in the open position.
3	Wait 15 minutes to allow the DC bus capacitors to discharge (the drive LEDs are not indicators of the absence of DC bus voltage).
4	Measure the voltage of the DC bus between the PA/+ and PC/- terminals to ensure that the voltage is less than 42 Vdc.
5	If the DC bus capacitors do not discharge completely, contact your local blemo representative. Do not repair or operate the drive.
6	Find and correct the cause of the detected error.
7	Restore power to the drive to confirm that the detected error has been rectified.

After the cause has been removed, the detected error can be cleared by:

- Switching off the drive.
- Using the **[Product restart]** RP parameter.
- Using the digital input or the control bit assigned to **[Prod Restart Assign]** RPA.
- Using the **[Auto Fault Reset]** ATR– function.
- A digital input or control bit set to the **[Fault reset]** RST– function.
  - For **[Fault Reset Assign]** RSF and **[Extended Fault Reset]** HRFC refer to **[Fault reset]** RST– Menu.
- Pressing the **OFF/RESET** key on the Display Terminaldepending on the setting of **[Stop Key Enable]** PST.

How To Clear the Error Code?

The following table summarizes the possibilities to clear a detected error after the cause has been removed:

How to clear the error code after the cause has been removed	List of the cleared error
Power reset: • Switch off the drive. • Use the **[Product restart]** RP parameter. • Use the digital input or the control bit assigned to **[Prod Restart Assign]** RPA.	All detected error.
Transient: • As soon as its cause has been removed.	CFF, CFI, CFI2, CFI3, CFI4, CSF, FWER, FWMC, HCF, HPF, INFZ, PGLF, PHF, SPTF, SPFC, USF
Hard Reset: If **[Extended Fault Reset]** HRFC is set to YES: • Use the digital input or the control bit assigned to **[Fault Reset Assign]** RSF , • Press the **STOP/RESET** key on the Display Terminaldepending on the setting of **[Stop Key Enable]** PST. If the parameter **[Extended Fault Reset]** HRFC is set to NO: This detected error requires a power reset.	CRF1, INFD, SCF1
Manual reset: • Use the digital input or the control bit assigned to **[Fault Reset Assign]** RSF. • Pressing the **RESET** button on the HMI panel	ACF1, ACF2, ACF3, ASF, BRBF, SOF, TNF
Automatic restart: • Use the digital input or the control bit assigned to **[Fault Reset Assign]** RSF. • Pressing the **RESET** button on the HMI panel • Use the **[Auto Fault Reset]** ATR– function.	ATDF, BELF, CNF, DGOF, DRYF, DUCF, EPF1, EPF2, FDR2, HFPF, INF9, INFB, LCF, LCHF, LCLF, LFF1, LFF2, LFF3, LFF4, LFF5, MPLF, OBF, OHF, OIMF, OLC, OLF, OPF1, OPF2, OPHF, OPLF, OSF, PCPF, PFMF, PLFF, PSMF, SCF4, SCF5, SLF1, SLF2, SLF3, SPOF, STF, T2CF, T3CF, T4CF, T5CF, TH2F, TH3F, TH4F, TH5F, TJF, ULF

[Angle error] ASF

Angle error

Probable Cause	This error is triggered for synchronous motors control law, during the phase-shift angle measurement. • The motor phase is disconnected. • The motor inductance is too high. • Wrong setting of the speed loop when the reference goes through 0.
Remedy	• Verify the motor phases. • Verify the maximum current allowed by the device. • Verify the speed loop parameters. • Increase the alignment current level using **[Current Level Align]** ACR. • Change **[Angle setting type]** AST selection.
Clearing the Error Code	This detected error can be cleared manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[AI Threshold Error] ATDF

Analog input threshold error

Probable Cause	Analog input value is above the configured threshold.
Remedy	Adjust the configuration of the function (**[AI Threshold Mode]** TDMO, **[AI Threshold Value]** TDT, etc ...)
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[MS/TP Com Interrupt] BELF

BACnet MS/TP Communication interruption

Probable Cause	Communication interruption on the BACnet bus.
Remedy	• Verify the communication settings on the devices (Drive, PLC, switches, repeater...). • Check for duplicate communication addresses. • Verify the environment (electromagnetic compatibility). • Verify the fieldbus wiring (continuity, cable type, grounding, and shielding). • Verify the terminating resistor. • Verify that the value set on **[MS/TP Timeout]** BTLP meets the requirements of your application. • Verify that the **[MS/TP Max Master Nb]** is set to **[MS/TP Address]** + 1. • Refer to the BACnet manual.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[Broken Belt Error] BRBF

Broken belt error

Probable Cause	Measured torque level is below the configured threshold.
Remedy	Please verify the transmission belt on your process.
Clearing the Error Code	This detected error can be cleared manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[Incorrect Config] CFF

Incorrect configuration

Probable Cause	At power on, the device proceeds to a self-test and checks its configuration. If the configuration is not correct, the error **[Incorrect Config]** CFF is triggered. • Option module changed or removed.
Remedy	• Verify that all option modules are inserted correctly into the option module slot. • Verify that there is no detected error on the option module. • Return to factory settings or retrieve the backup configuration if it is valid.
Clearing the Error Code	This detected error is cleared as soon as its cause has been removed.

[Invalid Config] CFI

Invalid configuration

Probable Cause	Invalid configuration. The configuration loaded in the device via the commissioning tool or fieldbus is inconsistent. • Invalid parameter value. • BACnet IP option module is plugged and **[Control Mode]** CHCF is set to **[I/O profile]** IO.
Remedy	• Verify the loaded configuration. • Load a valid configuration.
Clearing the Error Code	This detected error is cleared as soon as its cause has been removed.

[Conf Transfer Error] CFI2

Configuration transfer error

Probable Cause	• The configuration transfer to the device was not successful or interrupted. • The configuration loaded is not compatible with the device.
Remedy	• Verify the configuration loaded previously. • Load a compatible configuration. • Use PC software commissioning tool to transfer a compatible configuration. • Perform a factory setting.
Clearing the Error Code	This detected error is cleared as soon as its cause has been removed.

[Pre-settings Transfer Error] CFI3

Pre-settings transfer error

Probable Cause	The configuration transfer to the device was not successful or interrupted.
Remedy	Contact your local Blemo representative.
Clearing the Error Code	This detected error is cleared as soon as its cause has been removed.

[Empty Config] CFI4

Empty configuration

Probable Cause	The device may contain up to 4 configurations, which can be saved using the **[Save Configuration]** SCSI parameter. Each of these configurations can be activated remotely, enabling adaptation to: • 2 to 4 different motors or mechanisms (multi-motors mode). • 2 to 4 different configurations for a single motor (multi-configurations mode).
Remedy	• Verify the configurations saved. • Switch to a compatible configuration.
Clearing the Error Code	This detected error is cleared as soon as its cause has been removed.

[Fdbus Com Interrupt] CNF

Fieldbus communication interruption

Probable Cause	Communication interruption on fieldbus module. This error is triggered when the communication between the fieldbus module and the manager (PLC) is interrupted.
Remedy	• Verify the communication settings on the devices (Drive, PLC, switches, repeater...). • Check for duplicate communication addresses. • Verify the environment (electromagnetic compatibility). • Verify the fieldbus wiring (continuity, cable type, grounding, and shielding). • Verify the terminating resistor. • Verify the timeout setting. • Replace the option module. • Verify that the value set on **[Bacnet IP Time-Out]** BATT meets the requirements of your application. • Refer to the fieldbus user manual. • Contact your local Blemo representative.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[Cust Supply Error] CPSF

Customer supply error

Probable Cause	The error is triggered if the external 24VDC supply voltage is higher than the maximum DC voltage 30V, or lower than the minimum DC voltage 19V • The external supply is not operating correctly. • The +24V terminal consumption has been greater than 200mA
Remedy	• Verify the external 24VDC supply applied on the +24 terminal. • Verify the current on the +24 terminal. • Verify there is no short circuit between 0 and +24 terminal. • Contact your local Blemo representative.
Clearing the Error Code	This detected error requires a power reset of the device after its cause has been removed.

[Precharge Capa] CRF1

Precharge capacitor

Probable Cause	• Charging circuit control detected error. • Charging circuit damaged. • Supply Mains unstable or too low.
Remedy	• Turn off the device and then turn on again. • Verify the setting of **[DC Bus Source Type]** DCBS. • Verify the mains supply voltage and stability. • Verify the parameters of **[UnderV handling]** USB– menu. • Contact your local Blemo representative.
Clearing the Error Code	● If the parameter **[Extended Fault Reset]** HRFC is set to **[No]** NO : This detected error requires a power reset. ● If the parameter **[Extended Fault Reset]** HRFC is set to **[Yes]** YES : This detected error can be cleared manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[Channel Switch Error] CSF

Channel switching detected error

Probable Cause	An invalid channel has been selected. This error may be triggered if the device has been switched to a configuration which implies an invalid channel.
Remedy	Verify the function parameters.
Clearing the Error Code	This detected error is cleared as soon as its cause has been removed.

[DC Bus Ripple Error] DCRE

DC Bus ripple error

Probable Cause	Persistent ripple detected on the DC bus or DC bus capacitors damaged.
Remedy	• Turn off the device and then turn on again. • Verify the correct behavior of the input filter. • Verify the Supply Mains wirings. • Verify the internal connections. • Contact your local Blemo representative.
Clearing the Error Code	This detected error requires a power reset of the device after its cause has been removed.

[Disch High Error] DGOF

Discharge gas high pressure/temperature error

Probable Cause	Measured pressure or temperature is above the emergency threshold.
Remedy	• Search for a possible cause of overheating or overpressure. • Verify the settings of the monitoring function.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[Dry Run Error] DRYF

Dry run detected error

Probable Cause	The dry run monitoring function has detected an error. **NOTE:** After the error has been triggered, even if the detected error has been cleared, it is not possible to restart the pump before the end of the **[DryRun Restart Delay]** DRYR.
Remedy	• Verify that the pump is well primed. • Verify that there is no air leak in the suction line. • Verify the settings of the monitoring function.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[Damper Control Error] DUCF

Damper control error

Probable Cause	Damper should be opened but is blocked in closed position.
Remedy	• Check if the relay is correctly connected to the damper or if the damper is obstructed. • Verify the feedback signal coming from the damper.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[Ctrl Memory Error] EEF1

Control memory error

Probable Cause	An error of the internal memory of the control electronics has been detected.
Remedy	• Verify the environment (electromagnetic compatibility). • Turn off the device and then turn on again. • Return to factory settings. • Contact your local Blemo representative.
Clearing the Error Code	This detected error requires a power reset of the device after its cause has been removed.

[Pwr Memory Error] EEF2

Power memory error

Probable Cause	An error of the internal memory of the power board has been detected.
Remedy	• Verify the environment (electromagnetic compatibility). • Turn off the device and then turn on again. • Return to factory settings. • Contact your local Blemo representative.
Clearing the Error Code	This detected error requires a power reset of the device after its cause has been removed.

[External Error] EPF1

External detected error

Probable Cause	The error message is displayed if a digital input that has been configured as **[Ext Error assign]** ETF is at active state. • An external error has been triggered by an external device, depending on user. •
Remedy	• Remove the cause of the external error. • Verify the setting of **[Ext Error assign]** ETF parameter. •
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[Fieldbus Error] EPF2

External error detected by Fieldbus

Probable Cause	External detected error from fieldbus module. • Event triggered by an external device, depending on user. • The error is caused by the fieldbus or an application program.
Remedy	• Remove the cause of the external error. • Verify the external circuit in the system which has triggered the error message. • Verify the PLC program which has caused the error message. • Verify the communication parameters. • Monitor with the commissioning software **[Fieldbus Error]** EPF2 parameter.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[FW Update Error] FWER

Firmware Update error

Probable Cause	Firmware update function has detected an error.
Remedy	Contact your local Blemo representative.
Clearing the Error Code	This detected error is cleared as soon as its cause has been removed.

[No Power Comm Error] FWMC

No power communication error

Probable Cause	• Power firmware is invalid or a hardware failure has occurred
Remedy	• Try to restore power firmware • Check the consistency of the STO inputs, and/or power OFF then power ON the product. • If the LEDs Warning/Error and COM are red and yellow, perform a power reset. • If the problem persists, contact your local Blemo representative • Refer to firmware update chapter.
Clearing the Error Code	This detected error is cleared as soon as its cause has been removed.

[Fware Pairing Err] FWPF

Firmware pairing error

Probable Cause	Current firmware configuration is inconsistent.
Remedy	• Restart the product • Perform a firmware pairing • Update the complete firmware of the device. • Refer to firmware update chapter. • If the problem persists, contact your local Blemo representative.
Clearing the Error Code	This detected error is cleared as soon as its cause has been removed.

[Boards Compat] HCF

Boards compatibility

Probable Cause	Hardware configuration error. The **[Pairing password]** PPI parameter has been enabled and an option module has been changed.
Remedy	• Refit the original option module. • Confirm the configuration by entering the **[Pairing password]** PPI if the module was changed deliberately.
Clearing the Error Code	This detected error is cleared as soon as its cause has been removed.

[High Flow Error] HFPF

High flow error

Probable Cause	The high flow monitoring function has detected an error.
Remedy	• Verify that the system works in its flow capabilities. • Verify that there is no pipe burst at the outlet of the system. • Verify the settings of the monitoring function.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[HW Topo Error] HPF

Hardware topology error

Probable Cause	• Product's hardware topology has changed. • Option module has been changed.
Remedy	• Check your hardware configuration.
Clearing the Error Code	This detected error is cleared as soon as its cause has been removed.

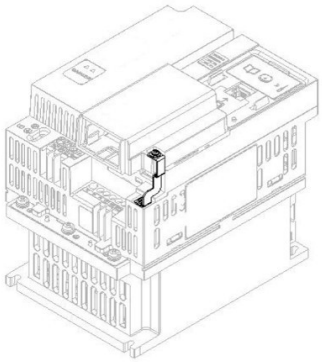
[Egy Saving Exit Error] IDLF

Idle mode exit error

Probable Cause	The device is still in **[Energy Saving]** IDLE mode after receiving a Start command, even though **[Egy Saving Timeout]** IDLT has elapsed. • The condition to leave **[Energy Saving]** IDLE state is not fulfilled.
Remedy	• Verify the Supply Mains/contactor/device wiring (undervoltage, overvoltage, open circuit). • Verify that the timeout **[Egy Saving Timeout]** IDLT is not too short.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[Internal Link Error] ILF

Internal communication interruption with option module

Probable Cause	Communication interruption between option module and the device.
Remedy	• Verify the environment (electromagnetic compatibility). **NOTE:** In case of unintended **[Internal Link Error]** ILF error triggering caused by EMC disturbance, when using BACnet IP VW3A3726 module and module adapter VW3A36001, replace the grounding plate used for the ground connection between the module adapter and the ground with a cable of 2.5 mm² (AWG 14) and with a cable length of 10 cm (3.94 in).  • Verify the connections. • Replace the option module. • Contact your local Blemo representative.
Clearing the Error Code	This detected error requires a power reset of the device after its cause has been removed.

[Internal Error 0] INF0

Internal error 0 (IPC)

Probable Cause	Internal control electronics CPU error. • Communication interruption between microprocessors of the control board. • The power board rating is not valid.
Remedy	• Turn off the device and then turn on again. • Contact your local Blemo representative.
Clearing the Error Code	This detected error requires a power reset of the device after its cause has been removed.

[Internal Error 1] INF1

Internal error 1 (Rating)

Probable Cause	• If a component is not compatible with the hardware configuration, the error **[Internal Error 1]** INF1 is triggered. • The power board rating is not valid.
Remedy	Contact your local Blemo representative.
Clearing the Error Code	This detected error requires a power reset of the device after its cause has been removed.

[Internal Error 2] INF2

Internal error 2 (Soft)

Probable Cause	The power board is incompatible with the control electronics software. • The Power board was replaced by a spare part and is not set to the correct power rating.
Remedy	• Turn off the device and then turn on again. • Contact your local Blemo representative.
Clearing the Error Code	This detected error requires a power reset of the device after its cause has been removed.

[Internal Error 3] INF3

Internal error 3 (Intern Comm)

Probable Cause	Internal communication detected error.
Remedy	• Verify the wiring on device control terminals (internal 10V supply for analog inputs overloaded). • Contact your local Blemo representative.
Clearing the Error Code	This detected error requires a power reset of the device after its cause has been removed.

[Internal Error 4] INF4

Internal error 4 (Manufacturing)

Probable Cause	Internal data inconsistent.
Remedy	Contact your local Blemo representative.
Clearing the Error Code	This detected error requires a power reset of the device after its cause has been removed.

[Internal Error 6] INF6

Internal error 6 (Option)

Probable Cause	• The option module installed in the device is not recognized. • The removable control terminal modules (if existing) are not present or not recognized. • The embedded Ethernet adapter (if existing) is not recognized. • The device firmware is not compatible with the option module. • Option module corrupted due to multiple firmware updates.
Remedy	• Verify the catalog number and compatibility of the option module. • Plug the removable control terminal modules after the device has been switched off. • Update the device firmware. • Contact your local Blemo representative.
Clearing the Error Code	This detected error requires a power reset of the device after its cause has been removed.

[Internal Error 7] INF7

Internal error 7 (Init)

Probable Cause	Communication interruption with CPLD component of the control board.
Remedy	Contact your local Blemo representative.
Clearing the Error Code	This detected error requires a power reset of the device after its cause has been removed.

[Internal Error 8] INF8

Internal error 8 (Switching Supply)

Probable Cause	The internal power supplies of the control electronics are monitored, if one is out of range the INF8 error is triggered.
Remedy	Contact your local Blemo representative.
Clearing the Error Code	This detected error requires a power reset of the device after its cause has been removed.

[Internal Error 9] INF9

Internal error 9 (Measure)

Probable Cause	An error on the current circuit measurement has been detected.
Remedy	Contact your local Blemo representative.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[Internal Error 11] INFB

Internal error 11 (Temperature)

Probable Cause	Internal temperature sensors are monitored for short circuit or open circuit. If a short circuit / open circuit is detected, the INFB error is triggered. The internal device thermal sensor is not operating correctly.
Remedy	Contact your local Blemo representative.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[Internal Error 12] INFC

Internal error 12 (Internal current supply)

Probable Cause	The INFC error is triggered when the current sensor supply monitoring has detected a low level on the current sensor supply.
Remedy	Contact your local Blemo representative.
Clearing the Error Code	This detected error requires a power reset of the device after its cause has been removed.

[Internal Error 13] INFD

Internal error 13 (Diff current)

Probable Cause	Differential current deviation on parallel inverter bricks/power modules.
Remedy	Verify connection of DigiLink cable (orange GG45). Verify connections between inverter brick/power module outputs and device output terminals.
Clearing the Error Code	• If the parameter **[Extended Fault Reset]** HRFC is set to **[No]** NO : This detected error requires a power reset. • If the parameter **[Extended Fault Reset]** HRFC is set to **[Yes]** YES : This detected error can be cleared manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[Internal Error 14] INFE

Internal error 14 (CPU)

Probable Cause	Internal microprocessor detected error.
Remedy	• Verify that the error code can be cleared. • Contact your local Blemo representative.
Clearing the Error Code	This detected error requires a power reset of the device after its cause has been removed.

[Internal Error 15] INFF

Internal error 15 (Flash)

Probable Cause	Serial memory flash format error.
Remedy	Contact your local Blemo representative.
Clearing the Error Code	This detected error requires a power reset of the device after its cause has been removed.

[Internal Error 16] INFG

Internal error 16 (IO module - relay)

Probable Cause	Option module error. • Communication interruption of the output relays option module. • Internal error of the output relays option module.
Remedy	• Verify that the option module is correctly connected to the control electronics. • Replace the option module. • Contact your local Blemo representative.
Clearing the Error Code	This detected error requires a power reset of the device after its cause has been removed.

[Internal Error 17] INFH

Internal error 17 (IO module - Standard)

Probable Cause	Extension module error. • Communication interruption with the extension module of digital & analog I/O. • Internal error of the extension module of digital & analog I/O.
Remedy	• Verify that the option module is correctly connected to the control electronics. • Replace the option module. • Contact your local Blemo representative.
Clearing the Error Code	This detected error requires a power reset of the device after its cause has been removed.

[Internal Error 21] INFL

Internal error 21 (RTC)

Probable Cause	Internal Real Time Clock error. • Communication interruption between the Graphic Display Terminal and the device. • Clock oscillator error.
Remedy	• Update the firmware. • Replace the Graphic Display Terminal. • Contact your local Blemo representative.
Clearing the Error Code	This detected error requires a power reset of the device after its cause has been removed.

[Internal Error 25] INFP

Internal error 25 (Incompatibility CB & SW)

Probable Cause	Incompatibility between the control board hardware version and firmware version.
Remedy	• Update the firmware package. • Contact your local Blemo representative.
Clearing the Error Code	This detected error requires a power reset of the device after its cause has been removed.

[Internal Error 27] INFR

Internal error 27 (Diagnostics CPLD)

Probable Cause	Diagnostics in CPLD have detected an error.
Remedy	Contact your local Blemo representative.
Clearing the Error Code	This detected error requires a power reset of the device after its cause has been removed.

[Internal Error 35] INFZ

Internal error 35 (Invalid firmware version)

Probable Cause	Invalid firmware version.
Remedy	• Update product firmware with an official version from EcoStruxure Automation Device Maintenance or SoMove. • Contact your local Blemo representative.
Clearing the Error Code	This detected error is cleared as soon as its cause has been removed.

[Input Contactor] LCF

input contactor

Probable Cause	Sequences allowed in the time window.
Remedy	• Verify the wiring between the Supply Mains, the contactor/breaker and device. • Verify that the Supply Mains is present upstream of the contactor/breaker. • Verify the input contactor/breaker and its wiring. • Verify the **[Mains V. time out]** LCT timeout setting. • Verify the input contactor/breaker configuration.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[High Level Error] LCHF

High level error

Probable Cause	The maximum level switch is active during filling process.
Remedy	• Verify the parameter **[Max Lvl Switch Assign]** LCWH. • Verify the state of the corresponding device digital input and its wiring.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[Low Level Error] LCLF

Low level error

Probable Cause	The minimum level switch is active during emptying process.
Remedy	• Verify the parameter **[Min Lvl Switch Assign]** LCWL. • Verify the state of the corresponding device digital input and its wiring.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[AI1 4-20 mA loss] LFF1

AI1 4-20 mA loss

Probable Cause	Loss of the 4-20 mA on analog input AI1. This error is triggered when the analog input current is below the minimum threshold value.
Remedy	• Verify the connection on the analog inputs. • Verify the setting of **[AI1 4-20mA loss]** LFL1 parameter.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[AI2 4-20mA loss] LFF2

AI2 4-20mA loss

Probable Cause	Loss of the 4-20 mA on analog input AI2. This error is triggered when the analog input current is below the minimum threshold value.
Remedy	• Verify the connection on the analog inputs. • Verify the setting of **[AI2 4-20mA loss]** LFL2 parameter.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[AI3 4-20mA loss] LFF3

AI3 4-20mA loss

Probable Cause	Loss of the 4-20 mA on analog input AI3. This error is triggered when the analog input current is below the minimum threshold value.
Remedy	• Verify the connection on the analog inputs. • Verify the setting of **[AI3 4-20mA loss]** LFL3 parameter.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[AI4 4-20mA loss] LFF4

AI4 4-20mA loss

Probable Cause	Loss of the 4-20 mA on analog input AI4. This error is triggered when the analog input current is below the minimum threshold value.
Remedy	• Verify the connection on the analog inputs. • Verify the setting of **[AI4 4-20mA loss]** LFL4 parameter.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[AI5 4-20 mA loss] LFF5

AI5 4-20 mA loss

Probable Cause	Loss of the 4-20 mA on analog input AI5. This error is triggered when the analog input current is below the minimum threshold value.
Remedy	• Verify the connection on the analog inputs. • Verify the setting of **[AI5 4-20mA loss]** LFL5 parameter.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[Lead Pump Error] MPLF

Lead pump not available

Probable Cause	The selected lead pump is not available while in run.
Remedy	Verify the state of the corresponding drive digital input for the pump availability information (for example **[Pump 1 Ready Assign]** MPI1 for the pump 1).
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[DC Bus OverV] OBF

DC bus overvoltage

Probable Cause	The DC bus voltage is too high. • Deceleration time too short or driving load too high. • Mains voltage too high. • Phase loss
Remedy	• Increase the deceleration time. • Configure the **[Dec.Ramp Adapt]** BRA function if it is compatible with the application. • Verify the Mains voltage.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[Overcurrent] OCF

Overcurrent

Probable Cause	Overcurrent limitation is reached. • Parameters in the **[Motor data]** MOA– menu are not correct. • Inertia or load too high. • Mechanical locking. • Motor autotuned values does not match with the motor connected.
Remedy	• Verify the motor parameters. • Verify the size of the motor/drive/load. • Verify the state of the mechanism. • Decrease **[Current Limitation]** CLI. • Increase the switching frequency. • Proceed to the motor autotuning.
Clearing the Error Code	This detected error requires a power reset of the device after its cause has been removed.

[Device Overheat] OHF

Device overheating

Probable Cause	Device temperature too high. • Ambient temperature too high. • Reduced air flow due to blocked air at the inlet or outlet. • One of the fans does not work properly.
Remedy	• Verify the device ventilation and the ambient temperature. • Clean the heat sink. • Clean the inlet filter. • Verify the air flow. • Verify the fans. • Verify the motor load according to the environmental conditions. • Verify the external 48V power supply function (if applicable). Wait for the device to cool down before restarting.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[Oiling Speed Err] OIMF

Oiling speed not reached error

Probable Cause	Motor did not reach the expected frequency during the oiling sequence.
Remedy	Increase the value of **[Oiling Time]** OMOT
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[Process Overload] OLC

Process overload

Probable Cause	Process overload. • Mechanical root cause in the application. • Changed load cycle situation of the application.
Remedy	• Verify and remove the cause of the overload. • Verify the parameters of the **[Process overload]** OLD– function.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[Motor Overload] OLF

Motor overload

Probable Cause	This error is triggered when an excessive motor current has been detected. The **[Motor Overload]** OLF threshold is set to 118 % of the **[Motor Therm State]** THR.
Remedy	• Verify the setting of the motor thermal monitoring. • Verify the motor load. Wait for the motor to cool down before restarting. • Verify the setting of the following parameters: ◦ **[Motor Th Current]** ITH ◦ **[Motor Thermal Mode]** THT ◦ **[Motor Therm Thd]** TTD ◦ **[MotorTemp ErrorResp]** OLL • Verify the parameter **[OutPhaseLoss Delay]** ODT value.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[Single out ph loss] OPF1

Single output phase loss

Probable Cause	Loss of one phase at device output.
Remedy	Verify the wiring from the device to the motor.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[Output Ph Loss] OPF2

Output phase loss

Probable Cause	Loss of three phases at device output. • Motor not connected or motor power too low. • Output contactor opened. • Instantaneous instability in the motor current.
Remedy	• Verify the wiring from the device to the motor, including the tightening of the connections (refer to the related installation manual). • If an output contactor is being used, set **[OutPhLoss Assign]** OPL to **[No Error]** OAC. • If the device is connected to a low-power motor or not connected to a motor: In factory settings mode, motor phase loss detection is active **[OutPhLoss Assign]** OPL = **[OPF Error]** YES . Deactivate motor phase loss detection **[OutPhLoss Assign]** OPL = **[Function Inactive]** NO. • Verify and optimize the following parameters: **[IR compensation]** UFR, **[Nom Motor Voltage]** UNS and **[Nom Motor Current]** NCR and perform **[Autotuning]** TUN .
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[Out Pressure High] OPHF

Outlet pressure high

Probable Cause	The outlet pressure monitoring function has detected a high-pressure error.
Remedy	• Search for a possible cause of high pressure at the outlet of system. • Verify the settings of the monitoring function.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[Out Pressure Low] OPLF

Outlet pressure low

Probable Cause	The outlet pressure monitoring function has detected a low-pressure error.
Remedy	• Verify that there is no pipe broken at the outlet of the system. • Search for a possible cause of low pressure at the outlet of system. • Verify the settings of the monitoring function.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[Supply Mains OverV] OSF

Supply mains overvoltage

Probable Cause	This error is triggered when the device is not running, and the DC bus voltage exceeds the maximum value allowed by the device. • Supply Mains voltage too high.
Remedy	Verify the Mains voltage.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[PumpCycle start Error] PCPF

Pump cycle start error

Probable Cause	The Pumpcycle monitoring function has exceeded the maximum number of start sequences allowed in the time window.
Remedy	• Search for a possible cause of repetitive start of system. • Verify the hydraulic system the pump is allocated. • Verify the settings of the monitoring function (**[Pumpcycle monitoring]** CSP– Menu).
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[PID Fdbk Error] PFMF

PID feedback detected error

Probable Cause	The PID feedback error was out of the allowed range around the set point during the time window.
Remedy	• Check for mechanical breakdown of pipes. • Check for water leakage. • Check for open discharge valve. • Check for fire hydrant opened. • Verify the settings of the monitoring function.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[Prog Load Error] PGLF

Program loading detected error

Probable Cause	Verify that the error code can be cleared with a power reset.
Remedy	Contact your local Blemo representative.
Clearing the Error Code	This detected error is cleared as soon as its cause has been removed.

[Prog Run Error] PGRF

Program running detected error

Probable Cause	Verify that the error code can be cleared with a power reset.
Remedy	Contact your local Blemo representative.
Clearing the Error Code	This detected error requires a power reset of the device after its cause has been removed.

[Input Phase Loss] PHF

Input phase loss

Probable Cause	• Device incorrectly supplied or a tripped fused. • One mains input or more phases are unavailable. • 3-phase device used on a single-phase Supply Mains. • Unbalanced load.
Remedy	• Verify the wiring from the mains to the device, including the tightening of the connections (refer to the related installation manual). • Verify the fuses and the power connection. • Use a 3-phase Supply Mains.
Clearing the Error Code	This detected error is cleared as soon as its cause has been removed.

[Pump Low Flow Error] PLFF

Pump low flow detected error

Probable Cause	The pump low flow monitoring function has detected an error.
Remedy	• Verify valve is closed on discharge. • Pipes are damaged on the discharge. • Search for a possible cause of low flow at the outlet of system. • Verify the settings of the monitoring function.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[Prestart Speed Error] PSMF

Prestart speed not reached error

Probable Cause	Motor did not reach the expected frequency after the configured delay.
Remedy	Verify the settings of the function and adjust the delays if needed.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[Safety Func Error] SAFF

Safety function detected error

Probable Cause	• Debounce time (signal stabilization) exceeded. • Internal hardware error. • STOA and STOB have a different status (high/low) for more than 1 second.
Remedy	Verify the wiring of the digital inputs STOA and STOB, and the +24 Vdc output (continuity, cable type, grounding, and shielding). For more details on the maximum cable length, refer to the related installation manual.
Clearing the Error Code	This detected error requires a power reset of the device after its cause has been removed.

[Motor short circuit] SCF1

Motor short circuit

Probable Cause	The monitoring function of the device has detected a short circuit between the phase outputs or a phase to the ground.
Remedy	• Verify the cables connecting the device to the motor, and the motor insulation. • Adjust the switching frequency. • Connect chokes in series with the motor.
Clearing the Error Code	● If the parameter **[Extended Fault Reset]** HRFC is set to **[No]** NO : This detected error requires a power reset. ● If the parameter **[Extended Fault Reset]** HRFC is set to **[Yes]** YES : This detected error can be cleared manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[Ground Short Circuit] SCF3

Ground short circuit

Probable Cause	• Significant ground leakage current at the device output. • Short circuit or grounding at the inverter output. • Short circuit on a motor with long cable. • Insulation error in the motor or in the cable. • High resistance at the motor connection.
Remedy	• Verify the cables connecting the device to the motor, and the motor insulation. • Adjust the switching frequency. • Connect chokes in series with the motor. • In case of long motor cables, verify the setting of **[Grd Fault Activation]** GRFL. • Contact your local Blemo representative.
Clearing the Error Code	This detected error requires a power reset of the device after its cause has been removed.

[IGBT Short Circuit] SCF4

IGBT short circuit

Probable Cause	Power component detected error. At product power-on, the IGBTs are tested for short circuit. Thereby an error (short circuit or interruption) has been detected on at least one IGBT.
Remedy	• Contact your local Blemo representative.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[Mot Short Circuit] SCF5

Motor short circuit

Probable Cause	Short-circuit at device output.
Remedy	• Verify the setting of **[Out Short Circuit Test]** STRT parameter. • Verify the cables connecting the device to the motor, and the motor's insulation. • Contact your local Blemo representative.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[Mdb Com Interrupt] SLF1

Modbus communication interruption

Probable Cause	Communication interruption on the Modbus port if the command and/or reference value is given by Modbus.
Remedy	• Verify the Modbus communication wiring. • Verify the Modbus communication parameter settings. • Verify the timeout. • Refer to the Modbus user manual.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[PC Com Interrupt] SLF2

PC communication interruption

Probable Cause	Communication interruption with the commissioning software. This error is triggered when the command or reference value are given using the commissioning software.
Remedy	• Verify the commissioning software connecting cable. • Verify the timeout.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[HMI Com Interruption] SLF3

HMI communication interruption

Probable Cause	Communication interruption with the Graphic display terminal. This error is triggered when the command or reference value are given using the Graphic Display Terminal and if the communication is interrupted during more than 2 seconds.
Remedy	• Verify the Graphic display terminal connection. • Verify that the cable length does not exceed 10 m.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[Motor Overspeed] SOF

Motor overspeed

Probable Cause	A too high-speed has been detected, based on the estimated speed, depending on the settings. • Invalid configuration of speed loop parameters (**[Inertia Factor]** SPGU, **[Speed time integral]** SIT, **[Speed prop. gain]** SPG ...) • Instability or driving load too high. • If a downstream contactor is used, the contacts between the motor and the drive have not been closed before applying a Run command. • The overspeed threshold (corresponding to 110 % of **[Max Frequency]** TFR) has been reached.
Remedy	• Verify the settings of Speed Loop parameters. • Verify the motor parameter settings. • Verify the size of the motor/drive/load. • Verify and close the contacts between the motor and the drive before applying a RUN command. • Verify the consistency between **[Max Frequency]** TFR and **[High Speed]** HSP. It is recommended to have at least **[Max Frequency]** TFR ≥ 110% * **[High Speed]** HSP.
Clearing the Error Code	This detected error can be cleared manually with the **[Fault Reset Assign]** parameter after its cause has been removed.

[Security Files Corrupt] SPFC

Security files corrupt

Probable Cause	Security file corrupted or missing.
Remedy	• Connect a display terminal to your device, if not already connected. The error code is displayed. Press **OK** and select a cybersecurity profile.
Clearing the Error Code	This detected error is cleared as soon as its cause has been removed.

[Overload Error] SPOF

Overload error

Probable Cause	The load is too high
Remedy	• Verify the settings of the function • Verify that the load is suitable for the drive
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[Sec Policy Update Err] SPTF

Security policy update error

Probable Cause	Security policy transfer error, invalid security configuration.
Remedy	• Check the security policy to transfer and transfer it again. • Check the connection.
Clearing the Error Code	This detected error is cleared as soon as its cause has been removed.

[Motor Stall Error] STF

Motor stall detected error

Probable Cause	The stall monitoring function has detected an error. The **[Motor Stall Error]** STF is triggered on the following conditions: • The output frequency is smaller than the stalling frequency **[Stall Frequency]** STP3, • The output current is higher than the stalling current **[Stall Current]** STP2, • For a duration longer than the stalling time **[Stall Max Time]** STP1.
Remedy	• Search for a mechanical blocking of the motor. • Search for a possible cause of motor overload. • Verify the settings of the monitoring function.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[AI2 Th Sensor Err] T2CF

Thermal sensor error on AI2

Probable Cause	The thermal monitoring function has detected an error of the thermal sensor connected to the analog input AI2: • Open circuit, or • Short circuit.
Remedy	• Verify the sensor and its wiring. • Replace the sensor. • Verify the setting of **[AI2 Type]** AI2T parameter.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[AI3 Th Sensor Err] T3CF

Thermal sensor error on AI3

Probable Cause	The thermal monitoring function has detected an error of the thermal sensor connected to the analog input AI3: • Open circuit, or • Short circuit.
Remedy	• Verify the sensor and its wiring. • Replace the sensor. • Verify the setting of **[AI3 Type]** AI3T parameter.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[AI4 Th Sensor Err] T4CF

Thermal sensor error on AI4

Probable Cause	The thermal monitoring function has detected an error of the thermal sensor connected to the analog input AI4: • Open circuit, or • Short circuit.
Remedy	• Verify the sensor and its wiring. • Replace the sensor. • Verify the setting of **[AI4 Type]** AI4T parameter.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[AI5 Th Sensor Err] T5CF

Thermal sensor error on AI5

Probable Cause	The thermal monitoring function has detected an error of the thermal sensor connected to the analog input AI5: • Open circuit, or • Short circuit.
Remedy	• Verify the sensor and its wiring. • Replace the sensor. • Verify the setting of **[AI5 Type]** AI5T parameter.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[AI2 Th Level Error] TH2F

AI2 thermal level error

Probable Cause	The thermal sensor monitoring function has detected a high temperature on analog input AI2.
Remedy	• Search for a possible cause of overheating. • Verify the settings of the monitoring function.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[AI3 Th Level Error] TH3F

AI3 thermal level error

Probable Cause	The thermal sensor monitoring function has detected a high temperature on analog input AI3.
Remedy	• Search for a possible cause of overheating. • Verify the settings of the monitoring function.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[AI4 Th Level Error] TH4F

AI4 thermal level error

Probable Cause	The thermal sensor monitoring function has detected a high temperature on analog input AI4.
Remedy	• Search for a possible cause of overheating. • Verify the settings of the monitoring function.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[AI5 Th Level Error] TH5F

AI5 thermal level error

Probable Cause	The thermal sensor monitoring function has detected a high temperature on analog input AI5.
Remedy	• Search for a possible cause of overheating. • Verify the settings of the monitoring function.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[Device Overheat] TJF

Device overheating

Probable Cause	The thermal junction monitoring function helps to prevent the IGBT from junction over temperature. • Device power stage overheating.
Remedy	• Verify the device ventilation and the ambient temperature. • Reduce the switching frequency. • Increase **[Acceleration]** ACC value • Decrease the load • Change to a drive with a higher rating
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[Autotuning Error] TNF

Autotuning detected error

Probable Cause	An error has been triggered during a motor autotune. • Special motor or motor whose power is not suitable for the drive. • Motor not connected to the drive. • Motor not stopped. • For a tune in rotation, the motor has been stopped prematurely. • The configuration of the drive (including the configuration of the tune in rotation) does not fit the use of tune in rotation with your application. • The motor cannot operate correctly during a tune in rotation. • Autotuning with long motor cables. • A low value of **[Autotune L d-axis]** LDS and **[Autotune L q-axis]** LQS.
Remedy	• Verify that the motor/device are compatible. • Verify that the motor is connected to the device during autotuning. • If an output contactor is being used, verify that it is closed during autotuning. • Verify that the motor is present and stopped during autotuning. • In case of error detected during a tune in rotation: ◦ Verify the run order remain active all along the tune in rotation. ◦ Increase **[Acceleration]** ACC and **[Deceleration]** DEC. They must not be set to value close to 0 s. ◦ If **[Nb Of Repetitions]** TNBR is different from 1, decrease **[2nd Id max current]** IDH2. ◦ If **[Nb Of Repetitions]** TNBR is different from 1, increase **[2nd Id min current]** IDL2. ◦ If possible, remove the load of the motor. ◦ Set back **[Rotation Tune Freq]** TLFR to **[Nominal Motor Freq]** FRS. • If the error continues to be triggered, decrease **[Rotation Tune Freq]** TLFR. • If possible, decrease **[Nb Of Repetitions]** TNBR. • Increase **[Autotune L d-axis]** LDS and **[Autotune L q-axis]** LQS to a value equal to 5 times their defaults values.
Clearing the Error Code	This detected error can be cleared manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[Proc Underload] ULF

Process underload

Probable Cause	Process underload. • Mechanical root cause in the application. • Changed load cycle situation of the application.
Remedy	• Verify and remove the cause of the underload. • Verify the parameters of the **[Process underload]** ULD– function.
Clearing the Error Code	This detected error can be cleared with the **[Auto Fault Reset]** ATR or manually with the **[Fault Reset Assign]** RSF parameter after its cause has been removed.

[Supply Mains UnderV] USF

Supply mains undervoltage

Probable Cause	The measured DC bus voltage is lower than the rated voltage of the Supply Mains **[Mains voltage]** URES configured: • Supply Mains power too weak.
Remedy	Verify the RMS inptut voltage and the parameters of **[Undervoltage Resp]** USB.
Clearing the Error Code	This detected error is cleared as soon as its cause has been removed.

FAQ

Introduction

If the display does not light up, verify the supply mains to the drive.

The assignment of the fast stop or freewheel functions help to prevent the drive starting if the corresponding digital inputs are not switched on. The drive then displays NST in freewheel stop andFST in fast stop. This is a normal behavior since these functions are active at zero so that the drive is stopped if there is a wire break.

Verify that the run command input is activated in accordance with the selected control mode (**[2/3-Wire Control]** TCC and **[2-wire type]** TCT parameters).

If the reference channel or command channel is assigned to a fieldbus, when the supply mains is connected, the drive displays NST. It remains in stop mode until the fieldbus gives a command.

Drive lock in blocking state

The drive is locked in a blocking state and displays NST, if a Run command such as Run forward, Run reverse, DC injection is still active during:

- A product reset to the factory settings,
- A manual "Fault Reset" using **[Fault Reset Assign]** RSF,
- A manual "Fault Reset" by applying a product switched off and on again,
- A stop command given by a channel that is not the active channel command (such as Stop key of the display terminal in 2/3 wires control),

It will be necessary to deactivate all active Run commands prior to authorizing a new Run command.

Option Module Changed or Removed

When an option module is removed or replaced by another, the drive locks in **[Incorrect configuration]** CFFerror mode at power-on. If the option module has been deliberately changed or removed, the detected error can be cleared by pressing the **OK** key twice, which causes the factory settings to be restored for the parameter groups affected by the option module.

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 configuration]** CFFerror mode at power-on. If the control block has been deliberately changed, the detected error can be cleared by pressing the **OK** key twice, which **causes all the factory settings to be restored.**

Glossary

D

Display terminal :

The display terminal menus are shown in square brackets.

For example: **[Communication]**

The codes are shown in round brackets.

For example: COM-

Parameter names are displayed on the display terminal in square brackets.

For example: **[Fallback Speed]**

Parameter codes are displayed in round brackets.

For example: LFF

E

Error :

Discrepancy between 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 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.

Fault:

Fault is an operating state. If the monitoring functions detect an 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 pertinent standards such as IEC 61800-7, ODVA Common Industrial Protocol (CIP).

M

Monitoring function:

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

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 information: IEC 60364-4-41

PLC:

Programmable logic controller

Power stage:

The power stage 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 error that was detected by a monitoring function. A warning does not cause a transition of the operating state.

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As standards, specifications, and design change from time to time, please ask for confirmation of the information given in this publication.

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