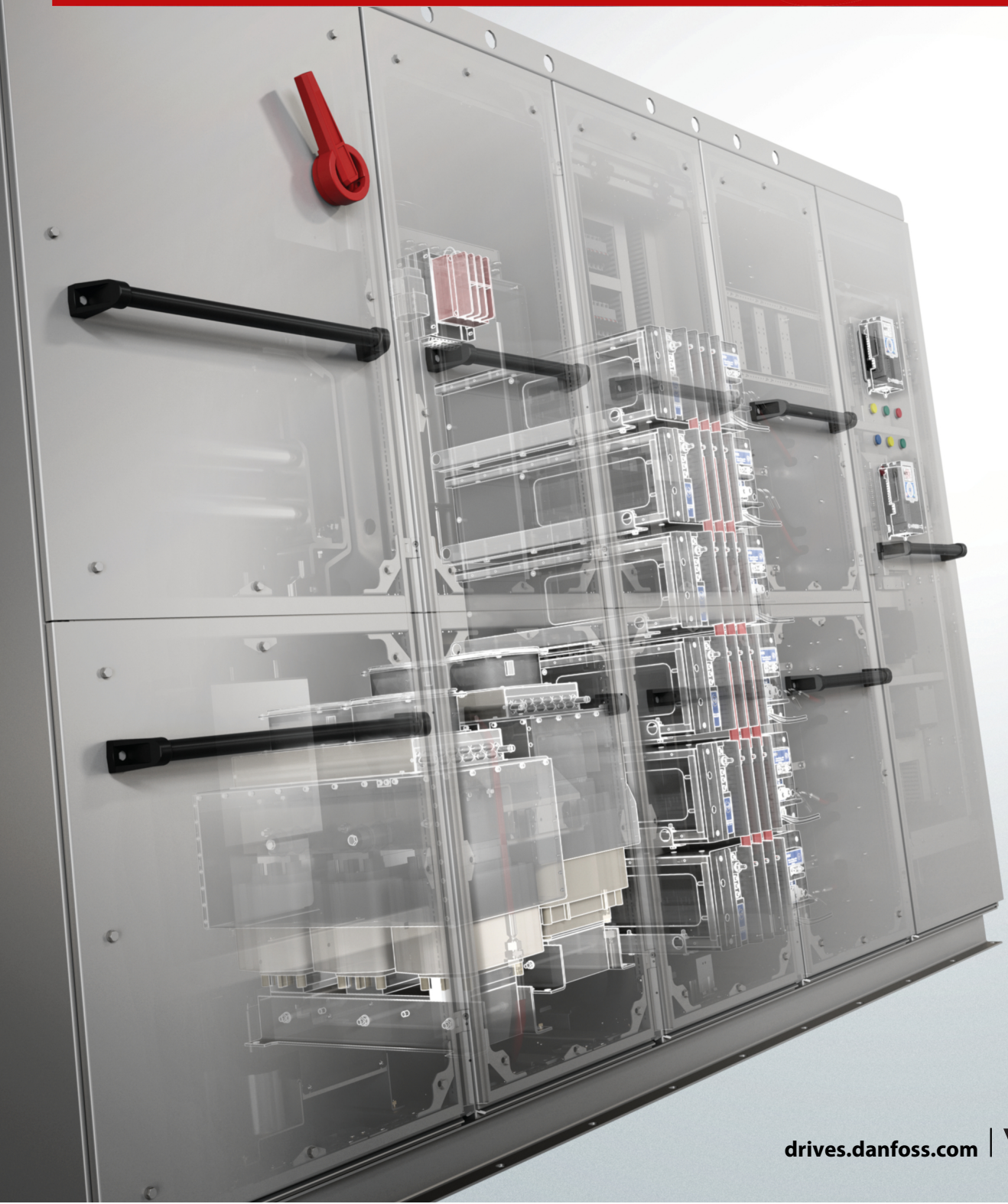
ENGINEERING
TOMORROW

Application Guide

VACON® 3000



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1 Introduction

1.1 Purpose of this Application Guide

This Application Guide provides information for configuring the system, controlling the AC drive, accessing parameters, programming, and troubleshooting of the AC drive. It is intended for use by qualified personnel. Read and follow the instructions to use the drive safely and professionally. Pay particular attention to the safety instructions and general warnings that are provided in this manual and other documentation delivered with the drive.

1.2 Guide and Software Version

This guide is regularly reviewed and updated. All suggestions for improvement are welcome.

The original language of this guide is English.

Table 1: Guide and Software Version

Guide version	Software version
DPD01822B	FW3000V006

1.3 Additional Resources

Other resources are available to understand advanced AC drive functions and operation.

- The VACON® 3000 Design Guide provides technical information to understand the capabilities of the VACON® 3000 Drive Kit for integration into motor control and monitoring systems.
- The VACON® 3000 Operating Guides provide detailed information for the installation, commissioning, and start-up of the drive.
- The operating and installation guides for VACONÆoptions give detailed information about specific drive options.

Supplementary publications and manuals are available from Danfoss. See www.danfoss.com for listings.

1.4 Parameter Table Reading Guide

This manual includes a large quantity of parameter tables. These instructions tell you how to read the tables.

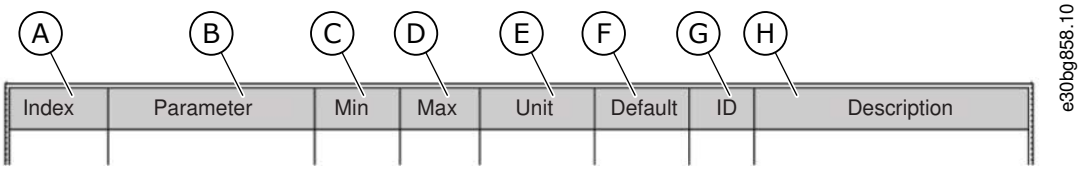


Illustration 1: Parameter Table Reading Guide

A	The location of the parameter in the menu, that is, the parameter number.	E	The unit of the value of the parameter. The unit shows if it is available.
B	The name of the parameter.	F	The value that was set in the factory.
C	The minimum value of the parameter.	G	The ID number of the parameter.
D	The maximum value of the parameter.	H	A short description of the values of the parameter and/or its function.

1.5 Start-up Quick Guide

The start-up wizard makes the commissioning of the drive easy and reduces the manual work with the parameters. It is also possible to edit these parameters later.

1.5.1 Start-Up Wizard for INU

The start-up wizard tells you to give necessary data for the drive to control your procedure.

Procedure

1. Select language (P6.1).

   If a battery is installed, the steps 2–5 are shown.

2. Set daylight saving time (P5.5.5). (Russia, US, EU, or OFF)
3. Set time (P5.5.2).
4. Set year (P5.5.4).
5. Set date (P5.5.3).
6. Run start-up wizard?

   If the selection is No, the start-up wizard ends.

7. Set a value for P3.1.2.2 Motor Type (so that it agrees with the nameplate).
8. Set a value for P3.1.1.1 Motor Nominal Voltage (so that it agrees with the nameplate).
9. Set a value for P3.1.1.2 Motor Nominal Frequency (so that it agrees with the nameplate).
10. Set a value for P3.1.1.3 Motor Nominal Speed (so that it agrees with the nameplate).
11. Set a value for P3.1.1.4 Motor Nominal Current.
12. Set a value for P3.1.1.5 Motor Cos Phi.
13. Set a value for P3.3.1.1 Minimum Frequency Reference.
14. Set a value for P3.3.1.2 Maximum Frequency Reference.
15. Set a value for P3.4.1.2 Acceleration Time 1.
16. Set a value for P3.4.1.3 Deceleration Time 1.

After these selections, the start-up wizard is completed. To start the start-up wizard again, go to the parameter B6.5.1 Restore Factory Defaults.

1.5.2 Start-Up Wizard for AFE

The start-up wizard tells you to give necessary data for the drive to control your procedure.

Procedure

1. Select language (P6.1).

   If a battery is installed, the steps 2–5 are shown.

2. Set daylight saving time (P5.5.5). (Russia, US, EU, or OFF)
3. Set time (P5.5.2).
4. Set year (P5.5.4).
5. Set date (P5.5.3).

After these selections, the start-up wizard is completed. To start the start-up wizard again, go to the parameter B6.5.1 Restore Factory Defaults.

2 User Interfaces

2.1 Description of the Control Panel

2.1.1 Control Panel and the Keypad

The control panel is the interface between the AC drive and the user. With the control panel, you can control the speed of a motor and monitor the status of the AC drive. You can also set the parameters of the AC drive.

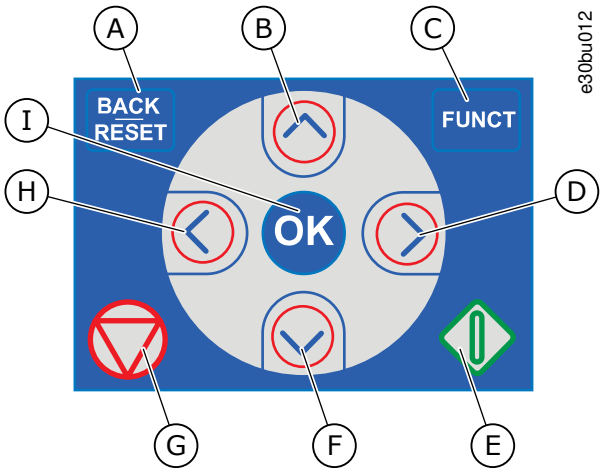


Illustration 2: Buttons of the Keypad

A	The [BACK/RESET] button. Use it to move back in the menu, exit the Edit mode, reset a fault.	F	The arrow button DOWN. Use it to scroll the menu down and to decrease a value.
B	The arrow button UP. Use it to scroll up the menu and to increase a value.	G	The STOP button.
C	The [FUNCT] button. Use it to change the rotation direction of the motor, access the control page, and change the control place.	H	The arrow button LEFT. Use it to move the cursor left.
D	The arrow button RIGHT.	I	The [OK] button. Use it to go into an active level or item, or to accept a selection.
E	The START button.		

2.1.2 Displays of the Control Panel

The display shows this data.

- The status of the motor and the drive.
- Faults in the motor and in the drive.
- Your location in the menu structure.

If the text in the text display is too long for the display, the text scrolls to show the full text string. Some functions are only available in the graphical display.

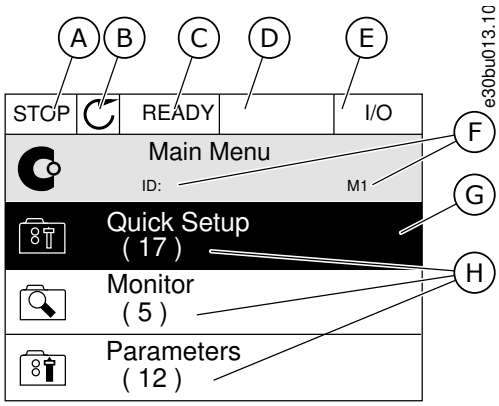


Illustration 3: Graphical Display of the Control Panel

A	The first status field: *STOP/RUN*	E	The control place field: *PC/I/O/KEYPAD/ FIELDBUS*
B	The rotation direction of the motor	F	The location field: the ID number of the parameter and the current location in the menu
C	The second status field: *READY/NOT READY/FAULT*	G	An activated group or item
D	The alarm field: *ALARM/-*	H	The number of items in the group in question

2.2 Graphical Display

2.2.1 Uses of the Monitor Menu

Monitor Menu allows monitoring the actual values of the parameters and signals. It also allows monitoring the statuses and measurements. Some of the values to be monitored can be customized.

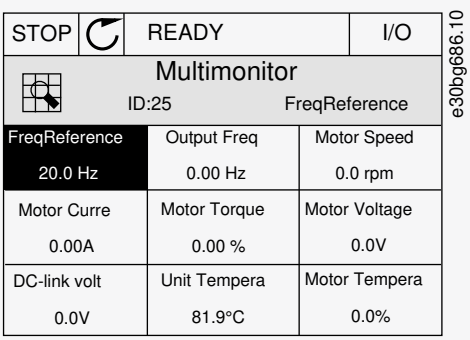
2.2.2 Multimonitor Monitoring

2.2.2.1 Changing the Items to Monitor

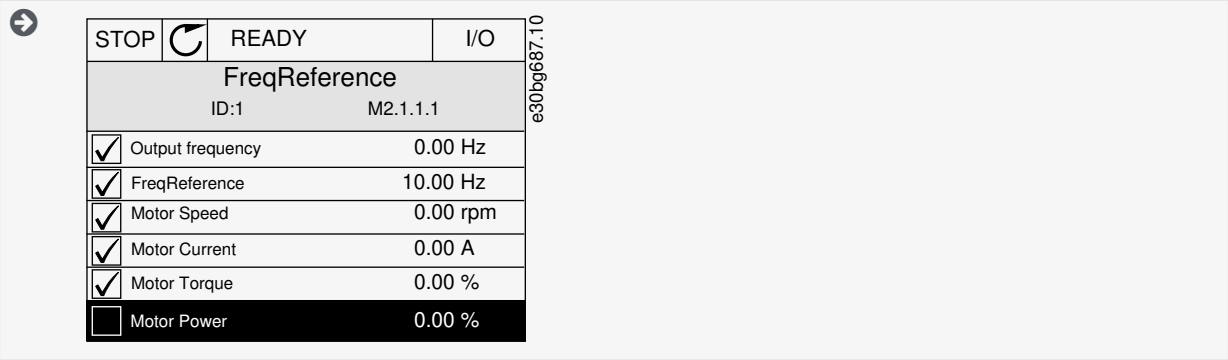
On the *Multimonitor* page, 4–9 items can be monitored. Select the number of items with the parameter *Multimonitor View* (ID 1196) in the *Application Settings* menu.

Procedure

1. Go into the *Monitor* menu with the [OK] button.
2. Go into *Multimonitor*.
3. To replace an old item, activate it. Use the arrow buttons.



4. To select a new item in the list, push [OK].

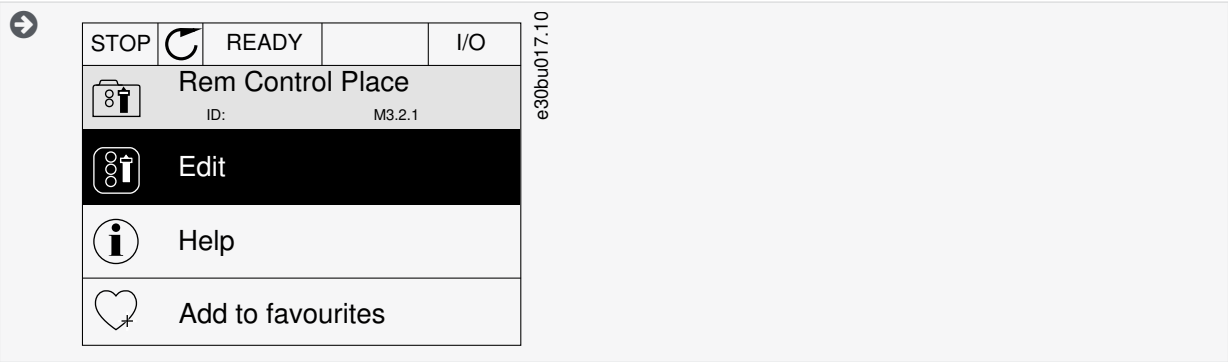


2.2.3 Editing the Text Values

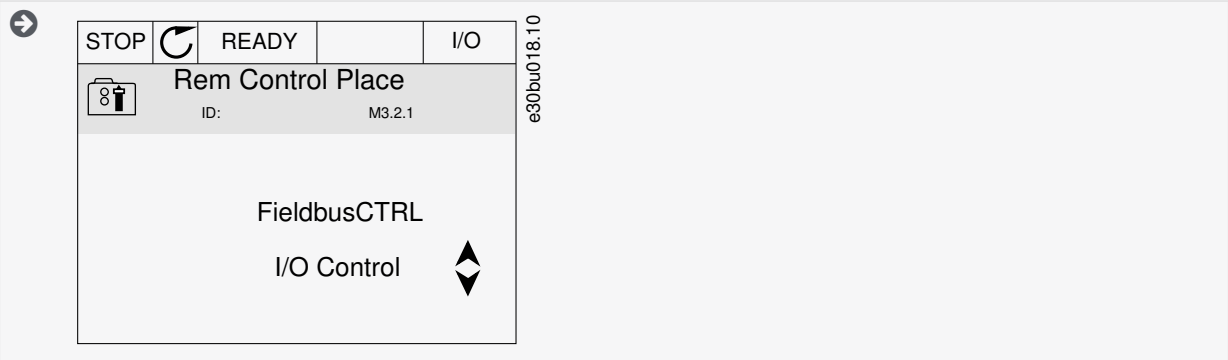
This topic gives instructions on how to edit the text values on the graphical display.

Procedure

1. Find the parameter with the arrow buttons.
2. To go to the *Edit* mode, push the [OK] button 2 times or push the arrow button Right.



3. To set a new value, push the arrow buttons Up and Down.



4. To accept the change, push the [OK] button. To ignore the change, use the [BACK/RESET] button.

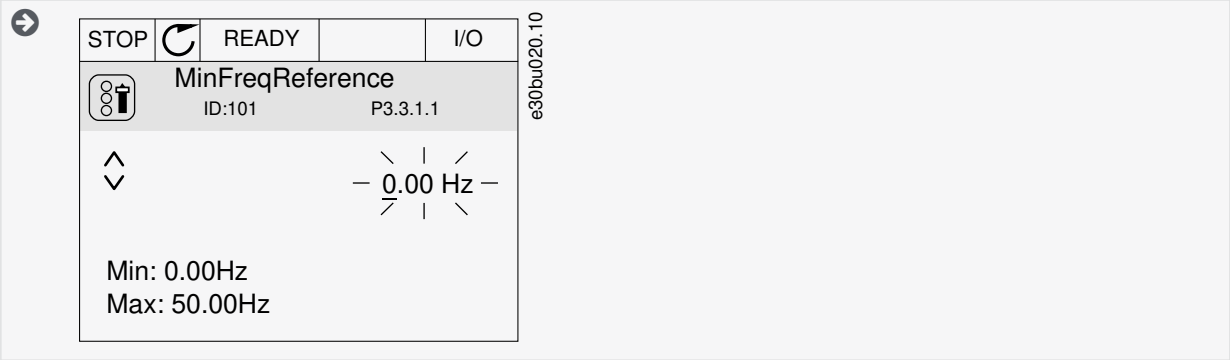
2.2.4 Editing the Numerical Values

This topic gives instructions on how to edit the numerical values on the graphical display.

Procedure

1. Find the parameter with the arrow buttons.
2. To go to the *Edit* mode, push the [OK] button 2 times or push the arrow button Right.

3. Move from digit to digit with the arrow buttons Left and Right. Change the digits with the arrow buttons Up and Down.



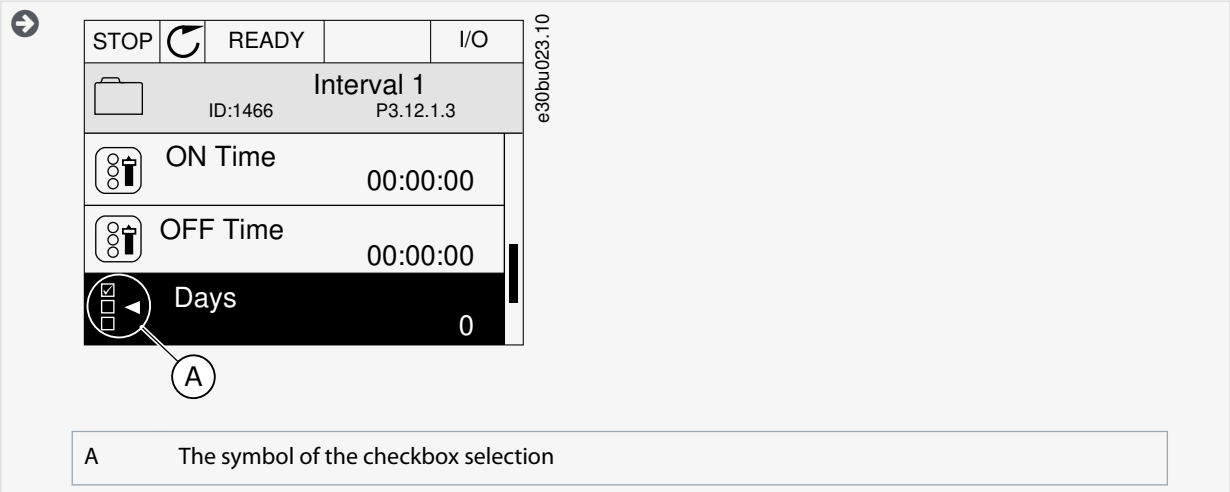
4. To accept the change, push the [OK] button. To ignore the change, use the [BACK/RESET] button.

2.2.5 Selecting More than 1 Value

With some parameters, more than 1 value can be selected. Select a checkbox at each necessary value.

Procedure

1. Find the parameter. There is a symbol on the display when a checkbox selection is possible.



A	The symbol of the checkbox selection

2. To move in the list of values, use the arrow buttons Up and Down.
3. To add a value into your selection, select the box that is next to it with the arrow button Right.

2.2.6 Faults

2.2.6.1 Uses of the Active Faults Submenu

When there is a fault or many faults, the display shows the name of the fault and blinks. Push [OK] to go back to the *Diagnostics* menu. The submenu *Active faults* shows the number of faults. To see the fault-time data, select a fault and push [OK].

The *Active faults* submenu can keep storage of maximum 10 faults. The submenu shows the faults in the sequence in which they occurred.

2.2.6.2 Reset Faults

When the drive shows a fault and stops, examine the cause of fault, and reset the fault. The fault stays active until it is reset.

There are 2 procedures to reset a fault in the local control place: with the [BACK/RESET] button and with a parameter. It is also possible to reset faults by using I/O, a fieldbus, or a PC tool.

N O T I C E

Before resetting the fault, remove the external control signal to prevent restarting the drive accidentally.

2.2.6.2.1 Resetting Faults with the [BACK/RESET] Button

Procedure

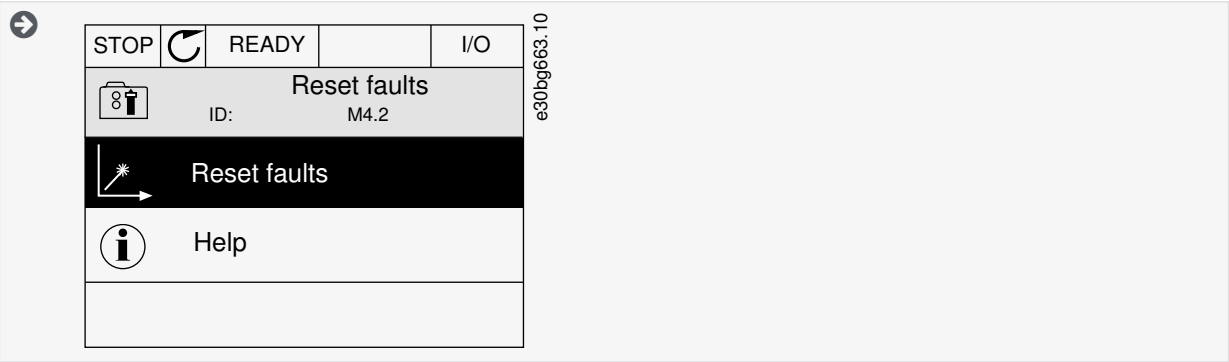
1. Push the [BACK/RESET] button on the keypad of the control panel for 2 seconds.

2.2.6.2.2 Resetting Faults with a Parameter on the Graphical Display

Faults can be reset with the parameter *Reset Faults*.

Procedure

1. Go to the *Diagnostics Menu*.
2. Go to the submenu *Reset faults*.
3. Select the parameter Reset Faults.



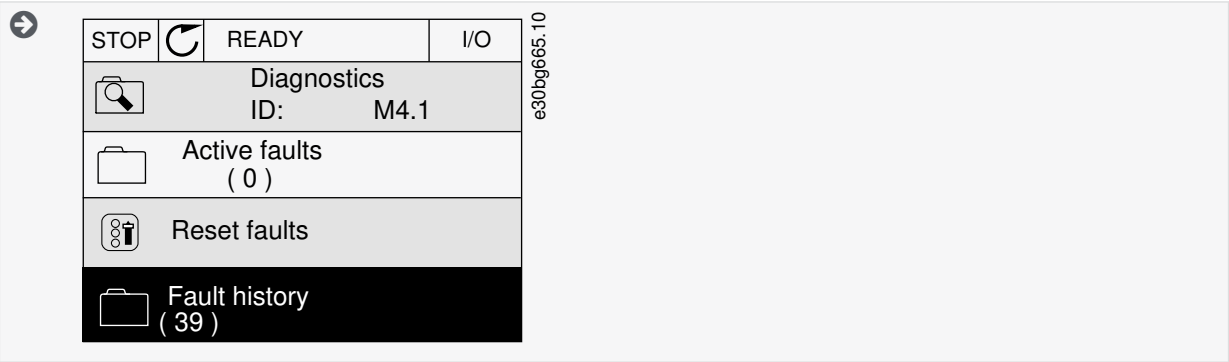
2.2.6.3 Uses of the Fault History

The Fault history shows more data on the faults. There is a maximum number of 40 faults in the Fault history.

2.2.6.3.1 Examining the Fault History on the Graphical Display

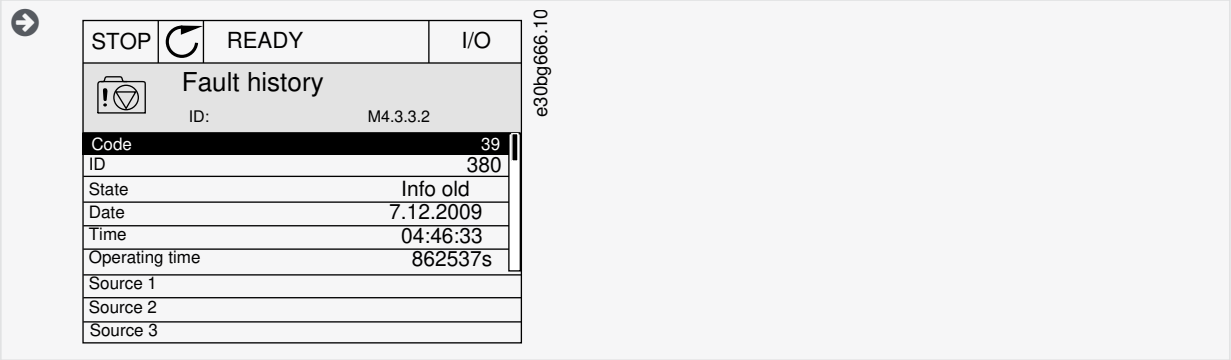
Procedure

1. To see more data on a fault, go to *Fault history*.



2. To examine the data of a fault, push the Arrow button Right.

3. Examine the data in a list.



2.2.7 [FUNCT] Button

The [FUNCT] button can be used for 4 functions.

- To have access to the Control page.
- To change easily between the Local and Remote control places.
- To change the rotation direction.
- To edit quickly a parameter value.

2.2.7.1 Different Control Places

The selection of the control place determines from where the AC drive takes the start and stop commands. All the control places have a parameter for the selection of the frequency reference source. The Local control place is always *Keypad*. The Remote control place is *I/O* or *Fieldbus*. The status bar of the display shows the current control place.

It is possible to use *I/O* A, *I/O* B, and *Fieldbus* as Remote control places. *I/O* A and *Fieldbus* have the lowest priority. Select them with P3.2.1 (Remote Control Place). *I/O* B can bypass the Remote control places *I/O* A and *Fieldbus* with a digital input. Select the digital input with parameter P3.5.1.7 (I/O B Control Force).

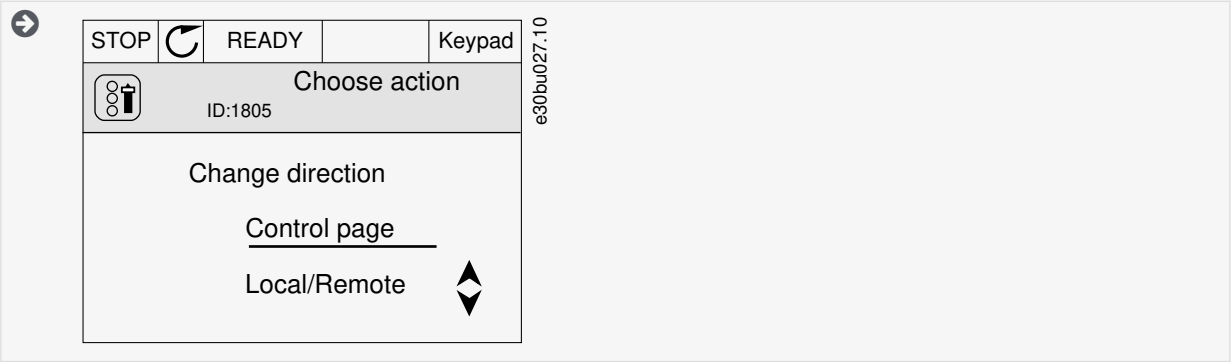
Keypad is always used as a control place when the control place is Local. Local control has higher priority than Remote control. For example, if parameter P3.5.1.7 bypasses the control place with a digital input, and Local is selected in Remote control, *Keypad* becomes the control place. Use the [FUNCT] button or P3.2.2 Local/Remote to change between the Local and Remote control.

2.2.7.2 Changing the Control Place

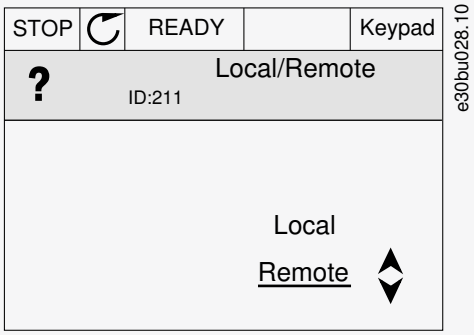
This topic gives instructions on how to change the control place on the control panel.

Procedure

1. Anywhere in the menu structure, push the [FUNCT] button.
2. To select Local/Remote, use the arrow buttons Up and Down. Push the [OK] button.



3. To select Local or Remote, use the arrow buttons Up and Down again. To accept the selection, push the [OK] button.



4. If Remote control place is changed to Local, that is, *Keypad*, give a keypad reference.

After the selection, the display goes back into the same location where it was when the [FUNCT] button was pushed.

2.2.7.3 Going into the Control Page

It is easy to monitor the most important values in the *Control page*.

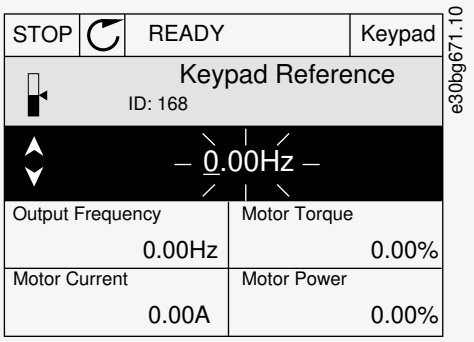
If other control places or reference values are used, the display shows the frequency reference, which cannot be edited. The other values on the page are *Multimonitor* values. These monitoring values can be selected.

Procedure

1. Anywhere in the menu structure, push the [FUNCT] button.
2. To select the *Control page*, push the arrow buttons Up and Down. Go in with the [OK] button.

The *Control page* opens.

3. With the Local control place and the keypad reference selected, P3.3.1.8 Keypad Reference can be set with the [OK] button.
4. To change the digits in the value, push the arrow buttons Up and Down. Accept the change with the [OK] button.



2.2.7.4 Changing the Rotation Direction

The rotation direction of the motor can be changed quickly with the [FUNCT] button.

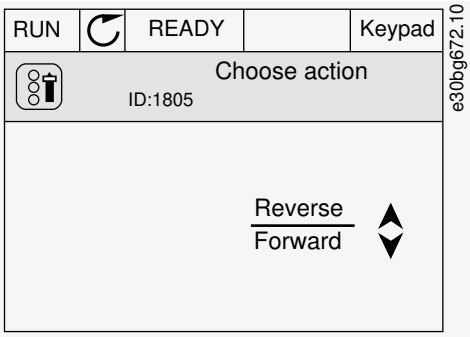
N O T I C E

The command *Change direction* is available in the menu only if the current control place is Local.

Procedure

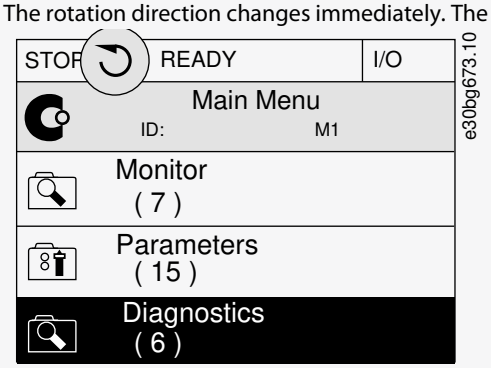
1. Anywhere in the menu structure, push the [FUNCT] button.
2. To select *Change direction*, push the arrow buttons Up and Down. Push the [OK] button.
3. Select a new rotation direction.

The current rotation direction blinks.



4. Push the [OK] button.

The rotation direction changes immediately. The arrow indication in the status field of the display changes.



2.2.7.5 Using the Quick Edit Function

With the *Quick Edit* function, a parameter can be accessed quickly by typing the ID number of the parameter.

Procedure

1. Anywhere in the menu structure, push the [FUNCT] button.
2. Push the arrow buttons Up and Down to select *Quick Edit* and accept with the [OK] button.
3. Write the ID number of a parameter or monitoring value. Push [OK].

The display shows the parameter value in the edit mode and the monitoring value in the monitoring mode.

2.2.8 Copying the Parameters of an AC Drive

Use this function to copy parameters from a drive to another. Before downloading parameters from the control panel to the drive, stop the drive.

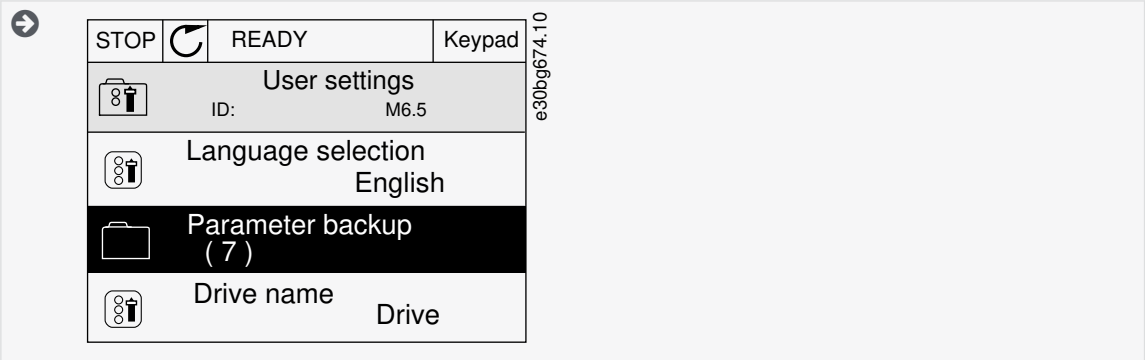
N O T I C E

This function is available only in the graphical display.

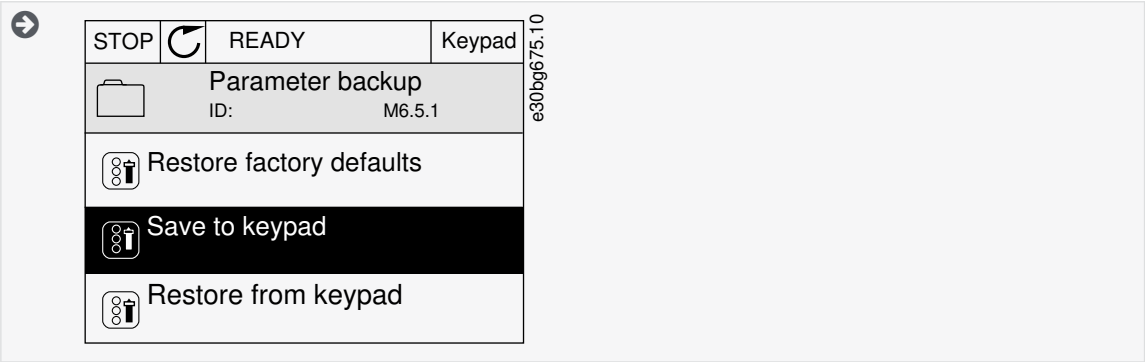
Procedure

1. Save the parameters to the control panel.
   - **a.** Go into the *User settings* menu.
   -

b. Go into the *Parameter backup* submenu.



- **c.** Use the arrow buttons Up and Down to select a function. Accept the selection with the [OK] button.



The command *Restore factory defaults* brings back the parameter settings that were made at the factory. Use the command *Save to keypad* to copy all the parameters to the control panel. The command *Restore from keypad* copies all the parameters from the control panel to the drive.

2. Detach the control panel and connect it to another drive.
3. Download the parameters to the new drive with the command *Restore from keypad*.

2.2.9 Comparing the Parameters

Use this function to compare the current parameter set with one of these 4 sets. See more about these parameters in 4.8.2 Parameter Backup Parameters.

- *Set 1* (B6.5.4 Save to Set 1)
- *Set 2* (B6.5.6 Save to Set 2)
- *Defaults* (B6.5.1 Restore Factory Defaults)

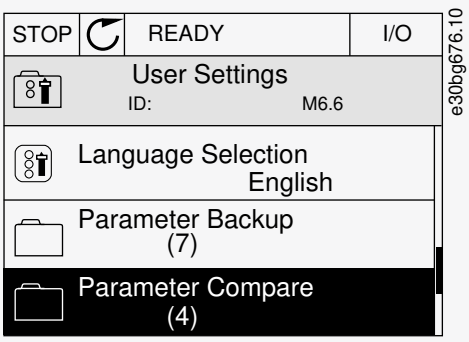
N O T I C E

If you have not saved the parameter set with which you want to compare the current set, the display shows the text *Comparing failed*.

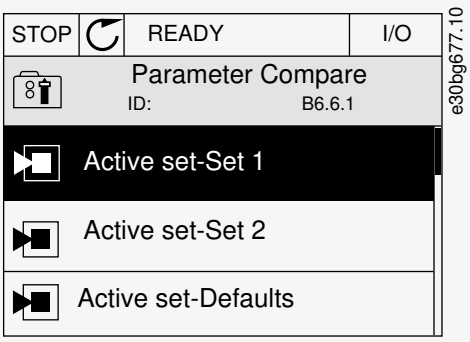
Procedure

1. Go into the *User settings* menu.

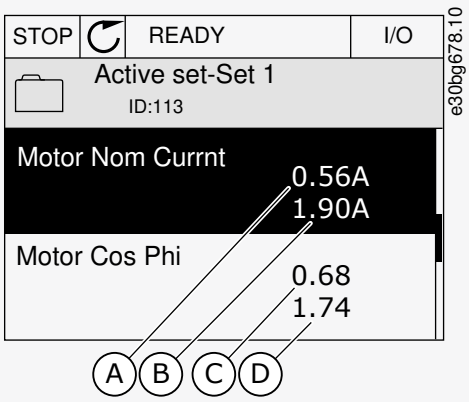
2. Go into the *Parameter Compare* function.



3. Select the pair of sets. Push [OK] to accept the selection.



4. Select *Active* and push [OK].
5. Examine the comparing between the current values and the values of the other set.



A	The current value	C	The current value
B	The value of the other set	D	The value of the other set

2.2.10 Reading Help Texts

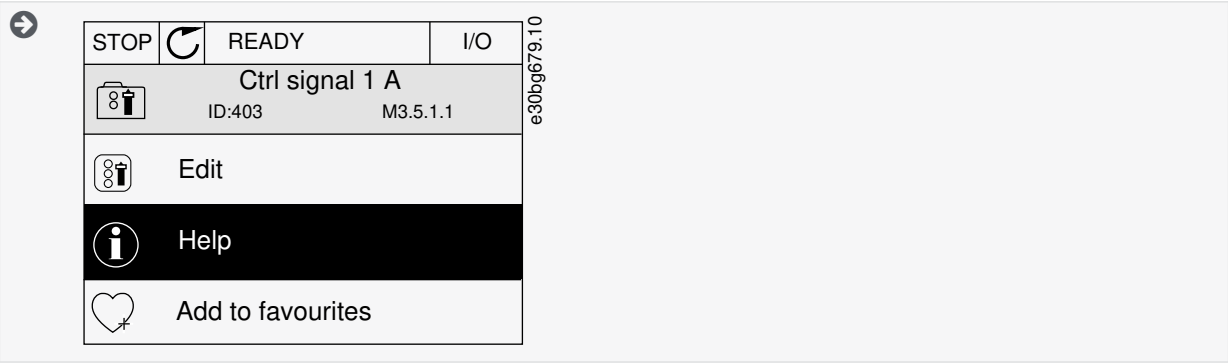
The graphical display can show help texts on many topics. All the parameters have a help text. The help texts are also available for the faults, alarms, and the start-up wizard.

NOTICE

The help texts are always in English.

Procedure

1. Find the item to read.
2. Use the arrow buttons Up and Down to select *Help*.



3. To open the help text, push the [OK] button.

2.2.11 Using the Favourites Menu

This menu is not available in the VACON®Live tool.

If the same items are used frequently, they can be added into *Favourites*. You can collect a set of parameters or monitoring signals from all the control panel menus. It is not necessary to find them in the menu structure one by one. As an alternative, add them into the *Favourites* folder where it is easy to find them.

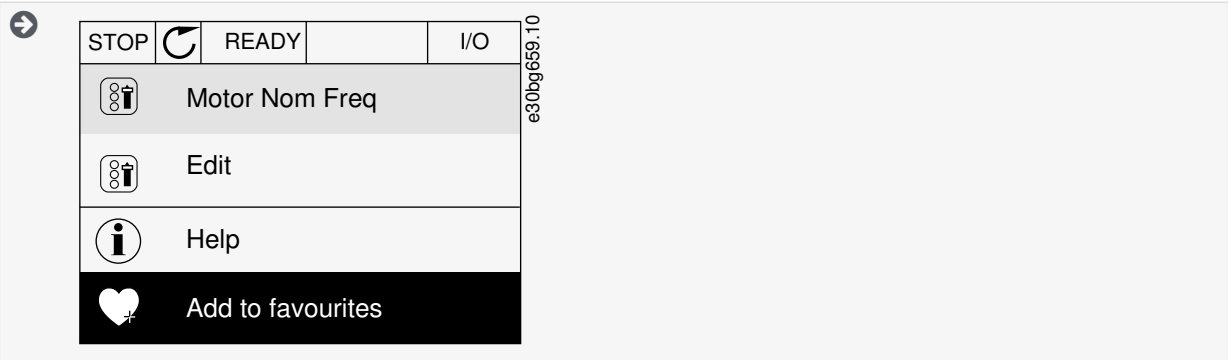
2.2.11.1 Adding an Item to the Favourites

It is possible to add frequently used items into *Favourites* where they are easily accessible.

Procedure

1. Find the item to be added to *Favourites*. Push the [OK] button.
2. Select *Add to favourites* and push the [OK] button.

The steps are now completed.



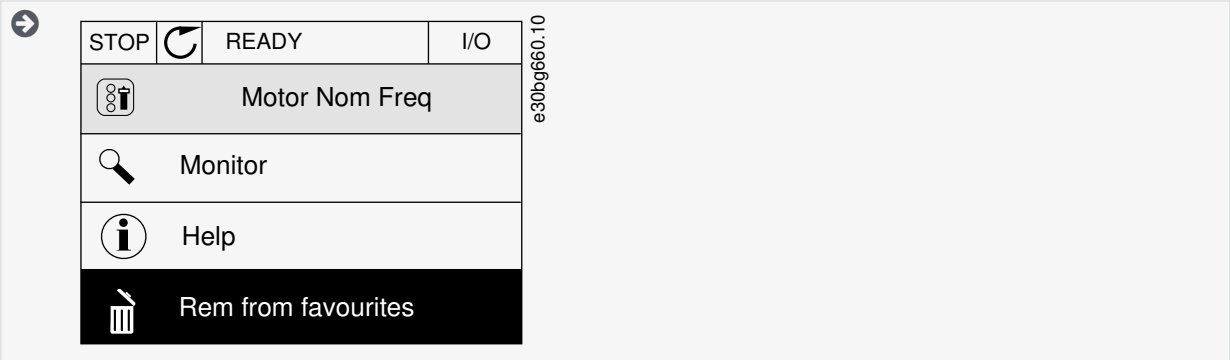
3. To continue, read the instructions on the display.

2.2.11.2 Removing an Item from the Favourites

Procedure

1. Go to the *Favourites*.
2. Find the item to be removed. Push the [OK] button.

3. Select *Rem from favourites*.



4. To remove the item, push the [OK] button again.

2.3 VACON® Live PC Tool

VACON®Live is a PC tool for commissioning and maintenance of the VACON®AC drives. VACON®Live can be downloaded from https://www.danfoss.com.

The VACON®Live PC tool includes these functions.

- Parameterization, monitoring, drive info, data logger, and so on.
- The software download tool VACON®Loader
- Serial communication and Ethernet support
- Windows XP, Vista, 7, 8, and 10 support
- 17 languages: English, German, Spanish, Finnish, French, Italian, Russian, Swedish, Chinese, Czech, Danish, Dutch, Polish, Portuguese, Romanian, Slovak and Turkish

Make the connection between the AC drive and the PC tool with the VACON®serial communication cable. The serial communication drivers are installed automatically during the installation of VACON®Live. After the cable is installed, VACON®Live finds the connected drive automatically.

See more on how to use VACON®Live in the help menu of the program.

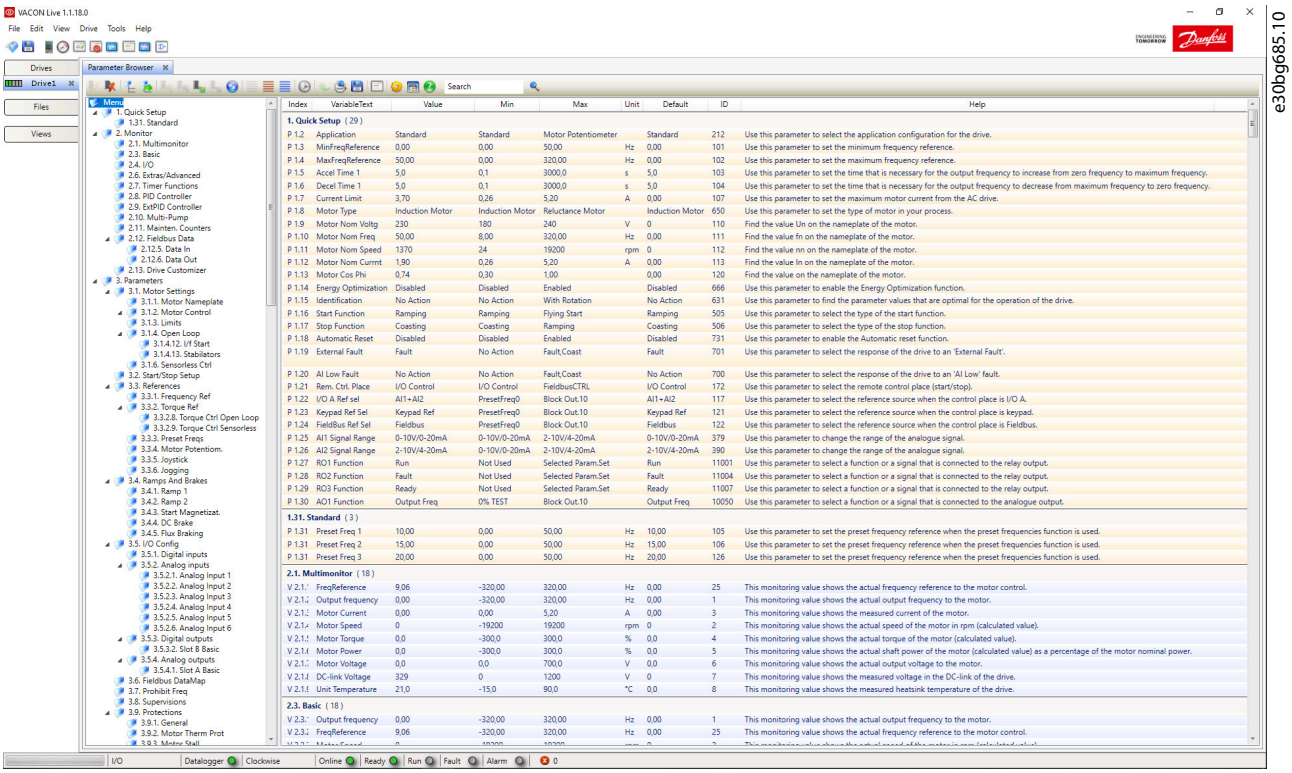


Illustration 4: The VACON®Live PC Tool

3 Programming of Digital and Analog Inputs

3.1 General Information on the Programming

The programming of inputs of the AC drive is flexible. It is possible to use freely the available inputs of the standard and optional I/O for different functions.

It is possible to expand the available capacity of I/O with option boards. It is possible to install the option boards in the slots C, D, and E. For more data on the installation of option boards, see the Installation Guide.

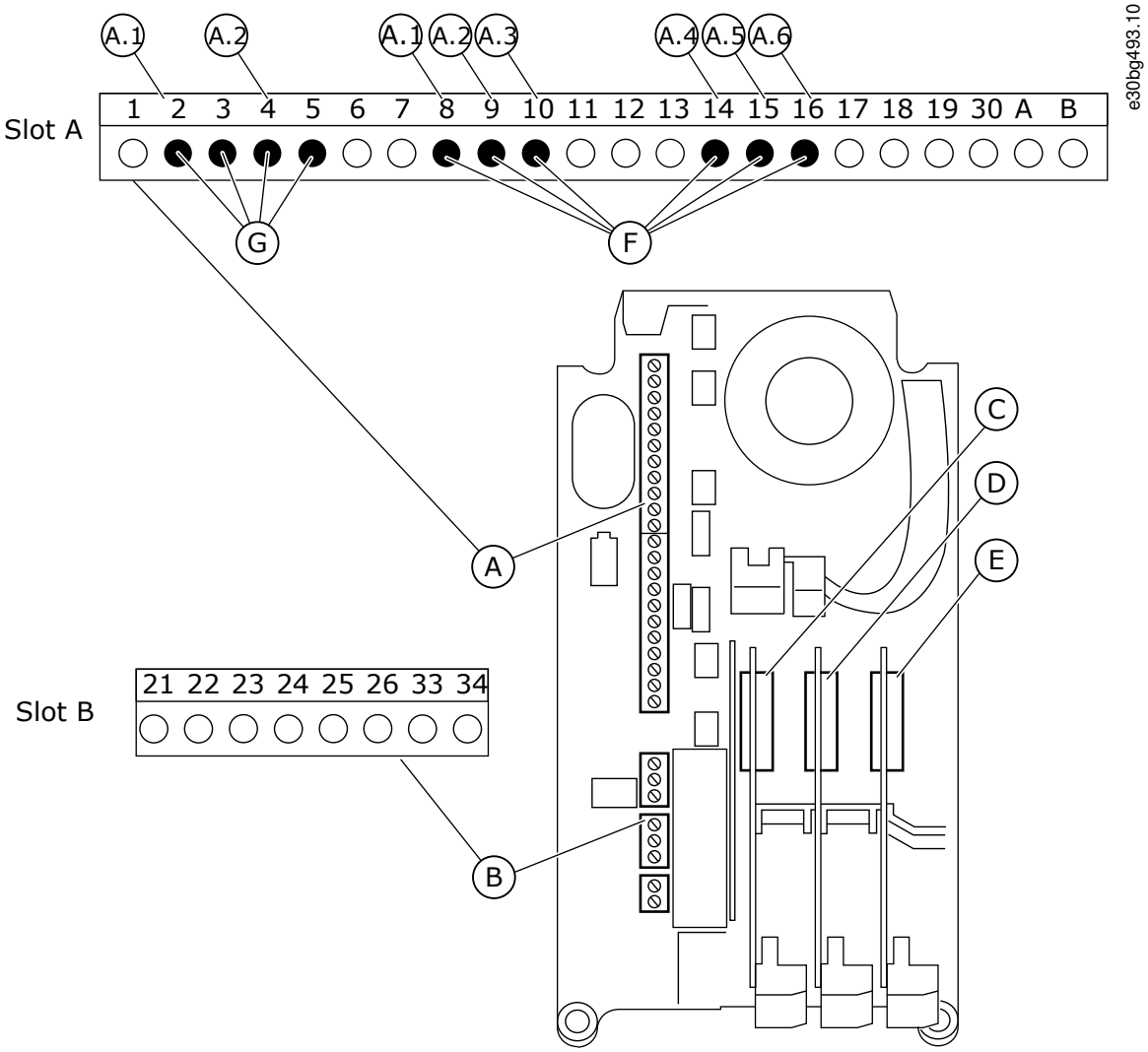


Illustration 5: The Option Board Slots and Programmable Inputs

A	Standard board slot A and its terminals	E	Option board slot E
B	Standard board slot B and its terminals	F	Programmable digital inputs (DI)
C	Option board slot C	G	Programmable analog inputs (AI)
D	Option board slot D		

3.2 DIP Switches on the Control Unit

3.2.1 Selection of Terminal Functions with DIP Switches

Two selections for specified terminals can be done with the DIP switches. The switches have two positions: up and down. See the location of the DIP switches and the possible selections in Illustration 6.

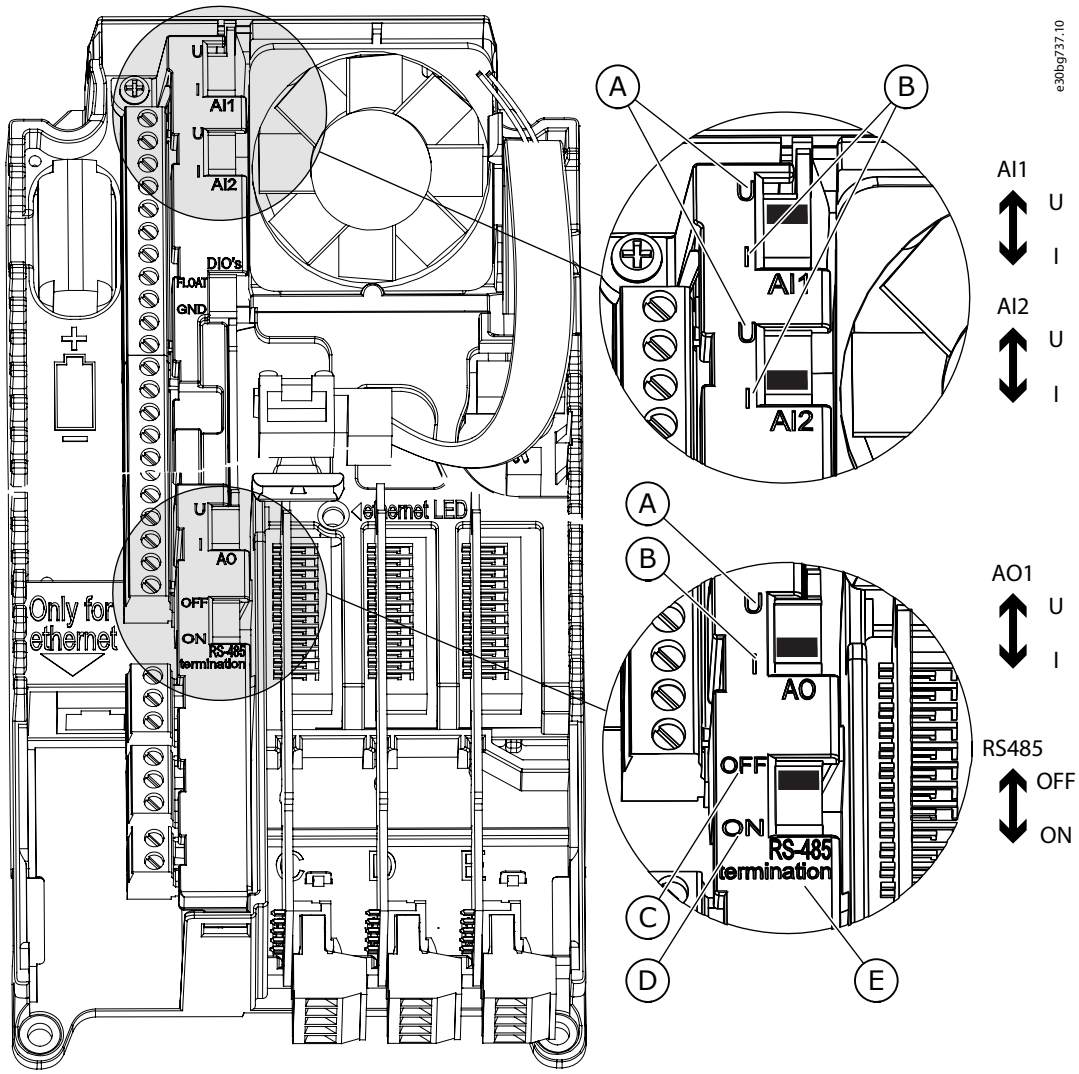


Illustration 6: The Selections of the DIP Switches

A	The voltage signal (U), 0–10 V input	D	ON
B	The current signal (I), 0–20 mA input	E	The RS485 bus termination
C	OFF		

Table 2: The Default Positions of the DIP Switches

The DIP switch	The default position
AI1	U
AI2	I
AO1	I
RS485 bus termination	OFF

3.2.2 Isolation of the Digital Inputs from Ground

It is possible to isolate from ground the digital inputs (terminals 8–10 and 14–16) on the standard I/O board. To do this, change the position of a DIP switch on the control board.

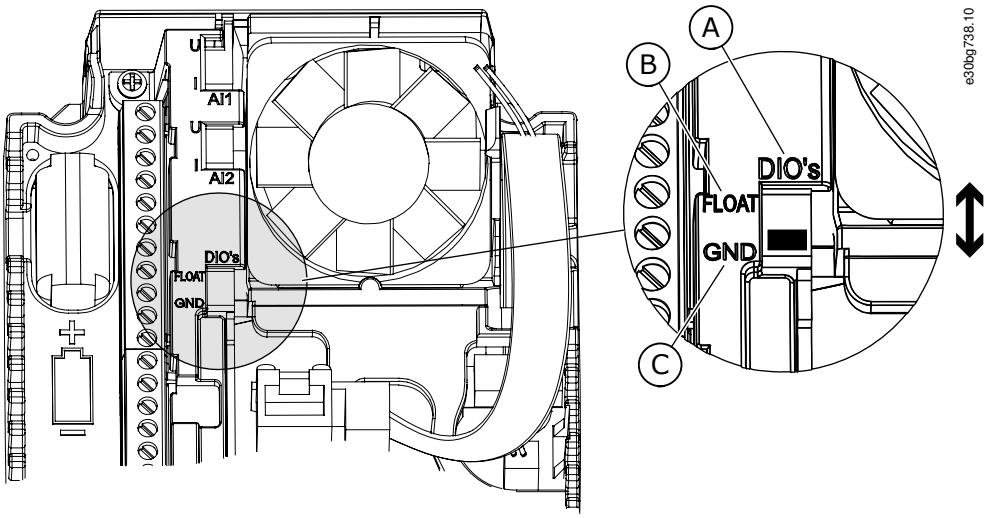


Illustration 7: Change the Position of This Switch to Isolate the Digital Inputs from Ground

A	The digital inputs	C	Connected to ground (default)
B	Floating		

3.3 Programming of Digital Inputs

The digital input parameters are functions that you can connect to a digital input terminal. The text DigIn Slot A.2 means the second input on the slot A. It is also possible to connect the functions to time channels. The time channels work as terminals.

You can monitor the statuses of the digital inputs and the digital outputs in the Multimonitoring view.

To give a digital input to a function, set a value to the correct parameter.

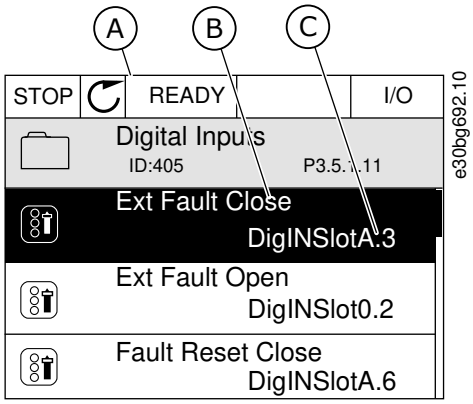


Illustration 8: The Digital inputs menu in the graphical display

A	The graphical display	C	The value of the parameter, that is, the set digital input
B	The name of the parameter, that is, the function		

Example

In the standard I/O board compilation, there are 6 digital inputs available: the slot A terminals 8, 9, 10, 14, 15 and 16.

Input type (graphical display)	Input type (text display)	Slot	Input #	Explanation
DigIN	dI	A	1	Digital input #1 (terminal 8) on a board in Slot A (standard I/O board).
DigIN	dI	A	2	Digital input #2 (terminal 9) on a board in Slot A (standard I/O board).

Input type (graphical display)	Input type (text display)	Slot	Input #	Explanation
DigIN	dI	A	3	Digital input #3 (terminal 10) on a board in Slot A (standard I/O board).
DigIN	dI	A	4	Digital input #4 (terminal 14) on a board in Slot A (standard I/O board).
DigIN	dI	A	5	Digital input #5 (terminal 15) on a board in Slot A (standard I/O board).
DigIN	dI	A	6	Digital input #6 (terminal 16) on a board in Slot A (standard I/O board).

The function *External Fault Close* (ID 405) gets the default value DigIN SlotA.3 in the graphical display, and dI A.3 in the text display. After this selection, a digital signal to the digital input DI3 (terminal 10) controls *External Fault Close*.

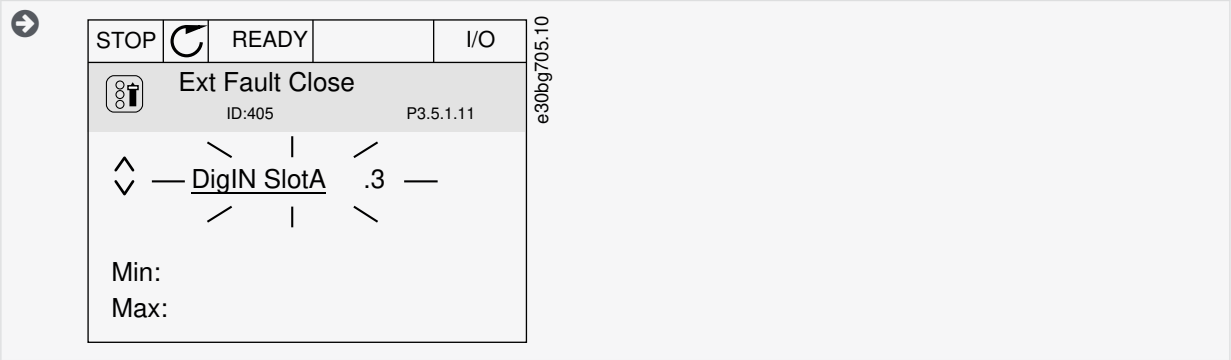
Parameter	Default	ID	Description
External fault close	DigIN SlotA.3	405	OPEN = OK CLOSED = External fault

To change the input from DI3 to, for example, DI6 (terminal 16) on the standard I/O, obey these instructions.

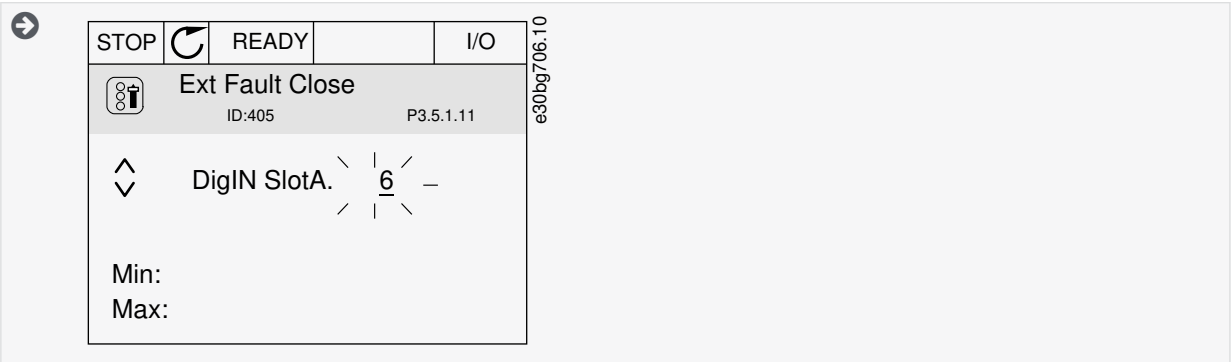
3.3.1 Programming of Digital Inputs in the Graphical Display

Procedure

1. Select a parameter. To go into the Edit mode, push the arrow button Right.
2. In the Edit mode, the slot value DigIN SlotA is underlined and blinks. If there are more digital inputs available in the I/O, for example, because of option boards in slots C, D, or E, select them.



3. To activate the terminal 3, push the arrow button Right again.
4. To change the terminal to 6, push the arrow button Up 3 times. Accept the change with the [OK] button.



5. If the digital input DI6 was already used for some other function, a message shows on the display. Change one of these selections.

3.4 Programming of Analog Inputs

You can select the target input for the signal of the analog frequency reference from the available analog inputs.

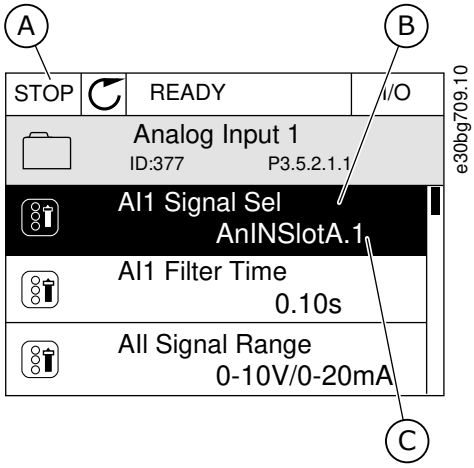


Illustration 9: The Analog inputs menu in the graphical display

A	The graphical display	C	The value of the parameter, that is, the set analog input
B	The name of the parameter		

Example

In the standard I/O board compilation, there are 2 analog inputs available: the slot A terminals 2/3 and 4/5.

Input type (graphical display)	Input type (text display)	Slot	Input #	Explanation
AnIN	AI	A	1	Analog input #1 (terminals 2/3) on a board in Slot A (standard I/O board).
AnIN	AI	A	2	Analog input #2 (terminals 4/5) on a board in Slot A (standard I/O board).

AI1 Signal Selection (ID 377) gets the default value AnIN SlotA.1 in the graphical display or AI A.1 in the text display. The target input for the signal of the analog frequency reference AI1 is then the analog input in the terminals 2/3. Use the dip switches to set the signal to be voltage or current. See the Installation manual for more data.

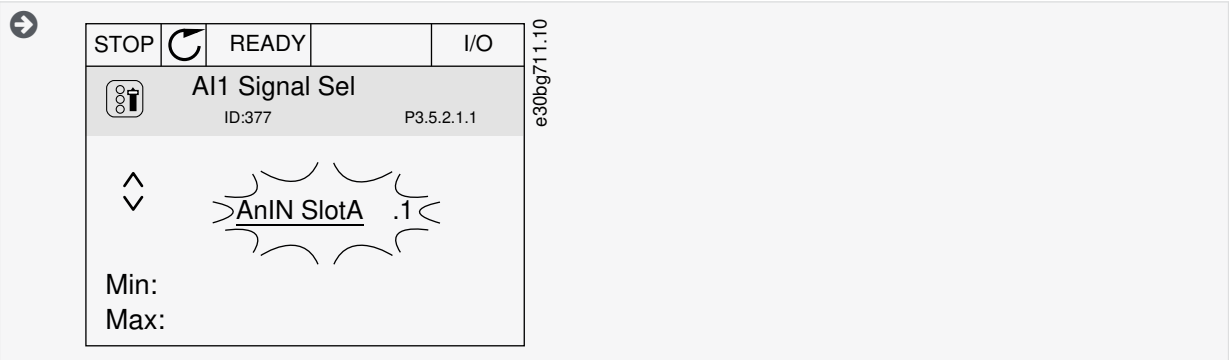
Parameter	Default	ID	Description
AI1 Signal Selection	AnIN SlotA.1	377	

To change the input from AI1 to, for example, the analog input on your option board in slot C, obey these instructions.

3.4.1 Programming of Analog Inputs in the Graphical Display

Procedure

1. To select the parameter, push the arrow button Right.
2. In the Edit mode, the value AnIN SlotA is underlined and blinks.



3. To change the value to AnIN SlotC, push the arrow button Up. Accept the change with the [OK] button.

3.5 Descriptions of Signal Sources

Table 3: Descriptions of Signal Sources

Source	Function
Slot0.#	Digital inputs: You can use this function to set a digital signal to be in a constant OPEN or CLOSED state. The manufacturer set some signals so that they are always in the CLOSED state, for example parameter ID 407 (Run Enable). The Run Enable signal is always on if you do not change it. # = 1: Always OPEN # = 2-10: Always CLOSED Analog inputs (used for testing purposes): # = 1: Analog input = 0% of the signal strength # = 2: Analog input = 20% of the signal strength # = 3: Analog input = 30% of the signal strength etc. # = 10: Analog input = 100% of the signal strength
SlotA.#	Number (#) agrees to a digital input in slot A.
SlotB.#	Number (#) agrees to a digital input in slot B.
SlotC.#	Number (#) agrees to a digital input in slot C.
SlotD.#	Number (#) agrees to a digital input in slot D.
SlotE.#	Number (#) agrees to a digital input in slot E.
FieldbusCW.#	Number (#) refers to a control word bit number.
FieldbusPD.#	Number (#) refers to the process data 1 bit number.
Aux 14–Aux 17	Auxiliary I/O signals
MV-star	MV-star signals

3.6 Default Functions of Programmable Inputs

Table 4: Default functions of the programmable digital and analog inputs

Input	Terminal(s)	Reference	Function	Parameter ID
DI1	8	A.1	Control Signal 1 A	403
DI2	9	A.2	Control Signal 2 A	404
DI3	10	A.3	External Fault Close	405
DI4	14	A.4	Preset Frequency Selection 1	419
DI5	15	A.5	Preset Frequency Selection 2	420
DI6	16	A.6	Fault Reset Close	414
AI1	2/3	A.1	AI1 Signal Selection	377
AI2	4/5	A.2	AI2 Signal Selection	388

4 INU Application

4.1 Overview

The INU application is used to control the INU phase modules of the VACON® 3000.

It is possible to control the drive from the control panel (keypad), Fieldbus, or I/O terminal.

When controlling the drive with the I/O terminal, the frequency reference signal is connected to AI1 (0…10 V) or AI2 (4…20 mA). The connection depends the type of the signal. There are also 3 preset frequency references available. The preset frequency references can be activated with DI4 and DI5. The start/stop signals of the drive are connected to DI1 (start forward) and DI2 (start reverse).

It is possible to configure all the drive outputs freely. There is 1 analog output (Output Frequency) and 3 relay outputs (Run, Fault, Ready) available on the Basic I/O board.

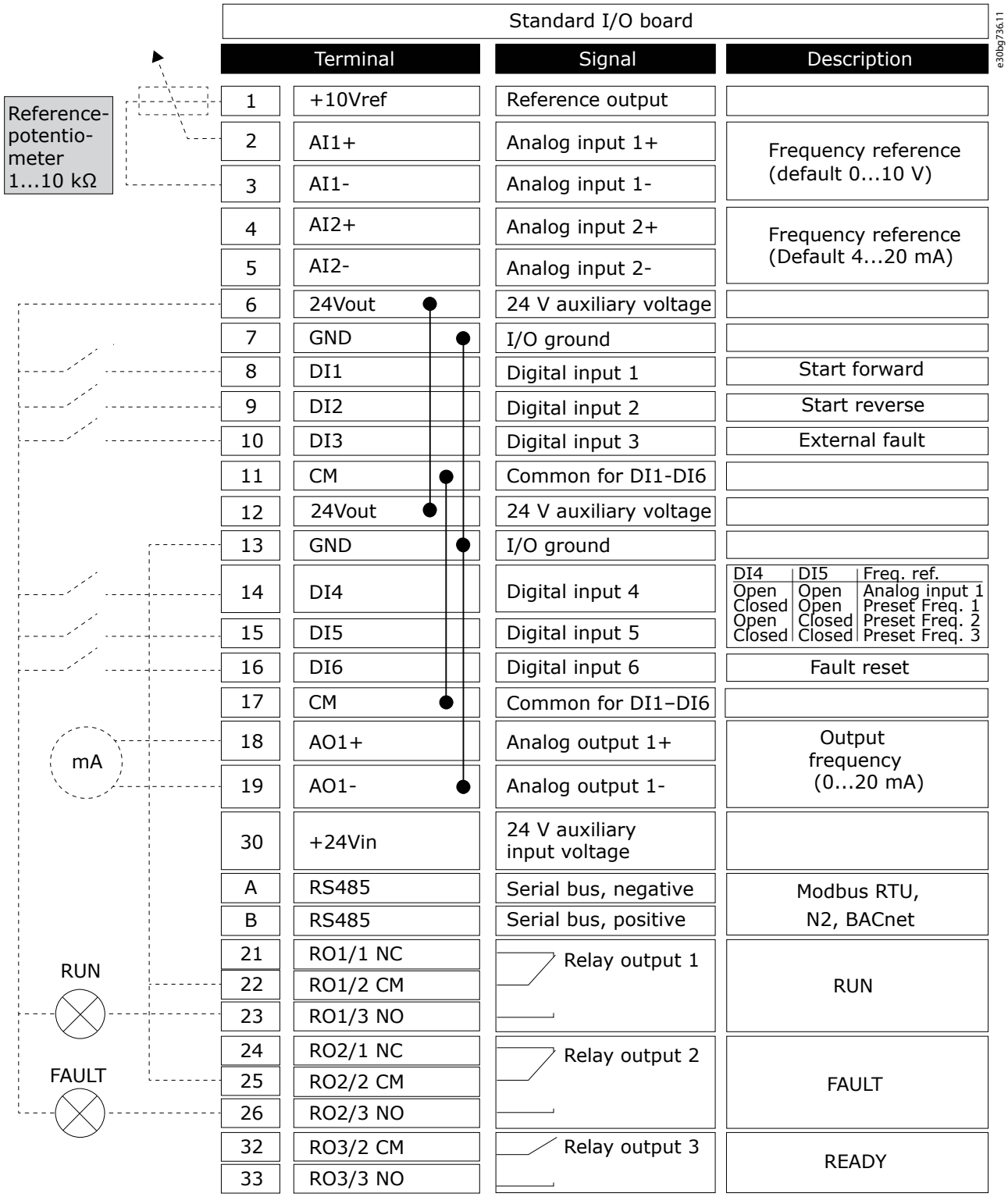


Illustration 10: The Default Control Connections of the INU Application

4.2 Menu Structure

The data of the AC drive is in menus and submenus. To move between the menus, use the arrow buttons Up and Down in the keypad. To go into a group or an item, push the [OK] button. To go back to the previous level, push the [BACK/RESET] button. The display shows the current location in the menu, for example M3.2.1, and the name of the group or item.

Table 5: Menu Structure

Menu	Function
M1 Quick setup	Quick setup
M2 Monitor	Multimonitor
	Basic
	I/O
	Extras/Advanced
	PID controller
	Fieldbus data
	Encoders
	Precharge
M3 Parameters	Motor settings
	Start/Stop setup
	References
	Ramps and brakes
	I/O Configuration
	Fieldbus data mapping
	Prohibit frequencies
	Supervisions
	Protections
	Automatic reset
	Application settings
	PID controller
	Motor preheat
	Mechanical brake
	Encoders
	Precharge
M4 Diagnostics	Active faults
	Reset faults
	Fault history
	Total counters
	Trip counters
	Software info
	Drive info

Menu	Function
	Unit status
M5 I/O and Hardware	Basic I/O
	Slot C
	Slot D
	Slot E
	Real-time clock
	Power unit settings
	RS485
	Ethernet
	Fieldbus general
	Aux chain
	MV-star
M6 User settings	Language selections
	Parameter back-up
	Parameter compare
	Drive name
	Licenses
M7 Favorites	Favorites

4.3 Quick Setup

Table 6: M1 Quick Setup

Index	Parameter	Min	Max	Unit	Default	ID	Description
1.2	Minimum Frequency Reference	0.00	60.00	Hz	0.00	101	
1.3	Maximum Frequency Reference	0.00	320.00	Hz	0.00	102	
1.4	Acceleration Time 1	0.1	3000.0	s	5.0	103	
1.5	Deceleration Time 1	0.1	3000.0	s	5.0	104	
1.6	Current Limit	34	420	A	0	107	
1.7	Motor Nominal Voltage	180	4160	V	0	110	Find this value U_n on the nameplate of the motor. **NOTICE** Find out if the motor connection is Delta or Star.

Index	Parameter	Min	Max	Unit	Default	ID	Description
1.8	Motor Nominal Frequency	8.00	320.00	Hz	0.00	111	Find this value f_n on the nameplate of the motor.
1.9	Motor Nominal Speed	24	19200	RPM	0	112	Find this value n_n on the nameplate of the motor.
1.10	Motor Nominal Current	34	680	A	0	113	Find this value I_n on the nameplate of the motor.
1.11	Motor Cos Phi (Power Factor)	0.30	1.00		0.00	120	Find this value on the nameplate of the motor.
1.12	Identification	0	2		0	631	0 = No action 1 = At standstill 2 = With rotation
1.13	Start Function	0	1		0	505	0 = Ramping 1 = Flying Start
1.14	Stop Function	0	1		0	506	0 = Coasting 1 = Ramping
1.15	Automatic Reset	0	1		0	731	0 = Disabled 1 = Enabled
1.16	Response to External Fault	0	3		2	701	0 = No action 1 = Alarm 2 = Fault (Stop according to stop mode) 3 = Fault (Stop by coasting)
1.17	Response to AI Low Fault	0	5		0	700	0 = No action 1 = Alarm 2 = Alarm+preset fault frequency (P3.9.1.1) 3 = Alarm + previous frequency 4 = Fault (Stop according to stop mode) 5 = Fault (Stop by coasting)
1.18	Remote Control Place	0	1		0	172	0 = I/O control 1 = Fieldbus control
1.19	I/O Control Reference A Selection	0	10		6	117	1 = Preset Frequency 0 2 = Keypad Reference 3 = Fieldbus 4 = AI1 5 = AI2 6 = AI1+AI2 7 = PID Reference 8 = Motor Potentiometer 9 = Joystick Reference 10 = Jogging Reference
1.20	Keypad Control Reference Selection	0	10		2	121	See P1.19.
1.21	Fieldbus Control Reference Selection	0	10		3	122	See P1.19.

Index	Parameter	Min	Max	Unit	Default	ID	Description
1.22	AI1 Signal Range	0	1		0	379	0 = 0...10 V/0...20 mA 1 = 2...10 V/4...20 mA
1.23	AI2 Signal Range	0	1		1	390	0 = 0...10 V/0...20 mA 1 = 2...10 V/4...20 mA
1.24	RO1 Function	0	58		2	11001	See P3.5.3.2.1
1.25	RO2 Function	0	58		3	11004	See P3.5.3.2.4
1.26	RO3 Function	0	58		1	11007	See P3.5.3.2.7
1.27	AO1 Function	0	31		2	10050	See P3.5.4.1.1
1.28	Preset Frequency 1	0.00	60.00	Hz	10.0	105	
1.29	Preset Frequency 2	0.00	60.00	Hz	15.0	106	
1.30	Preset Frequency 3	0.00	60.00	Hz	20.0	126	

4.4 Monitor Menu

4.4.1 Basic Monitoring

4.4.1.1 Uses of the Basic Monitoring

Only the standard I/O board statuses are available in the Monitor menu. For the statuses of all the I/O board signals as raw data, see the I/O and Hardware menu.

Check the statuses of the expander I/O board in the I/O and Hardware menu when the system asks.

4.4.1.2 Basic Monitoring Parameters

Table 7: Items in the Basic Monitoring Menu

Index	Monitoring value	Unit	Scale	ID	Description
V2.3.1	Output frequency	Hz	0.01	1	
V2.3.2	Frequency reference	Hz	0.01	25	
V2.3.3	Motor speed	RPM	1	2	
V2.3.4	Motor current	A	Varies	3	
V2.3.5	Motor torque	%	0.1	4	
V2.3.7	Motor shaft power	%	0.1	5	
V2.3.8	Motor shaft power	kW/hp	Varies	73	
V2.3.9	Motor voltage	V	0.1	6	
V2.3.10	DC-link voltage	V	1	7	
V2.3.11	Unit temperature	°C	0.1	8	

Index	Monitoring value	Unit	Scale	ID	Description
V2.3.12	Motor temperature	%	0.1	9	
V2.3.13	Torque reference	%	0.1	18	
V2.3.14	Output power	kW	1	79	

4.4.2 I/O Monitoring

Table 8: I/O Signal Monitoring

Index	Monitoring value	Unit	Scale	ID	Description
V2.4.1	Slot A DIN 1, 2, 3		1	15	
V2.4.2	Slot A DIN 4, 5, 6		1	16	
V2.4.3	Slot B RO 1, 2, 3		1	17	
V2.4.4	Analog input 1	%	0.01	59	Slot A.1 as default.
V2.4.5	Analog input 2	%	0.01	60	Slot A.2 as default.
V2.4.6	Analog input 3	%	0.01	61	Slot D.1 as default.
V2.4.7	Analog input 4	%	0.01	62	Slot D.2 as default.
V2.4.8	Analog input 5	%	0.01	75	Slot E.1 as default.
V2.4.9	Analog input 6	%	0.01	76	Slot E.2 as default.
V2.4.10	Slot A AO1	%	0.01	81	

4.4.3 Extras and Advanced

Table 9: Monitoring of the advanced values

Index	Monitoring value	Unit	Scale	ID	Description
V2.6.1	Drive Status Word		1	43	B1 = Ready B2 = Run B3 = Fault B6 = Run Enable B7 = Alarm Active B10 = DC current in stop B11 = DC brake active B12 = Run Request B13 = Motor Regulator Active
V2.6.2	Ready status		1	78	B0 = Run Enable high B1 = No fault active B2 = Charge switch closed B3 = DC voltage within limits B4 = Power manager initialized B5 = Power unit is not blocking start B6 = System software is not blocking start
V2.6.3	Application Status Word1		1	89	B0 = Interlock 1 B1 = Interlock 2

Index	Monitoring value	Unit	Scale	ID	Description
					B2 = Reserved B3 = Ramp 2 active B4 = Mechanical brake control B5 = I/O A control active B6 = I/O B control active B7 = Fieldbus Control Active B8 = Local control active B9 = PC control active B10 = Preset frequencies active B11 = Jogging active B13 = Motor Preheat active B14 = Quick stop active B15 = Drive stopped from keypad
V2.6.4	Application Status Word2		1	90	B0 = Acc/Dec prohibited B1 = Motor switch open B5 = Precharge ready B6 = Precharge inhibit B7 = Precharge started B8 = Supervision 1 B9 = Supervision 2
V2.6.5	DIN Status Word 1		1	56	
V2.6.6	DIN Status Word 2		1	57	
V2.6.7	Motor current 1 decimal		0.1	45	
V2.6.8	Frequency reference source		1	1495	0 = PC 1 = Preset Freqs 2 = Keypad Reference 3 = Fieldbus 4 = AI1 5 = AI2 6 = AI1+AI2 7 = PID Controller 8 = Motor Potentiometer 9 = Joystick 10 = Jogging 100 = Not defined 101 = Alarm,PresetFreq
V2.6.9	Last active fault code		1	37	
V2.6.10	Last active fault ID		1	95	
V2.6.11	Last active alarm code		1	74	
V2.6.12	Last active alarm ID		1	94	
V2.6.13	Motor regulator status		1	77	B0 = Current Limit (Motor) B1 = Current Limit (Generator) B2 = Torque Limit (Motor) B3 = Torque Limit (Generator)

Index	Monitoring value	Unit	Scale	ID	Description
					B4 = Overvoltage Control B5 = Undervoltage Control B6 = Power Limit (Motor) B7 = Power Limit (Generator)
V2.6.14	Motor speed filtered	RPM	1	4500	
V2.6.15	Fault word 1		1	1172	
V2.6.16	Fault word 2		1	1173	
V2.6.17	Cos Phi actual		0.01	68	
V2.6.18	Enclosure humidity and temperature		1	3586	
V2.6.19	Output filter status word		1	4502	
V2.6.20	Motor torque lp 16	%	0.1	4503	
V2.6.21	Motor torque unfilt	%	0.1	4504	

4.4.4 PID Controller Monitoring

Table 10: Monitoring of the values of the PID controller

Index	Monitoring value	Unit	Scale	ID	Description
V2.7.1	PID setpoint	Varies	As is set in P3.13.1.7 (See 4.5.12 Group 3.12: PID Controller.)	20	
V2.7.2	PID feedback	Varies	As is set in P3.13.1.7	21	
V2.7.3	PID error value	Varies	As is set in P3.13.1.7	22	
V2.7.4	PID output	%	0.01	23	
V2.7.5	PID status		1	24	0 = Stopped 1 = Running 3 = Sleep mode 4 = In dead band (see 4.5.12 Group 3.12: PID Controller)

4.4.5 Fieldbus Process Data Monitoring

Table 11: Fieldbus process data monitoring

Index	Monitoring value	Unit	Scale	ID	Description
V2.8.1	Fieldbus Control Word		1	874	
V2.8.2	Fieldbus Status Word		1	864	
V2.8.3	Fieldbus Speed Reference	Hz	0.01	875	
V2.8.4	Fieldbus Speed Actual	%	0.01	865	
V2.8.5	Fieldbus General Control Word		1	861	
V2.8.6	Fieldbus General Status Word		1	862	
V2.8.7	Fieldbus Speed Actual Signed	%	0.01	4501	

Table 12: Fieldbus Data In

Index	Monitoring value	Unit	Scale	ID	Description
V2.8.8.1	FB Data In 1		1	876	
V2.8.8.2	FB Data In 2		1	877	
V2.8.8.3	FB Data In 3		1	878	
V2.8.8.4	FB Data In 4		1	879	
V2.8.8.5	FB Data In 5		1	880	
V2.8.8.6	FB Data In 6		1	881	
V2.8.8.7	FB Data In 7		1	882	
V2.8.8.8	FB Data In 8		1	883	
V2.8.8.9	FB Data In 9		1	229	
V2.8.8.10	FB Data In 10		1	230	
V2.8.8.11	FB Data In 11		1	231	
V2.8.8.12	FB Data In 12		1	232	
V2.8.8.13	FB Data In 13		1	233	
V2.8.8.14	FB Data In 14		1	234	
V2.8.8.15	FB Data In 15		1	235	
V2.8.8.16	FB Data In 16		1	236	

Table 13: Fieldbus Data Out

Index	Monitoring value	Unit	Scale	ID	Description
V2.8.9.1	FB Data Out 1		1	866	
V2.8.9.2	FB Data Out 2		1	867	
V2.8.9.3	FB Data Out 3		1	868	
V2.8.9.4	FB Data Out 4		1	869	
V2.8.9.5	FB Data Out 5		1	870	
V2.8.9.6	FB Data Out 6		1	871	
V2.8.9.7	FB Data Out 7		1	872	
V2.8.9.8	FB Data Out 8		1	873	
V2.8.9.9	FB Data Out 9		1	245	
V2.8.9.10	FB Data Out 10		1	246	
V2.8.9.11	FB Data Out 11		1	247	
V2.8.9.12	FB Data Out 12		1	248	
V2.8.9.13	FB Data Out 13		1	249	

Index	Monitoring value	Unit	Scale	ID	Description
V2.8.9.14	FB Data Out 14		1	250	
V2.8.9.15	FB Data Out 15		1	251	
V2.8.9.16	FB Data Out 16		1	252	

4.4.6 Encoder Monitoring

Table 14: Encoder Monitoring Values

Index	Monitoring value	Unit	Scale	ID	Description
V2.10.1	Encoder HW Fallback Count		1	3007	
V2.10.2	Encoder SW Fallback Count		1	3008	

Table 15: Monitoring of the Encoder Channel A Values

Index	Monitoring value	Unit	Scale	ID	Description
V2.10.3.1	Encoder Status Word		1	3050	1 = Direction State 2 = Pulse State 4 = Input A State 8 = Input B State 16 = Input Z State 32 = Input M State
V2.10.3.2	Encoder Glitch Count		1	3051	
V2.10.3.3	Encoder Error Flags		1	3052	1 = Resolution Range 2 = Resolution Prescale Range 4 = Invalid Encoder Mode 8 = Timebase Prescale Range 16 = Debounce Time Range 32 = Strobe Timeout 64 = Hysteresis Filter Config 128 = Glitch Detected 256 = Hardware
V2.10.3.4	Frequency Error	Hz	0.0001	3053	
V2.10.3.5	Encoder Direction		1	3054	0 = CCW (Forward) 1 = CW (Reverse)
V2.10.3.6	Encoder Electrical Frequency	Hz	0.0001	3055	
V2.10.3.7	Encoder Mechanical Frequency	RPM	0.0001	3056	
V2.10.3.8	Encoder Electrical Angle	deg	0.0001	3057	
V2.10.3.9	Encoder Mechanical Angle	deg	0.0001	3058	
V2.10.3.10	Revolutions		1	3059	
V2.10.3.11	Encoder Update Position		1	3060	
V2.10.3.12	Encoder Index Position		1	3061	

Index	Monitoring value	Unit	Scale	ID	Description
V2.10.3.13	Encoder Marker Position		1	3062	
V2.10.3.14	Encoder Alternate Marker Position		1	3063	
V2.10.3.15	Encoder Fault Detection Status Word		1	3066	b0 = Fallback active b1 = HW detection unfiltered b2 = HW detection active b3 = SW detection active b4 = SW detection speed limits not OK b5 = SW difference detection active b6 = Fault timeout active b7 = Fault repeat timeout active
V2.10.3.16	Encoder HW Error Count		1	3067	
V2.10.3.17	Encoder SW Error Count		1	3068	
V2.10.3.18	Encoder SW Error Peak	Hz	0.001	3069	

Table 16: Monitoring of the Encoder Channel B Values

Index	Monitoring value	Unit	Scale	ID	Description
V2.10.4.1	Encoder Status Word		1	3070	1 = Direction State 2 = Pulse State 4 = Input A State 8 = Input B State 16 = Input Z State 32 = Input M State
V2.10.4.2	Encoder Glitch Count		1	3071	
V2.10.4.3	Encoder Error Flags		1	3072	1 = Resolution Range 2 = Resolution Prescale Range 4 = Invalid Encoder Mode 8 = Timebase Prescale Range 16 = Debounce Time Range 32 = Strobe Timeout 64 = Hysteresis Filter Config 128 = Glitch Detected
V2.10.4.4	Frequency Error	Hz	0.0001	3073	
V2.10.4.5	Encoder Direction		1	3074	0 = CCW (Forward) 1 = CW (Reverse)
V2.10.4.6	Encoder Electrical Frequency	Hz	0.0001	3075	
V2.10.4.7	Encoder Mechanical Frequency	RPM	0.0001	3076	
V2.10.4.8	Encoder Electrical Angle	deg	0.0001	3077	
V2.10.4.9	Encoder Mechanical Angle	deg	0.0001	3078	
V2.10.4.10	Revolutions		1	3079	
V2.10.4.11	Encoder Update Position		1	3080	

Index	Monitoring value	Unit	Scale	ID	Description
V2.10.4.12	Encoder Index Position		1	3081	
V2.10.4.13	Encoder Marker Position		1	3082	
V2.10.4.14	Encoder Alternate Marker Position		1	3083	

4.4.7 Precharge Monitoring

Table 17: Precharge Monitoring Values

Index	Monitoring value	Unit	Scale	ID	Description
V2.12.1	Precharge state		1	3510	0 = Reset 1 = Failed 2 = Not Ready 3 = Ready 4 = Charging 5 = Synchronizing 6 = Contactor Close 7 = Stabilizing 8 = Operational 9 = Loaded
V2.12.2	Precharge inhibit		1	3511	
V2.12.3	Precharge error flags		1	3568	b0 = Software b1 = Main Pilot Open TO b2 = Mx Open TO b3 = PC Contactor Open TO b4 = DC-link Discharge TO b5 = Front End Fault Clear TO b6 = DC-link Overvoltage b7 = Front End Lost Phase Lock b8 = Front End Faulted b9 = Mx Premature Close b10 = Main Pilot Premature Close b11 = Precharge Premature Termination b12 = Max Charge Rate Exceeded b13 = Min Charge Rate Deficient b14 = Precharge TO b15 = DC-link Voltage Deficient b16 = Synchronization TO b17 = Main Pilot Close TO b18 = Front End Lost Synchronization b19 = Mx Close TO b20 = Mx Premature Open b21 = Stabilization TO b22 = Front End Deactivated b23 = Front End Lost Stabilization b24 = Unexpected Parameterization b25 = Invalid Parameterization b26 = Test Mode Activated While Hot b27 = INU Became Faulted

Index	Monitoring value	Unit	Scale	ID	Description
					b28 = Precharge Contactor Unexpected Close
V2.12.4	Precharge status word		1	3513	b0 = Precharge Permissive b1 = Mx Permissive b2 = Mx Start b3 = PCC Interlock b4 = Precharge Inhibit b5 = Precharge Ready b6 = Precharge Started b7 = PCC Gating Enabled b8 = Kpc State b9 = Kmx State b10 = Mx State b11 = GSW Permissive b12 = Kpc Sub State b13 = Kmx Sub State b14 = Mx Sub State b15 = Reserved
M2.12.5	Internal control				See Table 18.
M2.12.6	Interlocks				See Table 19.
M2.12.7	Interlocks @ Last Fault				See Table 20.

Table 18: Internal Control Monitoring Values

Index	Monitoring value	Unit	Scale	ID	Description
V2.12.5.1	Power on state		1	3520	0 = Reset 1 = Failed 2 = Initializing 3 = Ready 4 = Cooling 5 = Charging 6 = Contactor Close 7 = Stabilizing 8 = Operational
V2.12.5.2	Power on status word		1	3574	b0 = PowerOn Req b1 = Power Off b2 = Reset b3 = Run Cooling b4 = Precharge b5 = Power On b6 = Fault b7 = Precharge Ready b8 = PreStart OK (1) b9 = MCBs and Interlocks OK b10 = Leak Detection OK b11 = LCL OK (AFE) b12 = GSW AFR DSI OK

Index	Monitoring value	Unit	Scale	ID	Description
					b13 = Cooling OK [2] b14 = DC Capacitors OK (INU)
V2.12.5.3	Power on state fault		1	3521	See ID 3520.
V2.12.5.4	Power on status word fault		1	3583	See ID 3574.
V2.12.5.5	Precharge status word fault		1	3514	See ID 3513.
V2.12.5.6	Precharge error flags @ fault		1	3580	See ID 3568 in Table 17.

[1] PreStart OK requires that all of the following status words are OK: MCB Status (ID 3570), Leak Det. Status (ID 3571), GSW UFES Status (ID 3575), and DC Cap Status (ID 3584).

[2] Cooling OK requires that all of the following status words are OK: Enc HX Status (ID 3572), and HEX Status (ID 3573).

Table 19: Interlocks Monitoring Values

Index	Monitoring value	Unit	Scale	ID	Description
V2.12.6.1	GSW UFES status word		1	3575	b0 = GSW Open 1 b1 = GSW Open 2 b2 = GSW Open 3 b3 = GSW Open 4 b4 = GSW Not Closed 1 b5 = GSW Not Closed 2 b6 = GSW Not Closed 3 b7 = GSW Not Closed 4 b12 = AFR Online b13 = AFR Not Faulted b14 = DSI Ok
V2.12.6.2	MCB status word		1	3570	b0 = ENC HX MCB 1 b1 = ENC HX MCB 2 b2 = ENC HX MCB 3 b3 = ENC HX MCB 4 b4 = TEMPCL MCB 1 b5 = TEMPCL MCB 2 b6 = TEMPCL MCB 3 b7 = TEMPCL MCB 4 b8 = Interlock Open 1 b9 = Interlock Open 2 b10 = Interlock Open 3 b11 = Interlock Open 4 b12 = Interlock Close 1 b13 = Interlock Close 2 b14 = Interlock Close 3
V2.12.6.3	Leak detection status word		1	3571	b0 = LD Sys Ok 1 b1 = LD Sys Ok 2 b2 = LD Sys Ok 3 b3 = LD Sys Ok 4 b4 = LD No Leak 1 b5 = LD No Leak 2

Index	Monitoring value	Unit	Scale	ID	Description
					b6 = LD No Leak 3 b7 = LD No Leak 4
V2.12.6.4	HEX status word		1	3573	b0 = HX Cooling Ok 1 b1 = HX Cooling Ok 2 b2 = HX Cooling Ok 3 b3 = HX Cooling Ok 4
V2.12.6.5	ENC HX status word		1	3572	b0 = ENC HX 1 b1 = ENC HX 2 b2 = ENC HX 3 b3 = ENC HX 4 b4 = ENC FAN 1.1 b5 = ENC FAN 1.2 b6 = ENC FAN 1.3 b7 = ENC FAN 2.1 b8 = ENC FAN 2.2 b9 = ENC FAN 2.3 b10 = ENC FAN 3.1 b11 = ENC FAN 3.2 b12 = ENC FAN 3.3 b13 = ENC FAN 4.1 b14 = ENC FAN 4.2
V2.12.6.6	DC capacitor status word		1	3584	b0 = DC Choke Ok 1 b1 = DC Choke Ok 2 b2 = DC Cap Ok 1 b3 = DC Cap Ok 2 b4 = DC Cap Ok 3 b5 = DC Cap Ok 4

Table 20: Interlocks @ Last Fault Monitoring Values

Index	Monitoring value	Unit	Scale	ID	Description
V2.12.7.1	GSW UFES status word fault			3582	See ID 3575 in Table 19.
V2.12.7.2	MCB status word fault		1	3576	See ID 3570 in Table 19.
V2.12.7.3	Leak detection status word fault		1	3577	See ID 3571 in Table 19.
V2.12.7.4	ENC HX status word fault		1	3578	See ID 3572 in Table 19.
V2.12.7.5	HEX status word fault		1	3579	See ID 3573 in Table 19.
V2.12.7.6	DC capacitor status word fault			3585	See ID 3584 in Table 19.

4.5 Parameters Menu

4.5.1 Group 3.1: Motor Settings

Table 21: Motor Nameplate Parameters

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.1.1.1	Motor Nominal Voltage	Varies	Varies	V	Varies	110	
P3.1.1.2	Motor Nominal Frequency	8.00	320.00	Hz	50 / 60	111	
P3.1.1.3	Motor Nominal Speed	24	19200	rpm	Varies	112	
P3.1.1.4	Motor Nominal Current	IH * 0.1	IH * 2	A	Varies	113	IH = Nominal current of the drive
P3.1.1.5	Motor Cos Phi (Power Factor)	0.30	1.00		Varies	120	
P3.1.1.6	Motor Nominal Power	Varies	Varies	kW	Varies	116	

Table 22: Motor Control Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.1.2.1	Control Mode	0	2		0	600	0 = Frequency control 1 = Speed control 2 = Torque control
P3.1.2.2	Motor Type	0	1		0	650	0 = Induction motor 1 = PM motor
M3.1.2.3	Current control						See Table 23.
M3.1.2.4	Speed control						See Table 24.
M3.1.2.5	Limit control						See Table 25.
M3.1.2.6	Modulation						See Table 26.
M3.1.2.7	Motor model						See Table 27.
M3.1.2.8	Identification						See Table 28.
M3.1.2.9	Sine filter						See Table 29.

Table 23: Current Control Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.1.2.3.1	Current Control Kp	1.0	400.0	%	30	617	
P3.1.2.3.2	Current Control Ti	0.0005	1 000	s	0.0050	657	

Table 24: Speed Control Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.1.2.4.1	CL Speed Control Kp	0.0	200.0	%	30.0	613	
P3.1.2.4.2	CL Speed Control Ti	0.001	100 000	s	0.100	614	
P3.1.2.4.3	Acceleration comp.TC	0.0000	100.0000	s	0.0000	626	
P3.1.2.4.4	Acceleration comp. filter TC	0.0000	10.0000	s	0.0000	4001	
P3.1.2.4.5	Load Drooping Mode	0	1		0	1534	0 = Normal 1 = Linear removal
P3.1.2.4.6	Load Drooping	0.00	20.00	%	0.00	620	
P3.1.2.4.7	Load Drooping Time	0.00	2.00	s	0.00	656	
P3.1.2.4.8	Speed error filter			s	0.0000	4025	

Table 25: Limit Control Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.1.2.5.1	Overvoltage Control	0	1		1	607	0 = Disabled 1 = Enabled
P3.1.2.5.2	Undervoltage Control	0	1		1	608	0 = Disabled 1 = Enabled
P3.1.2.5.3	AFE In Use?	0	1		0	4003	0 = No 1 = Yes
P3.1.2.5.4	OVC reference selection				0	4004	0 = Supply voltage 1 = DC voltage high maximum 2 = DC voltage high limit
P3.1.2.5.5	OVC reference			V	0	4005	

Table 26: Modulation Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.1.2.6.1	Switching Frequency	0.5	2.0	kHz	0.0	601	
P3.1.2.6.2	Modulator Type	0	4		1	648	1 = SVM 2 = DPWM1 3 = DPWMIN 4 = No 3rd harmonic
P3.1.2.6.3	Modulator Options	0	3		2	3301	1 = Deadtime Compensation 2 = Switching Frequency Reduction At Start
P3.1.2.6.4	Synchronous Modulation	0	4		4	3302	0 = Synchronous 1 = Asynchronous 4 = Soft Synchronous

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.1.2.6.5	Maximum Modulation Index	90	105	%	100	655	
P3.1.2.6.6	Fsw Reduction Min			kHz	0.0	3303	
P3.1.2.6.7	DC-Link Compensation TC			s	0.0000	3305	

Table 27: Motor Model Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.1.2.7.1	Magnetizing Current	0	420	A	0	612	
P3.1.2.7.2	Rs Voltage Drop	0.0000	10.0000	%	0.5000	662	
P3.1.2.7.3	Ls Voltage Drop	0.0000	50.0000	%	21.0000	673	
P3.1.2.7.4	Stator Voltage Adjust	50.0	150.0	%	100.0	659	
P3.1.2.7.5	Slip adjust			%	100.0	619	

Table 28: Identification Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.1.2.8.1	Identification	0	2		0	631	0 = No action 1 = At standstill 2 = With rotation
P3.1.2.8.2	Identification Options				0	680	
P3.1.2.8.3	Magnetizing Current	34.0	680.0	A	0.0	677	
P3.1.2.8.4	Rs Voltage Drop	0.0000	10.0000	%	0.0000	675	
P3.1.2.8.5	Ls Voltage Drop	0.0000	50.0000	%	0.0000	678	
P3.1.2.8.6	Forward Voltage Drop	0.0000	10.0000	%	0.0000	679	

Table 29: Sine Filter Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.1.2.9.1	Regen Filter Select				0	5039	0 = Special 1 = L20.3 2 = L20.3 HSI 3 = L20.4 4 = L20.4 HSI 5 = L30.3 6 = L30.3 HSI 7 = L30.4 8 = L30.4 HSI
P3.1.2.9.2	Special Filter Index				21200	5040	
P3.1.2.9.3	Active Damp Resistance			%	20.0	5054	
P3.1.2.9.4	Active Damp Cutoff Frequency			Hz	0.00	5055	

Table 30: Motor Limit Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.1.3.1	Motor Current Limit	34	420	A	0	107	
P3.1.3.2	Motor Torque Limit	0.0	300.0	%	300.0	1287	
P3.1.3.3	Generator Torque Limit	0.0	300.0	%	300.0	1288	
P3.1.3.4	Motor Power Limit	0.0	300.0	%	300.0	1289	
P3.1.3.5	Generator Power Limit	0.0	300.0	%	300.0	1290	
P3.1.3.6	Torque Limit			%	0.0	609	
P3.1.3.7	CL motoring torque limit			%	0.0	4020	
P3.1.3.8	CL generator torque limit			%	0.0	4021	
P3.1.3.9	CL motoring power limit			%	0.0	4022	
P3.1.3.10	CL generator power limit			%	0.0	4023	
P3.1.3.11	Supply voltage select				Estimated	3355	
P3.1.3.12	Set supply voltage			V	0	1201	
P3.1.3.13	Motor voltage fault limit				0	4006	
P3.1.3.14	Input Phase Fault Ripple Limit			V	0.0	4007	

Table 31: Open Loop Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.1.4.1	U/f Ratio	0	2		0	108	0=Linear 1=Squared 2=Programmable
P3.1.4.2	Field Weakening Point Frequency	8.00	320.00	Hz	0.00	602	
P3.1.4.3	Voltage at Field Weakening Point	10.00	200.00	%	100.00	603	
P3.1.4.4	U/f Midpoint Fre- quency	0.00	60.00	Hz	0.00	604	
P3.1.4.5	U/f Midpoint Voltage	0.0	100.0	%	100.0	605	
P3.1.4.6	Zero Frequency Voltage	0.00	40.00	%	0.00	606	
P3.1.4.7	Flying Start Options	0	63		0	1590	1 = Disable reverse direction search 2 = Disable AC scanning 4 = Reserved 8 = Reserved 16 = Use the frequency reference for the initial guess 32 = Disable DC pulses
P3.1.4.8	Flying Start Scan Current	0.0	100.0	%	45.0	1610	
P3.1.4.9	Auto Torque Boost	0	1		0	109	0=Disabled 1=Enabled

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.1.4.10	Torque Boost Motor Gain	0.0	100.0	%	100.0	667	
P3.1.4.11	Torque Boost Generator Gain	0.0	100.0	%	0.0	665	
M3.1.4.12	I/f start						See Table 32.
M3.1.4.13	Stabilators						See Table 33.

Table 32: I/f Start Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.1.4.12.1	I/f Start	0	1		0	534	0 = Disabled 1 = Enabled
P3.1.4.12.2	I/f Start Frequency	5.0	60.0	Hz	0.0	535	
P3.1.4.12.3	I/f Start Current	0.0	100.0	%	0.0	536	

Table 33: Stabilator Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.1.4.13.1	Torque stabilator gain			%	0.0	1412	
P3.1.4.13.2	Torque stabilator gain FWP			%	0.0	1414	
P3.1.4.13.3	Torque stabilator damping time constant			s	0.0000	1413	
P3.1.4.13.4	Flux stabilator gain			%	0	1797	
P3.1.4.13.5	Flux stabilator damping time constant			s	0.0000	1551	
P3.1.4.13.6	Voltage stabilator gain			%	0.0	1738	
P3.1.4.13.7	Voltage stabilator damping time constant			s	0.0000	1552	
P3.1.4.13.8	Flux trace stabilator gain			%	0.0	1736	
P3.1.4.13.9	Flux trace stabilator damping time constant			s	0.0000	1550	

Table 34: Flux Vector Control Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.1.5.1	Sensorless control				Disabled	1724	
P3.1.5.2	Sensorless control mode				0	1725	
P3.1.5.3	Sensorless control options				0	1726	
P3.1.5.4	Flux mode coefficient 1				0.0	1727	
P3.1.5.5	Flux mode coefficient 2				0.0	1728	
P3.1.5.6	Flux mode coefficient 3				0.0	1729	
P3.1.5.7	Voltage drop IGBT			V	0.00	1730	
P3.1.5.8	Offset voltage alpha			%	0.000	1737	
P3.1.5.9	Offset voltage beta			%	0.000	1739	

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.1.5.10	Frequency filter time constant			s	0.012	15647	
P3.1.5.11	Flux reference			%	100.0	1250	
P3.1.5.12	FW control Kp			%	0.00	4027	
P3.1.5.13	FW control Ti			s	0.0000	4028	
P3.1.5.14	Flux Ready Limit			%	0.0	4017	

4.5.2 Group 3.2: Start/Stop Setup

Table 35: Start/Stop Setup

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.2.1	Remote Control Place	0	1		0	172	0 = I/O control 1 = Fieldbus control
P3.2.2	Local/Remote	0	1		0	211	0 = Remote 1 = Local
P3.2.3	Keypad Stop Button	0	1		1	114	0 = No 1 = Yes
P3.2.4	Start Function	0	1		0	505	0 = Ramping 1 = Flying start
P3.2.5	Stop Function	0	1		0	506	0 = Coasting 1 = Ramping
P3.2.6	I/O A Start/Stop Logic	0	4		2	300	**Logic = 0** • Ctrl sgn 1 = Forward • Ctrl sgn 2 = Backward **Logic = 1** • Ctrl sgn 1 = Forward (edge) • Ctrl sgn 2 = Inverted Stop • Ctrl sgn 3 = Bckwrd (edge) **Logic = 2** • Ctrl sgn 1 = Forward (edge) • Ctrl sgn 2 = Bckwrd (edge) **Logic = 3** • Ctrl sgn 1 = Start • Ctrl sgn 2 = Reverse **Logic = 4** • Ctrl sgn 1 = Start (edge) • Ctrl sgn 2 = Reverse
P3.2.7	I/O B Start/Stop Logic	0	4		2	363	See P3.2.6.
P3.2.8	Fieldbus Start Logic	0	1		0	889	0 = A rising edge is necessary

Index	Parameter	Min	Max	Unit	Default	ID	Description
							1 = State
P3.2.9	Start Delay	0.000	60.000	s	0.00	524	
P3.2.10	Remote to Local Function	0	2		2	181	0 = Keep Run 1 = Keep Run & Reference 2 = Stop
P3.2.11	Restart delay			s	0.0	1424	
P3.2.12	Short restart delay			s	0.0	672	

4.5.3 Group 3.3: References

Table 36: Frequency Reference Parameters

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.3.1.1	Minimum Frequency Reference	0.00	P3.3.1.2	Hz	0.00	101	
P3.3.1.2	Maximum Frequency Reference	P3.3.1.1	320.00	Hz	0.00	102	
P3.3.1.3	Positive Frequency Reference Limit	-320.0	320.0	Hz	320.00	1285	
P3.3.1.4	Negative Frequency Reference Limit	-320.0	320.0	Hz	-320.00	1286	
P3.3.1.5	I/O Control Reference A Selection	1	10		6	117	1 = Preset Frequency 0 2 = Keypad reference 3 = Fieldbus 4 = AI1 5 = AI2 6 = AI1+AI2 7 = PID reference 8 = Motor potentiometer 9 = Joystick reference 10 = Jogging reference
P3.3.1.6	I/O Control Reference B Selection	1	10		4	131	See P3.3.1.5.
P3.3.1.7	Keypad Control Reference Selection	1	10		2	121	1 = Preset Frequency 0 2 = Keypad reference 3 = Fieldbus 4 = AI1 5 = AI2 6 = AI1+AI2 7 = PID reference 8 = Motor potentiometer 9 = Joystick reference 10 = Jogging reference
P3.3.1.8	Keypad Reference	P3.3.1.1	P3.3.1.2	Hz	0.00	184	
P3.3.1.9	Keypad Direction	0	1		0	123	0 = Forward

Index	Parameter	Min	Max	Unit	Default	ID	Description
							1 = Reverse
P3.3.1.10	Fieldbus Control Reference Selection	1	10		3	122	1 = Preset Frequency 0 2 = Keypad reference 3 = Fieldbus 4 = AI1 5 = AI2 6 = AI1+AI2 7 = PID reference 8 = Motor potentiometer 9 = Joystick reference 10 = Jogging reference

Table 37: Torque Reference Parameters

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.3.2.1	Torque Reference Selection	0	16		0	641	0 = Not used 1 = Keypad 2 = Joystick 3 = AI1 4 = AI2 5 = AI3 6 = AI4 7 = AI5 8 = AI6 9 = ProcessDataIn 1 10 = ProcessDataIn 2 11 = ProcessDataIn 3 12 = ProcessDataIn 4 13 = ProcessDataIn 5 14 = ProcessDataIn 6 15 = ProcessDataIn 7 16 = ProcessDataIn 8
P3.3.2.2	Torque Minimum Reference	-300.0	300.0	%	0.0	643	
P3.3.2.3	Torque Maximum Reference	-300.0	300.0	%	100.0	642	
P3.3.2.4	Torque Reference Filter Time	0.00	300.00	s	0.00	1244	
P3.3.2.5	Keypad Torque Reference	0.0	P3.3.2.3	%	0.0	1439	
P3.3.2.6	Torque control Speed Limiter Mode	0	6		0	1568	0 = NegFreqLimit ... PosFreqLimit 1 = -|FreqRampOut| ... +|FreqRampOut 2 = NegFreqLimit ... FreqRampOut 3 = FreqRampOut ... PosFreqLimit 4 = 0 ... |FreqRampOut| & Direction

Index	Parameter	Min	Max	Unit	Default	ID	Description
							5 = FreqRampOut +/- Window 6 = FreqRampOut +/- Window with Hysteresis
P3.3.2.7	Torque Reference Gain	-800.0	800.0	%	0.0	4015	
P3.3.2.8	Torque Reference Ramp Time	0.0000	1000.0000	s	0.0000	4011	
P3.3.2.9	Torque Reference Interpolator Time	0.0000	1000.00 00	s	0.0000	4010	
P3.3.2.14	Torque Control Open Loop	This menu includes 3 parameters. See Table 38.					
P3.3.2.15	Torque Control Sensorless	This menu includes 2 parameters. See Table 39.					

Table 38: Parameters for Torque Control in Open Loop Control

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.3.2.14.1	Open Loop Torque Control Minimum Frequency	0.0	P3.3.1.2	Hz	0.0	636	
P3.3.2.14.2	Open Loop Torque Control P Gain	0.0	214748. 36		0.00	639	
P3.3.2.14.3	Open Loop Torque Control I Gain	0.0	214748. 36		0.00	640	

Table 39: Parameters for Torque Control in Advanced Sensorless Control

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.3.2.15.1	Sensorless Torque Control P Gain	0.00	214748.36		0.00	1731	
P3.3.2.15.2	Sensorless Torque Control I Gain	0.00	214748.36		0.00	1732	

Table 40: Preset Frequency Parameters

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.3.3.1	Preset Frequency 0	P3.3.1.1	P3.3.1.2	Hz	5.00	180	
P3.3.3.2	Preset Frequency 1	P3.3.1.1	P3.3.1.2	Hz	10.00	105	
P3.3.3.3	Preset Frequency 2	P3.3.1.1	P3.3.1.2	Hz	15.00	106	
P3.3.3.4	Preset Frequency 3	P3.3.1.1	P3.3.1.2	Hz	20.00	126	
P3.3.3.5	Preset Frequency 4	P3.3.1.1	P3.3.1.2	Hz	25.00	127	
P3.3.3.6	Preset Frequency 5	P3.3.1.1	P3.3.1.2	Hz	30.00	128	
P3.3.3.7	Preset Frequency 6	P3.3.1.1	P3.3.1.2	Hz	40.00	129	
P3.3.3.8	Preset Frequency 7	P3.3.1.1	P3.3.1.2	Hz	50.00	130	

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.3.3.9	Preset Frequency Selection 0				DigIN Slot0.1	419	
P3.3.3.10	Preset Frequency Selection 1				DigIN Slot0.1	420	
P3.3.3.11	Preset Frequency Selection 2				DigIN Slot0.1	421	

Table 41: Motor Potentiometer Parameters

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.3.4.1	Motor Potentiometer UP				DigIN Slot0.1	418	OPEN = Not active CLOSED = Active
P3.3.4.2	Motor Potentiometer DOWN				DigIN Slot0.1	417	OPEN = Not active CLOSED = Active
P3.3.4.3	Motor Potentiometer Ramp Time	0.1	500.0	Hz/s	10.0	331	
P3.3.4.4	Motor Potentiometer Reset	0	2		1	367	0 = No reset 1 = Reset if stopped 2 = Reset if powered down

Table 42: Joystick Control Parameters

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.3.5.1	Joystick Signal Selection	0	6		0	451	0 = Not Used 1 = AI1 (0–100%) 2 = AI2 (0–100%) 3 = AI3 (0–100%) 4 = AI4 (0–100%) 5 = AI5 (0–100%) 6 = AI6 (0–100%)
P3.3.5.2	Joystick Dead Zone	0.0	20.0	%	2.0	384	
P3.3.5.3	Joystick Sleep Delay	0.00	300.00	s	0.00	386	0 = Not used

Table 43: Jogging Parameters

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.3.6.1	Enable DI Jogging	Varies	Varies		DigIN Slot0.1	532	
P3.3.6.2	Jogging Reference 1 Activation	Varies	Varies		DigIN Slot0.1	530	
P3.3.6.3	Jogging Reference 2 Activation	Varies	Varies		DigIN Slot0.1	531	

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.3.6.4	Jogging Reference 1	-MaxRef	MaxRef	Hz	0.00	1239	
P3.3.6.5	Jogging Reference 2	-MaxRef	MaxRef	Hz	0.00	1240	
P3.3.6.6	Jogging Ramp	0.1	300.0	s	10.0	1257	

4.5.4 Group 3.4: Ramps and Brakes Setup

Table 44: Ramp 1 Setup

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.4.1.1	Ramp 1 Shape	0.0	100.0	%	0.0	500	
P3.4.1.2	Acceleration Time 1	0.1	300.0	s	5.0	103	
P3.4.1.3	Deceleration Time 1	0.1	300.0	s	5.0	104	

Table 45: Ramp 2 Setup

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.4.2.1	Ramp 2 Shape	0.0	100.0	%	0.0	501	
P3.4.2.2	Acceleration Time 2	0.1	300.0	s	10.0	502	
P3.4.2.3	Deceleration Time 2	0.1	300.0	s	10.0	503	
P3.4.2.4	Ramp 2 Selection	Varies	Varies		DigIN Slot0.1	408	0 = OPEN 1 = CLOSED

Table 46: Start Magnetization Parameters

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.4.3.1	Start Magnetizing Current	0.00	IL	A	IH	517	0 = Disabled
P3.4.3.2	Start Magnetizing Time	0.00	600.00	s	0.00	516	

Table 47: DC Brake Parameters

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.4.4.1	DC Brake Current	0	IL	A	IH	507	0 = Disabled
P3.4.4.2	DC Braking Time at Stop	0.00	600.00	s	0.00	508	
P3.4.4.3	Frequency to Start DC Braking at Ramp Stop	0.10	10.00	Hz	1.50	515	

Table 48: Flux Braking Parameters

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.4.5.1	Flux Braking	0	1		0	520	0 = Disabled 1 = Enabled
P3.4.5.2	Flux Braking Current	0	IL	A	IH	519	

4.5.5 Group 3.5: I/O Configuration

Table 49: Digital Input Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.5.1.1	Control Signal 1 A				DigIN Slot0.1	403	
P3.5.1.2	Control Signal 2 A				DigIN Slot0.1	404	
P3.5.1.3	Control Signal 3 A				DigIN Slot0.1	434	
P3.5.1.4	Control Signal 1 B				DigIN Slot0.1	423	
P3.5.1.5	Control Signal 2 B				DigIN Slot0.1	424	
P3.5.1.6	Control Signal 3 B				DigIN Slot0.1	435	
P3.5.1.7	I/O B Control Force				DigIN Slot0.1	425	CLOSED = Force the control place to I/O B
P3.5.1.8	I/O B Reference Force				DigIN Slot0.1	343	CLOSED = I/O reference B (P3.3.1.6) gives the frequency reference
P3.5.1.9	Fieldbus Control Force				DigIN Slot0.1	411	
P3.5.1.10	Keypad Control Force				DigIN Slot0.1	410	
P3.5.1.11	External Fault Close				DigIN Slot0.1	405	OPEN = OK CLOSED = External fault
P3.5.1.12	External Fault Open				DigIN Slot0.2	406	OPEN = External fault CLOSED = OK
P3.5.1.13	Fault Reset Close				DigIN Slot0.1	414	CLOSED = Resets all active faults
P3.5.1.14	Fault Reset Open				DigIN Slot0.1	213	OPEN = Resets all active faults
P3.5.1.15	Run Enable				DigIN SlotA.1	407	
P3.5.1.16	Run Interlock 1				DigIN Slot0.2	1041	
P3.5.1.17	Run Interlock 2				DigIN Slot0.2	1042	
P3.5.1.18	Ramp 2 Selection				DigIN Slot0.1	408	OPEN = Ramp 1 Shape, Acceleration Time 1, and Deceleration Time 1.

Index	Parameter	Min	Max	Unit	Default	ID	Description
							CLOSED = Ramp 2 Shape, Acceleration Time 2, and Deceleration Time 2.
P3.5.1.19	Acc/Dec Prohibit				DigIN Slot0.1	415	
P3.5.1.20	Preset Frequency Selection 0				DigIN Slot0.1	419	
P3.5.1.21	Preset Frequency Selection 1				DigIN Slot0.1	420	
P3.5.1.22	Preset Frequency Selection 2				DigIN Slot0.1	421	
P3.5.1.23	Motor Potentiometer UP				DigIN Slot0.1	418	OPEN = Not active CLOSED = Active
P3.5.1.24	Motor Potentiometer DOWN				DigIN Slot0.1	417	OPEN = Not active CLOSED = Active
P3.5.1.25	Quick Stop Activation				DigIN Slot0.2	1213	OPEN = Activated
P3.5.1.26	PID1 Select Setpoint				DigIN Slot0.1	1047	OPEN = Setpoint 1 CLOSED = Setpoint 2
P3.5.1.27	Enable DI Jogging				DigIN Slot0.1	532	
P3.5.1.28	Jogging Reference 1 Activation				DigIN Slot0.1	530	
P3.5.1.29	Jogging Reference 2 Activation				DigIN Slot0.1	531	
P3.5.1.30	Mechanical Brake Feedback				DigIN Slot0.1	1210	
P3.5.1.31	Parameter Set 1/2 Selection				DigIN Slot0.1	496	OPEN = Parameter set 1 CLOSED = Parameter set 2
P3.5.1.32	User Defined Fault 1 Activation				DigIN Slot0.1	15523	OPEN = No action CLOSED = Fault activated
P3.5.1.33	User Defined Fault 2 Activation				DigIN Slot0.1	15524	OPEN = No action CLOSED = Fault activated
P3.5.1.34	Power on				DigIN Slot0.1	3550	
P3.5.1.35	Power off				DigIN Slot0.1	3551	
P3.5.1.36	Reset power on state				DigIN Slot0.1	3552	
P3.5.1.37	GSW Unlock				DigIN Slot0.1	3553	
P3.5.1.38	STO Status				DigIN Slot0.1	4401	
P3.5.1.39	Output Inductor TempSW 1				DigIN Slot0.2	3700	
P3.5.1.40	Output Inductor TempSW 2				DigIN Slot0.2	3701	
P3.5.1.41	Output Inductor TempSW 3				DigIN Slot0.2	3702	

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.5.1.42	Output Inductor TempSW 4				DigIN Slot0.2	3703	
P3.5.1.43	Output RC TempSW 1				DigIN Slot0.2	3704	
P3.5.1.44	Output RC TempSW 2				DigIN Slot0.2	3705	
P3.5.1.45	Output RC TempSW 3				DigIN Slot0.2	3706	
P3.5.1.46	Output RC TempSW 4				DigIN Slot0.2	3707	
P3.5.1.47	Output RC PressSW 1				DigIN Slot0.2	3708	
P3.5.1.48	Output RC PressSW 2				DigIN Slot0.2	3709	
P3.5.1.49	Output RC PressSW 3				DigIN Slot0.2	3710	
P3.5.1.50	Output RC PressSW 4				DigIN Slot0.2	3711	

Table 50: Analog Input 1 Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.5.2.1.1	AI1 Signal Selection				AnIN SlotA.1	377	
P3.5.2.1.2	AI1 Signal Filter Time	0.00	300.00	s	0.10	378	
P3.5.2.1.3	AI1 Signal Range	0	1		0	379	0 = 0…10 V / 0…20 mA 1 = 2…10 V / 4…20 mA
P3.5.2.1.4	AI1 Custom. Min	-160.00	160.00	%	0.00	380	
P3.5.2.1.5	AI1 Custom. Max	-160.00	160.00	%	100.00	381	
P3.5.2.1.6	AI1 Signal Inversion	0	1		0	387	0 = Normal 1 = Signal inverted

Table 51: Analog Input 2 Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.5.2.2.1	AI2 Signal Selection				AnIN SlotA.2	388	See P3.5.2.1.1.
P3.5.2.2.2	AI2 Signal Filter Time	0.00	300.00	s	0.10	389	See P3.5.2.1.2.
P3.5.2.2.3	AI2 Signal Range	0	1		1	390	See P3.5.2.1.3.
P3.5.2.2.4	AI2 Custom. Min	-160.00	160.00	%	0.00	391	See P3.5.2.1.4.
P3.5.2.2.5	AI2 Custom. Max	-160.00	160.00	%	100.00	392	See P3.5.2.1.5.
P3.5.2.2.6	AI2 Signal Inversion	0	1		0	398	See P3.5.2.1.6.

Table 52: Analog Input 3 Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.5.2.3.1	AI3 Signal Selection				AnIN SlotD.1	141	See P3.5.2.1.1.
P3.5.2.3.2	AI3 Signal Filter Time	0.00	300.00	s	0.10	142	See P3.5.2.1.2.
P3.5.2.3.3	AI3 Signal Range	0	1		0	143	See P3.5.2.1.3.
P3.5.2.3.4	AI3 Custom. Min	-160.00	160.00	%	0.00	144	See P3.5.2.1.4.
P3.5.2.3.5	AI3 Custom. Max	-160.00	160.00	%	100.00	145	See P3.5.2.1.5.
P3.5.2.3.6	AI3 Signal Inversion	0	1		0	151	See P3.5.2.1.6.

Table 53: Analog Input 4 Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.5.2.4.1	AI4 Signal Selection				AnIN SlotD.2	152	See P3.5.2.1.1.
P3.5.2.4.2	AI4 Signal Filter Time	0.00	300.00	s	0.10	153	See P3.5.2.1.2.
P3.5.2.4.3	AI4 Signal Range	0	1		0	154	See P3.5.2.1.3.
P3.5.2.4.4	AI4 Custom. Min	-160.00	160.00	%	0.00	155	See P3.5.2.1.4.
P3.5.2.4.5	AI4 Custom. Max	-160.00	160.00	%	100.00	156	See P3.5.2.1.5.
P3.5.2.4.6	AI4 Signal Inversion	0	1		0	162	See P3.5.2.1.6.

Table 54: Analog Input 5 Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.5.2.5.1	AI5 Signal Selection				AnIN SlotE.1	188	See P3.5.2.1.1.
P3.5.2.5.2	AI5 Signal Filter Time	0.00	300.00	s	0.10	189	See P3.5.2.1.2.
P3.5.2.5.3	AI5 Signal Range	0	1		0	190	See P3.5.2.1.3.
P3.5.2.5.4	AI5 Custom. Min	-160.00	160.00	%	0.00	191	See P3.5.2.1.4.
P3.5.2.5.5	AI5 Custom. Max	-160.00	160.00	%	100.00	192	See P3.5.2.1.5.
P3.5.2.5.6	AI5 Signal Inversion	0	1		0	198	See P3.5.2.1.6.

Table 55: Analog Input 6 Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.5.2.6.1	AI6 Signal Selection				AnIN SlotE.2	199	See P3.5.2.1.1.
P3.5.2.6.2	AI6 Signal Filter Time	0.00	300.00	s	0.10	200	See P3.5.2.1.2.

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.5.2.6.3	AI6 Signal Range	0	1		0	201	See P3.5.2.1.3.
P3.5.2.6.4	AI6 Custom. Min	-160.00	160.00	%	0.00	203	See P3.5.2.1.4.
P3.5.2.6.5	AI6 Custom. Max	-160.00	160.00	%	100.00	204	See P3.5.2.1.5.
P3.5.2.6.6	AI6 Signal Inversion	0	1		0	209	See P3.5.2.1.6.

N O T I C E

Shows only the parameters for the outputs on option boards in slots C, D, and E. Make the selections as in RO1 Function (P3.5.3.2.1). This group or these parameters are not visible if there are no digital outputs in slots C, D, or E.

Table 56: Digital Output Settings on Standard I/O Board

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.5.3.2.1	RO1 Function	0	40		3	11001	0 = Not used 1 = Test (always closed) 2 = Ready 3 = Run 4 = Fault 5 = Fault inverted 6 = Alarm 7 = Reverse 8 = At speed 9 = Thermistor fault 10 = Motor regulator active 11 = Start signal active 12 = Keypad control active 13 = I/O B control activated 14 = Limit supervision1 15 = Limit supervision2 16 = Jogging activated 17 = Preset frequency active 18 = Quick stop active 19 = PID in Sleep mode 20 = Fieldbus Control- Word B13 21 = Fieldbus Control- Word B14 22 = Fieldbus Control- Word B15 23 = Fieldbus Process- Data1.B0 24 = Fieldbus Process- Data1.B1 25 = Fieldbus Process- Data1.B2 26 = Mechanical brake (Open brake command) 27 = Mechanical brake inverted 28 = Motor Switch Open 29 = Mains contactor permissive 30 = Mains contactor close 31 = Precharge permissive 32 = INU run enable

Index	Parameter	Min	Max	Unit	De-fault	ID	Description
							33 = Precharge ready 34 = Precharge started 35 = Precharge inhibit 36 = Precharge coil 37 = HXL coil 38 = MV HX coil 39 = LV HX coil 40 = MCB coil
P3.5.3.2.2	RO1 ON De-lay	0.00	320.00	s	0.00	11002	
P3.5.3.2.3	RO1 OFF Delay	0.00	320.00	s	0.00	11003	
P3.5.3.2.4	RO2 Func-tion	0	56		4	11004	See P3.5.3.2.1.
P3.5.3.2.5	RO2 ON De-lay	0.00	320.00	s	0.00	11005	See P3.5.3.2.2.
P3.5.3.2.6	RO2 OFF Delay	0.00	320.00	s	0.00	11006	See P3.5.3.2.3.
P3.5.3.2.7	RO3 Func-tion	0	56		2	11007	See P3.5.3.2.1. Not visible if only 2 output relays are installed.
P3.5.3.2.8	RO3 ON De-lay	0.00	320.00	s	0.00	11008	See P3.5.3.2.2. Not visible if only 2 output relays are installed.
P3.5.3.2.9	RO3 OFF Delay	0.00	320.00	s	0.00	11009	See P3.5.3.2.3. Not visible if only 2 output relays are installed.

Table 57: Digital Output Settings on MV Star Board

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.5.3.6.1	RO1 Function	0	21		0	6040	0 = Not used 1 = Test (always closed) 2 = Ready 3 = Run 4 = Fault 5 = Fault inverted 6 = Alarm 7 = Fieldbus Control- Word B13 8 = Fieldbus Control- Word B14 9 = Fieldbus Control- Word B15 10 = Fieldbus Process- Data1.B0 11 = Fieldbus Process- Data1.B1 12 = Fieldbus Process- Data1.B2 13 = Main contactor permissive 14 = Main contactor close

Index	Parameter	Min	Max	Unit	Default	ID	Description
							15 = Precharge permissive 16 = GSW unlock 17 = Run cooling 18 = Close breaker 19 = STO active 20 = Pulse close breaker 21 = Pulse open breaker
P3.5.3.6.2	RO2 Function	0	21		0	6041	See ID 6040.
P3.5.3.6.3	RO3 Function	0	21		0	6042	See ID 6040.

⚠ W A R N I N G ⚠

Do not close the main breaker manually or through a control place other than the VACON® 3000.

N O T I C E

Shows only the parameters for the outputs on option boards in slots C, D, and E. Make the selections as in Basic AO1 Function (P3.5.4.1.1). This group or these parameters are not visible if there are no digital outputs in slots C, D, or E.

Table 58: Analog Output Settings on Standard I/O board

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.5.4.1.1	AO1 function	0	31		2	10050	0 = TEST 0% 1 = TEST 100% 2 = Output freq (0 - fmax) 3 = Freq reference (0 - fmax) 4 = Motor speed (0 - Motor nominal speed) 5 = Output current (0 - InMotor) 6 = Motor torque (0 - TnMotor) 7 = Motor power (0 - PnMotor) 8 = Motor voltage (0 - UnMotor) 9 = DC-link voltage (0 - 1000V) 10 = PID Setpoint (0-100%) 11 = PID Feedback (0-100%) 12 = PID output (0-100%) 13 = ProcessDataIn1 (0-100%) 14 = ProcessDataIn2 (0-100%) 15 = ProcessDataIn3 (0-100%) 16 = ProcessDataIn4 (0-100%) 17 = ProcessDataIn5 (0-100%) 18 = ProcessDataIn6 (0-100%) 19 = ProcessDataIn7 (0-100%) 20 = ProcessDataIn8 (0-100%)
P3.5.4.1.2	AO1 filter time	0.0	300.0	s	1.00	10051	0 = No filtering
P3.5.4.1.3	AO1 minimum signal	0	1		0	10052	0 = 0 mA / 0 V

Index	Parameter	Min	Max	Unit	Default	ID	Description
							1 = 4 mA / 2 V
P3.5.4.1.4	AO1 minimum scale			Hz	0.00	10053	
P3.5.4.1.5	AO1 maximum scale			Hz	0.00	10054	

4.5.6 Group 3.6: Fieldbus Data Mapping

Table 59: Fieldbus Data Mapping parameters

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.6.1	Fieldbus Data Out 1 Selection	0	35000		1	852	
P3.6.2	Fieldbus Data Out 2 Selection	0	35000		2	853	
P3.6.3	Fieldbus Data Out 3 Selection	0	35000		3	854	
P3.6.4	Fieldbus Data Out 4 Selection	0	35000		4	855	
P3.6.5	Fieldbus Data Out 5 Selection	0	35000		5	856	
P3.6.6	Fieldbus Data Out 6 Selection	0	35000		6	857	
P3.6.7	Fieldbus Data Out 7 Selection	0	35000		7	858	
P3.6.8	Fieldbus Data Out 8 Selection	0	35000		37	859	
P3.6.9	Fieldbus Data Out 9 Selection	0	35000		0	890	
P3.6.10	Fieldbus Data Out 10 Selection	0	35000		0	891	
P3.6.11	Fieldbus Data Out 11 Selection	0	35000		0	892	
P3.6.12	Fieldbus Data Out 12 Selection	0	35000		0	893	
P3.6.13	Fieldbus Data Out 13 Selection	0	35000		0	894	
P3.6.14	Fieldbus Data Out 14 Selection	0	35000		0	895	
P3.6.15	Fieldbus Data Out 15 Selection	0	35000		0	896	
P3.6.16	Fieldbus Data Out 16 Selection	0	35000		0	897	
P3.6.17	Fieldbus Data In 1 Selection				0	6400	
P3.6.18	Fieldbus Data In 2 Selection				0	6401	
P3.6.19	Fieldbus Data In 3 Selection				0	6402	
P3.6.20	Fieldbus Data In 4 Selection				0	6403	
P3.6.21	Fieldbus Data In 5 Selection				0	6404	
P3.6.22	Fieldbus Data In 6 Selection				0	6405	

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.6.23	Fieldbus Data In 7 Selection				0	6406	
P3.6.24	Fieldbus Data In 8 Selection				0	6407	
P3.6.25	Fieldbus Data In 9 Selection				0	6408	
P3.6.26	Fieldbus Data In 10 Selection				0	6409	
P3.6.27	Fieldbus Data In 11 Selection				0	6410	
P3.6.28	Fieldbus Data In 12 Selection				0	6411	
P3.6.29	Fieldbus Data In 13 Selection				0	6412	
P3.6.30	Fieldbus Data In 14 Selection				0	6413	
P3.6.31	Fieldbus Data In 15 Selection				0	6414	
P3.6.32	Fieldbus Data In 16 Selection				0	6415	
P3.6.33	Fieldbus profile	1	2		1	6417	1 = Standard 2 = Bypass

Table 60: The default values for Process Data Out in fieldbus

Data	Default Value	Scale
Process Data Out 1	Output frequency	0.01 Hz
Process Data Out 2	Motor speed	1 rpm
Process Data Out 3	Motor current	0.1 A
Process Data Out 4	Motor torque	0.1%
Process Data Out 5	Motor power	0.1%
Process Data Out 6	Motor voltage	0.1 V
Process Data Out 7	DC link voltage	1 V
Process Data Out 8	Last active fault code	1

Example

The value 2500 for Output frequency equals 25.00 Hz, because the scale is 0.01. All the monitoring values that you can find in the Monitor menu are given the scale value.

4.5.7 Group 3.7: Prohibit Frequencies

Table 61: Prohibit Frequencies Parameters

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.7.1	Prohibit Frequency Range 1 Low Limit	-1.00	320.00	Hz	0.00	509	0 = Not used
P3.7.2	Prohibit Frequency Range 1 High Limit	0.00	320.00	Hz	0.00	510	0 = Not used
P3.7.3	Prohibit Frequency Range 2 Low Limit	0.00	320.00	Hz	0.00	511	0 = Not used
P3.7.4	Prohibit Frequency Range 2 High Limit	0.00	320.00	Hz	0.00	512	0 = Not used

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.7.5	Prohibit Frequency Range 3 Low Limit	0.00	320.00	Hz	0.00	513	0 = Not used
P3.7.6	Prohibit Frequency Range 3 High Limit	0.00	320.00	Hz	0.00	514	0 = Not used
P3.7.7	Ramp Time Factor	0.1	10.0	Times	1.0	518	

4.5.8 Group 3.8 Supervisions

Table 62: Supervision Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.8.1	Supervision #1 Item Selection	0	14		0	1431	0 = Output frequency 1 = Frequency reference 2 = Motor current 3 = Motor torque 4 = Motor power 5 = DC-link voltage 6 = Analogue input 1 7 = Analogue input 2 8 = Analogue input 3 9 = Analogue input 4 10 = Analogue input 5 11 = Analogue input 6 12 = Temperature input 1 13 = Temperature input 2 14 = Temperature input 3
P3.8.2	Supervision #1 Mode	0	2		0	1432	0 = Not used 1 = Low limit supervision 2 = High limit supervision
P3.8.3	Supervision #1 Limit	-50.00	50.00	Varies	25.00	1433	
P3.8.4	Supervision #1 Limit Hysteresis	0.00	50.00	Varies	5.00	1434	
P3.8.5	Supervision #2 Item Selection	0	17		1	1435	See P3.8.1
P3.8.6	Supervision #2 Mode	0	2		0	1436	See P3.8.2
P3.8.7	Supervision #2 Limit	-50.00	50.00	Varies	40.00	1437	
P3.8.8	Supervision #2 Limit Hysteresis	0.00	50.00	Varies	5.00	1438	

4.5.9 Group 3.9: Protections

Table 63: General protection settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.9.1.1	Preset Alarm Frequency	P3.3.1.1	P3.3.1.2	Hz	25.00	183	
P3.9.1.2	Response to External Fault	0	3		2	701	0 = No action 1 = Alarm

Index	Parameter	Min	Max	Unit	Default	ID	Description
							2 = Fault (Stop according to stop function) 3 = Fault (Stop by coasting)
P3.9.1.3	Undervoltage Fault	0	1		0	727	0 = Fault stored in history 1 = Fault not stored in history
P3.9.1.4	Response to Output Phase Fault	0	3		2	702	See P3.9.1.2.
P3.9.1.5	Response to Fieldbus Communication Fault	0	5		3	733	0 = No action 1 = Alarm 2 = Alarm + preset fault frequency (P3.9.1.1) 3 = Fault (Stop according to stop function) 4 = Fault (Stop by coasting)
P3.9.1.6	Slot Communication Fault	0	3		2	734	See P3.9.1.2.
P3.9.1.7	Thermistor Fault	0	3		0	732	See P3.9.1.2.
P3.9.1.8	Earth Fault	0	3		3	703	See P3.9.1.2.
P3.9.1.9	Response to Safe Torque Off (STO) Fault	0	2		2	775	0 = No action 1 = Alarm 2 = Fault (Stop by coasting)
P3.9.1.10	Fieldbus watchdog fault mode	0	3		0	1807	See ID 701
P3.9.1.11	Fieldbus watchdog delay			s	2.00	1808	0 = Watchdog disabled
P3.9.1.12	Startup Prevented Fault	0	1		0	15593	0 = Fault 1 = No action
P3.9.1.13	Redundant Switchover Indication	0	2		1	750	0 = No action 1 = Alarm 2 = Alarm + Autoreset
P3.9.1.14	FBCommFlt Force Delay			s	0.00	751	
P3.9.1.15	FBCommFlt Clear Delay			s	0.00	752	
P3.9.1.17	Output Filter	0	3		3	4038	0 = No action 1 = Alarm 2 = Fault 3 = Fault, coast
P3.9.1.18	Enclosure Humidity and Temperature	0	3		1	3360	0 = No action 1 = Alarm 2 = Fault

Index	Parameter	Min	Max	Unit	Default	ID	Description
							3 = Fault, coast
P3.9.1.19	Current imbalance - Belt	0	2		1	4039	0 = No action 1 = Alarm 2 = Fault, coast
P3.9.1.20	Neutral to ground fault response	0	1		1	4040	0 = No action 1 = Fault, coast

Table 64: Motor thermal protection settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.9.2.1	Motor Thermal Protection	0	3		2	704	0 = No action 1 = Alarm 2 = Fault (Stop by stop mode) 3 = Fault (Stop by coasting)
P3.9.2.2	Ambient Temperature	-20.0	100.0	°C	40.0	705	
P3.9.2.3	Zero Speed Cooling Factor	5.0	150.0	%	Varies	706	
P3.9.2.4	Motor Thermal Time Constant	1	200	min	Varies	707	
P3.9.2.5	Motor Thermal Loadability	10	150	%	100	708	

Table 65: Motor stall protection settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.9.3.1	Motor Stall Fault	0	3		0	709	0 = No action 1 = Alarm 2 = Fault (Stop according to stop mode) 3 = Fault (Stop by coasting)
P3.9.3.2	Stall Current	0.00	Varies	A	0	710	
P3.9.3.3	Stall Time Limit	1.00	120.00	s	15.00	711	
P3.9.3.4	Stall Frequency Limit	1.00	P3.3.1.2	Hz	25.00	712	

Table 66: Motor underload protection settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.9.4.1	Underload Fault	0	3		0	713	0 = No action 1 = Alarm 2 = Fault (Stop according to stop mode)

Index	Parameter	Min	Max	Unit	Default	ID	Description
							3 = Fault (Stop by coasting)
P3.9.4.2	Underload Protection: Field Weakening Area Load	10.0	150.0	%	50.0	714	
P3.9.4.3	Underload Protection: Zero Frequency Load	5.0	150.0	%	10.0	715	
P3.9.4.4	Underload Protection: Time Limit	2.00	600.00	s	20.00	716	

Table 67: Quick stop settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.9.5.1	Quick Stop Mode	0	2		1	1276	0 = Coasting 1 = Quick stop deceleration time 2 = Stop according to Stop function (P3.2.5)
P3.9.5.2	Quick Stop Activation	Varies	Varies		DigIN Slot0.2	1213	OPEN = Activated
P3.9.5.3	Quick Stop Deceleration Time	0.1	300.0	s	3.0	1256	
P3.9.5.4	Response to Quick Stop Fault	0	2		1	744	0 = No action 1 = Alarm 2 = Fault (Stop according to Quick stop mode)

Table 68: Temperature input fault 1 settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.9.6.1[(1)]	Temperature Signal 1	0	63		0	739	B0 = Temperature Signal 1 B1 = Temperature Signal 2 B2 = Temperature Signal 3
P3.9.6.2[(1)]	Alarm Limit 1	-30.0	200.0	°C	130.0	741	
P3.9.6.3[(1)]	Fault Limit 1	-30.0	200.0	°C	155.0	742	
P3.9.6.4[(1)]	Fault Limit Response 1	0	3		2	740	0 = No response 1 = Alarm 2 = Fault (Stop according to stop mode) 3 = Fault (Stop by coasting)

[1] Temperature input settings are only available if a B8 or BH option board is installed.

Table 69: Temperature input fault 2 settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.9.7.1[(1)]	Temperature Signal 2	0	63		0	763	B0 = Temperature Signal 1 B1 = Temperature Signal 2

Index	Parameter	Min	Max	Unit	Default	ID	Description
							B2 = Temperature Signal 3
P3.9.7.2[1]	Alarm Limit 2	-30.0	200.0	°C	130.0	764	
P3.9.7.3[1]	Fault Limit 2	-30.0	200.0	°C	155.0	765	
P3.9.7.4[1]	Fault Limit Response 2	0	3		2	766	0 = No response 1 = Alarm 2 = Fault (Stop according to stop mode) 3 = Fault (Stop by coasting)

[1] Temperature input settings are only available if a B8 or BH option board is installed.

Table 70: AI low protection settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.9.8.1	Analog Input Low Protection	0	2		2	767	0 = No protection 1 = Protection enabled in Run state 2 = Protection enabled in Run and Stop state
P3.9.8.2	Analog Input Low Fault	0	5		0	700	0 = No action 1 = Alarm 2 = Alarm + preset fault frequency (P3.9.1.1) 3 = Alarm + previous frequency reference 4 = Fault (Stop according to stop mode) 5 = Fault (Stop by coasting)

Table 71: User Defined Fault 1

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.9.9.1	User Defined Fault 1	-	-		DigIN Slot0.1	15523	OPEN = No operation CLOSED = Fault activated
P3.9.9.2	Response to User Defined Fault 1	0	3		3	15525	0 = No action 1 = Alarm 2 = Fault (Stop according to stop function) 3 = Fault (Stop by coasting)

Table 72: User Defined Fault 2

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.9.10.1	User Defined Fault 2	-	-		DigIN Slot0.1	15524	OPEN = No operation CLOSED = Fault activated
P3.9.10.2	Response to User Defined Fault 2	0	3		3	15526	0 = No action 1 = Alarm 2 = Fault (Stop according to stop function) 3 = Fault (Stop by coasting)

Table 73: Speed Error

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.9.11.1	Speed error fault response	0	3		0	4032	0 = No action 1 = Alarm 2 = Fault (Stop according to stop function) 3 = Fault (Stop by coasting)
P3.9.11.2	Speed error limit			%	0.00	4030	
P3.9.11.3	Speed error delay			s	0.00	4031	
P3.9.11.4	Over speed fault response				0	780	See P3.9.11.1.
P3.9.11.5	Speed Delta Error Fault Response				0	4036	See P3.9.11.1.
P3.9.11.6	Speed Difference Limit			rpm	0	4034	
P3.9.11.7	Speed Difference Fault Delay			s	0.00	4035	

Table 74: Thermal

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.9.12.1	Coolant temperature input select	0	14		0	3308	0 = Not used 1 = AI1 2 = AI2 3 = AI3 4 = AI4 5 = AI5 6 = AI6 7 = ProcessDataIn1 8 = ProcessDataIn2 9 = ProcessDataIn3 10 = ProcessDataIn4 11 = ProcessDataIn5 12 = ProcessDataIn6 13 = ProcessDataIn7 14 = ProcessDataIn8
P3.9.12.2	Coolant scale minimum			°C	0.0	3366	
P3.9.12.3	Coolant scale maximum			°C	100.0	3367	
P3.9.12.4	FB coolant decimal places	0	1		0	3365	0 = 2D 1 = 1D
P3.9.12.5	DTM backwards compatibility mode	0	1		0	3307	0 = Disabled 1 = Enabled
P3.9.12.6	PHM temperature sensor disable				0	3306	Bit value 1 = Disable b0 = Module #2 b1 = Module #3 b2 = Module #4 b3 = Module #5 b4 = Module #6

Index	Parameter	Min	Max	Unit	Default	ID	Description
							b5 = Module #7

4.5.10 Group 3.10: Automatic Reset

Table 75: Automatic Reset Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.10.1	Automatic Reset	0	1		0	731	0 = Disabled 1 = Enabled
P3.10.2	Restart Function	0	1		1	719	0 = Flying start 1 = Start function
P3.10.3	Wait Time	0.10	10000.00	s	0.50	717	
P3.10.4	Trial Time	0.00	10000.00	s	60.00	718	
P3.10.5	Number of Trials	1	10		4	759	
P3.10.6	Autoreset: Undervoltage	0	1		1	720	0 = No 1 = Yes
P3.10.7	Autoreset: Overvoltage	0	1		1	721	0 = No 1 = Yes
P3.10.8	Autoreset: Overcurrent	0	1		1	722	0 = No 1 = Yes
P3.10.9	Autoreset: AI Low	0	1		1	723	0 = No 1 = Yes
P3.10.10	Autoreset: Unit Overtemperature	0	1		1	724	0 = No 1 = Yes
P3.10.11	Autoreset: Motor Overtemperature	0	1		1	725	0 = No 1 = Yes
P3.10.12	Autoreset: External Fault	0	1		0	726	0 = No 1 = Yes
P3.10.13	Autoreset: Underload Fault	0	1		0	738	0 = No 1 = Yes

4.5.11 Group 3.11: Application Settings

Table 76: Application Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.11.1	Password	0	9999		0	1806	
P3.11.2	C/F Selection	0	1		0[(1)]	1197	0 = Celsius

Index	Parameter	Min	Max	Unit	Default	ID	Description
							1 = Fahrenheit
P3.11.3	kW/hp Selection	0	1		0[1]	1198	0 = kW 1 = hp
P3.11.4	Multimonitor View	0	2		1	1196	0 = 2x2 sections 1 = 3x2 sections 2 = 3x3 sections
P3.11.5	FUNCT Button Configuration	0	15		15	1195	B0 = Local / Remote B1 = Control Page B2 = Change Direction B3 = Quick Edit
P3.11.6	Motor speed filter time			s	0.00	4026	

[1] The default value in the US is 1.

4.5.12 Group 3.12: PID Controller

Table 77: PID Controller Basic Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.12.1.1	PID Gain	0.00	1000.00	%	100.00	118	
P3.12.1.2	PID Integration Time	0.00	600.00	s	1.00	119	
P3.12.1.3	PID Derivation Time	0.00	100.00	s	0.00	132	
P3.12.1.4	Process Unit Selection	1	38		1	1036	
P3.12.1.5	Process Unit Min	Varies	Varies	Varies	0	1033	
P3.12.1.6	Process Unit Max	Varies	Varies	Varies	100	1034	
P3.12.1.7	Process Unit Decimals	0	4		2	1035	
P3.12.1.8	Error Inversion	0	1		0	340	0 = Normal (Feedback < Setpoint -> Increase PID output) 1 = Inverted (Feedback < Setpoint -> Decrease PID output)
P3.12.1.9	Dead Band	Varies	Varies	Varies	0	1056	
P3.12.1.10	Dead Band Delay	0.00	320.00	s	0.00	1057	

Table 78: Setpoint Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.12.2.1	Keypad setpoint 1	Varies	Varies	Varies	0	167	
P3.12.2.2	Keypad setpoint 2	Varies	Varies	Varies	0	168	
P3.12.2.3	Setpoint ramp time	0.00	300.0	s	0.00	1068	
P3.12.2.4	PID select setpoint	Varies	Varies		DigIN Slot0.1	1047	OPEN = Setpoint 1 CLOSED = Setpoint 2
P3.12.2.5	Setpoint source 1 selection	0	16		1	332	0 = Not used 1 = Keypad setpoint 1 2 = Keypad setpoint 2 3 = AI1 4 = AI2 5 = AI3 6 = AI4 7 = AI5 8 = AI6 9 = ProcessDataIn1 10 = ProcessDataIn2 11 = ProcessDataIn3 12 = ProcessDataIn4 13 = ProcessDataIn5 14 = ProcessDataIn6 15 = ProcessDataIn7 16 = ProcessDataIn8
P3.12.2.6	Setpoint 1 minimum	-200.00	200.00	%	0.00	1069	
P3.12.2.7	Setpoint 1 maximum	-200.00	200.00	%	100.00	1070	
P3.12.2.8	Setpoint source 2 selection	0	22		2	431	See P3.12.2.5.
P3.12.2.9	Setpoint 2 minimum	-200.00	200.00	%	0.00	1073	See P3.12.2.6.
P3.12.2.10	Setpoint 2 maximum	-200.00	200.00	%	100.00	1074	See P3.12.2.7.

Table 79: Feedback Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.12.3.1	Feedback Function Gain	-2100.0	2100.0	%	100.0	1058	
P3.12.3.2	Feedback 1 Source Selection	0	14		2	334	0 = Not used 1 = AI1 2 = AI2 3 = AI3 4 = AI4 5 = AI5 6 = AI6 7 = ProcessDataIn1 8 = ProcessDataIn2

Index	Parameter	Min	Max	Unit	Default	ID	Description
							9 = ProcessDataIn3 10 = ProcessDataIn4 11 = ProcessDataIn5 12 = ProcessDataIn6 13 = ProcessDataIn7 14 = ProcessDataIn8
P3.12.3.3	Feedback 1 Minimum	-200.00	200.00	%	0.00	336	
P3.12.3.4	Feedback 1 Maximum	-200.00	200.00	%	100.00	337	

Table 80: Sleep Function Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.12.4.1	SP1 Sleep Frequency	0.00	320.00	Hz	0.00	1016	
P3.12.4.2	SP1 Sleep Delay	0	300	s	0	1017	
P3.12.4.3	SP1 Wake-up Level			%	0.0000	1018	
P3.12.4.4	SP2 Sleep Frequency	0.00	320.00	Hz	0.00	1075	See P3.12.4.1.
P3.12.4.5	SP2 Sleep Delay	0	3000	s	0	1076	See P3.12.4.2.
P3.12.4.6	SP2 Wake-up Level			%	0.0000	1077	See P3.12.4.3.

4.5.13 Group 3.13: Motor Preheat Parameters

Table 81: Motor Preheat Parameters

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.13.1	Motor Preheat Function	0	4		0	1225	0 = Not used 1 = Always in stop state 2 = Controlled by DI 3 = Temperature limit 4 = Temperature limit (Measured motor temperature)
P3.13.2	Preheat Temperature Limit	-20	100	°C	0	1226	
P3.13.3	Motor Preheat Current	0	31048	A	0	1227	
P3.13.4	Motor Preheat ON	Varies	Varies		DigIN Slot0.1	1044	OPEN = No action CLOSED = Preheat activated in Stop state
P3.13.5	Preheat Motor Temperature	0	3		0	1045	0 = Not used 1 = Temperature Input 1 2 = Temperature Input 2

Index	Parameter	Min	Max	Unit	Default	ID	Description
							3 = Temperature Input 3

4.5.14 Group 3.14: Mechanical Brake

Table 82: Mechanical Brake Parameters

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.14.1	Brake Control	0	2		0	1541	0 = Disabled 1 = Enabled 2 = Enabled with brake status supervision
P3.14.2	Brake Mechanical Delay	0.00	60.00	s	0.00	1544	
P3.14.3	Brake Opening Frequency Limit	0	P3.3.1.2	Hz	2.00	1535	
P3.14.4	Brake Closing Frequency Limit	0	P3.3.1.2	Hz	2.00	1539	
P3.14.5	Brake Current Limit	0.0	Varies	A	0.0	1085	
P3.14.6	Brake Fault Delay	0.00	60.00	s	2.00	352	
P3.14.7	Response to Brake Fault	0	3		0	1316	0 = No action 1 = Alarm 2 = Fault (Stop according to stop mode) 3 = Fault (Stop by coasting)
P3.14.8	Brake Feedback				DigIN Slot0.1	1210	

4.5.15 Group 3.15: Encoders

Table 83: Encoder Parameters

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.15.2	Encoder Repeat Channel	0	1		0	3001	0 = Channel A 1 = Channel B
P3.15.3	Encoder Advanced Control Word				0	3003	b0 = Encoder A fallback during error timeout b1 = Encoder A no action with fallback b2 = Encoder A fault rather than fallback during startup
M3.15.4	Channel A						See Table 84.
M3.15.5	Channel B						See Table 85.

Table 84: Channel A Settings

Index	Parameter	Min	Max	Unit	De-fault	ID	Description
P3.15.4.1	Input Control	0	255		0	3010	1 = Input A: Single Ended Signaling 2 = Input A: Active Low Signaling 4 = Input B: Single Ended Signaling 8 = Input B: Active Low Signaling 16 = Input Z: Single Ended Signaling 32 = Input Z: Active Low Signaling 64 = Input M: Single Ended Signal-ing 128 = Input M: Active Low Signaling
P3.15.4.2	Input AB Swap	0	1		0	3011	0 = No 1 = Yes
P3.15.4.3	Encoder Debounce Time	0	3400	ns	250	3012	
P3.15.4.4	Marker Debounce Time	0	3400	ns	250	3013	
P3.15.4.5	Marker Event Mode	0	2		0	3014	0 = Input M Rising Edge 1 = Input M, Gated by Z 2 = Input Z Rising Edge
P3.15.4.6	Encoder Mode	0	3		0	3015	0 = Quadrature Mode 1 = Directional Pulse Mode 3 = Pulse + Direction Mode
P3.15.4.7	Resolution Prescale	1	16		0	3016	
P3.15.4.8	Hysteresis Filter Prescale	0	14		0	3017	Prescaler: 0 = /2 1 = /4 2 = /8 3 = /16 4 = /32 5 = /64 6 = /128 7 = /256 8 = /512 9 = /1024 10 = /2048 11 = /4096 12 = /8192 13 = /16384 14 = /32768
P3.15.4.9	Encoder Resolution	0	524288		2048	3018	
P3.15.4.10	Motor Pole Pairs	0	255		2	3019	
P3.15.4.11	Offset Mode	0	2		0	3020	0 = Manual Offset 1 = Auto upon first Z pulse 2 = Auto upon first M pulse

Index	Parameter	Min	Max	Unit	De-fault	ID	Description
P3.15.4.12	Manual Offset	-524288	524288	deg	0	3021	
P3.15.4.13	Filter Time Constant	0.00	1000.00	ms	0.00	3022	
P3.15.4.14	Frequency monitor A timeout	0.0	10000.0	ms	20.0	3024	
P3.15.4.15	Frequency monitor A re-sponse	0	2		2	3025	0 = Issue fault 1 = Fallback to alternate encoder 2 = Fallback to sensorless operation
P3.15.4.16	HW Glitch Filter Time				0	3027	0 = HW error disabled
P3.15.4.17	SW Detection Limit			Hz	0.000	3028	0 = SW error disabled
P3.15.4.18	Encoder Repeated Error Limit			ms	0.0	3029	

Table 85: Channel B Settings

Index	Parameter	Min	Max	Unit	De-fault	ID	Description
P3.15.5.1	Input Control	0	255		0	3030	1 = Input A: Single Ended Signaling 2 = Input A: Active Low Signaling 4 = Input B: Single Ended Signaling 8 = Input B: Active Low Signaling 16 = Input Z: Single Ended Signaling 32 = Input Z: Active Low Signaling 64 = Input M: Single Ended Signaling 128 = Input M: Active Low Signaling
P3.15.5.2	Input AB Swap	0	1		0	3031	0 = No 1 = Yes
P3.15.5.3	Encoder Debounce Time	0	3400	ns	250	3032	
P3.15.5.4	Marker Debounce Time	0	3400	ns	250	3033	
P3.15.5.5	Marker Event Mode	0	2		0	3034	0 = Input M Rising Edge 1 = Input M, Gated by Z 2 = Input Z Rising Edge
P3.15.5.6	Encoder Mode	0	3		0	3035	0 = Quadrature Mode 1 = Directional Pulse Mode 3 = Pulse + Direction Mode
P3.15.5.7	Resolution Prescale	1	16		0	3036	
P3.15.5.8	Hysteresis Filter Prescale	0	14		0	3037	Prescaler: 0 = /2 1 = /4 2 = /8 3 = /16 4 = /32 5 = /64

Index	Parameter	Min	Max	Unit	De-fault	ID	Description
							6 = /128 7 = /256 8 = /512 9 = /1024 10 = /2048 11 = /4096 12 = /8192 13 = /16384 14 = /32768
P3.15.5.9	Encoder Resolution	0	524288		2048	3038	
P3.15.5.10	Motor Pole Pairs	0	255		2	3039	
P3.15.5.11	Offset Mode	0	2		0	3040	0 = Manual Offset 1 = Auto upon first Z pulse 2 = Auto upon first M pulse
P3.15.5.12	Manual Offset	-524288	524288	deg	0	3041	
P3.15.5.13	Filter Time Constant	0.00	1000.00	ms	0.00	3042	
P3.15.5.14	Frequency monitor B timeout	0.0	10000.0	ms	0.0	3044	
P3.15.5.15	Frequency monitor B response	0	2		0	3045	0 = Issue fault 1 = Fallback to alternate encoder 2 = Fallback to sensorless operation

4.5.16 Group 3.17: Precharge

Table 86: Digital Output Parameters

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.17.1.1	MV star relay configuration				0	3403	
P3.17.1.2	Aux 1A relay configuration				0	3407	

Table 87: Digital Input Common Parameters

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.17.2.1.1	PCC Interlock				DigIN Slot0.1	3315	
P3.17.2.1.2	Enable PC feedback MVS DIN1				Disabled	3400	
P3.17.2.1.3	Enable MX feedback MVS DIN2				Disabled	3401	
P3.17.2.1.4	Enable KMX feedback MVS DIN3				Disabled	3402	
P3.17.2.1.5	Aux14 KPC feedback configuration				0	3404	
P3.17.2.1.6	Aux14 MX feedback configuration				0	3405	
P3.17.2.1.7	Aux14 KMX feedback configuration				0	3406	

Table 88: Digital Input Internal Control Parameters

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.17.2.2.1	Power on				DigIN Slot0.1	3550	
P3.17.2.2.2	Power off				DigIN Slot0.1	3551	
P3.17.2.2.3	Reset power on state				DigIN Slot0.1	3552	
P3.17.2.2.4	Arc Fault Relay Online				DigIN Slot0.2	3607	
P3.17.2.2.5	Arc Fault Relay Fault				DigIN Slot0.1	3608	
P3.17.2.2.6	Door Safety Interlock				DigIN Slot0.2	3609	
P3.17.2.2.7	GSW Unlock				DigIN Slot0.1	3553	
P3.17.2.2.8	DC choke overtemperature 1				DigIN Slot0.2	3600	
P3.17.2.2.9	DC choke overtemperature 2				DigIN Slot0.2	3601	
P3.17.2.2.10	DC capacitor overpressure 1				DigIN Slot0.2	3602	
P3.17.2.2.11	DC capacitor overpressure 2				DigIN Slot0.2	3603	
P3.17.2.2.12	DC capacitor overpressure 3				DigIN Slot0.2	3604	
P3.17.2.2.13	DC capacitor overpressure 4				DigIN Slot0.2	3605	
P3.17.2.2.14	GSW open 1				DigIN Slot0.2	3610	
P3.17.2.2.15	GSW open 2				DigIN Slot0.2	3611	
P3.17.2.2.16	GSW open 3				DigIN Slot0.2	3612	
P3.17.2.2.17	GSW open 4				DigIN Slot0.2	3613	
P3.17.2.2.18	GSW closed 1				DigIN Slot0.2	3614	
P3.17.2.2.19	GSW closed 2				DigIN Slot0.2	3615	
P3.17.2.2.20	GSW closed 3				DigIN Slot0.2	3616	
P3.17.2.2.21	GSW closed 4				DigIN Slot0.2	3617	
P3.17.2.2.22	Interlock NC 1				DigIN Slot0.2	3624	
P3.17.2.2.23	Interlock NC 2				DigIN Slot0.2	3625	
P3.17.2.2.24	Interlock NC 3				DigIN Slot0.2	3626	
P3.17.2.2.25	Interlock NC 4				DigIN Slot0.2	3627	
P3.17.2.2.26	Interlock NO 1				DigIN Slot0.1	3628	
P3.17.2.2.27	Interlock NO 2				DigIN Slot0.1	3629	
P3.17.2.2.28	Interlock NO 3				DigIN Slot0.1	3630	
P3.17.2.2.29	Interlock NO 4				DigIN Slot0.1	3631	
P3.17.2.2.30	Enc HX breaker status 1				DigIN Slot0.2	3632	
P3.17.2.2.31	Enc HX breaker status 2				DigIN Slot0.2	3633	
P3.17.2.2.32	Enc HX breaker status 3				DigIN Slot0.2	3634	

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.17.2.2.33	Enc HX breaker status 4				DigIN Slot0.2	3635	
P3.17.2.2.34	Temperature control breaker status 1				DigIN Slot0.2	3636	
P3.17.2.2.35	Temperature control breaker status 2				DigIN Slot0.2	3637	
P3.17.2.2.36	Temperature control breaker status 3				DigIN Slot0.2	3638	
P3.17.2.2.37	Temperature control breaker status 4				DigIN Slot0.2	3639	
P3.17.2.2.38	Cab HX status 1				DigIN Slot0.2	3640	
P3.17.2.2.39	Cab HX status 2				DigIN Slot0.2	3641	
P3.17.2.2.40	Cab HX status 3				DigIN Slot0.2	3642	
P3.17.2.2.41	Cab HX status 4				DigIN Slot0.2	3643	
P3.17.2.2.42	LD system OK 1				DigIN Slot0.2	3644	
P3.17.2.2.43	LD system OK 2				DigIN Slot0.2	3645	
P3.17.2.2.44	LD system OK 3				DigIN Slot0.2	3646	
P3.17.2.2.45	LD system OK 4				DigIN Slot0.2	3647	
P3.17.2.2.46	LD no leak 1				DigIN Slot0.2	3648	
P3.17.2.2.47	LD no leak 2				DigIN Slot0.2	3649	
P3.17.2.2.48	LD no leak 3				DigIN Slot0.2	3650	
P3.17.2.2.49	LD no leak 4				DigIN Slot0.2	3651	
P3.17.2.2.50	Hex fan status 1.1				DigIN Slot0.2	3656	
P3.17.2.2.51	Hex fan status 1.2				DigIN Slot0.2	3657	
P3.17.2.2.52	Hex fan status 1.3				DigIN Slot0.2	3658	
P3.17.2.2.53	Hex fan status 2.1				DigIN Slot0.2	3659	
P3.17.2.2.54	Hex fan status 2.2				DigIN Slot0.2	3660	
P3.17.2.2.55	Hex fan status 2.3				DigIN Slot0.2	3661	
P3.17.2.2.56	Hex fan status 3.1				DigIN Slot0.2	3662	
P3.17.2.2.57	Hex fan status 3.2				DigIN Slot0.2	3663	
P3.17.2.2.58	Hex fan status 3.3				DigIN Slot0.2	3664	
P3.17.2.2.59	Hex fan status 4.1				DigIN Slot0.2	3665	
P3.17.2.2.60	Hex fan status 4.2				DigIN Slot0.2	3666	
P3.17.2.2.61	Hex fan status 4.3				DigIN Slot0.2	3667	
P3.17.2.2.62	Cooling Monitor 1				DigIN Slot0.2	3670	
P3.17.2.2.63	Cooling Monitor 2				DigIN Slot0.2	3671	
P3.17.2.2.64	Cooling Monitor 3				DigIN Slot0.2	3672	

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.17.2.2.65	Cooling Monitor 4				DigIN Slot0.2	3673	
P3.17.2.2.66	Enclosure Humidity, Temp Status Invert				0	3736	
P3.17.2.2.67	Enclosure Humidity Status 1				DigIN Slot0.2	3720	
P3.17.2.2.68	Enclosure Humidity Status 2				DigIN Slot0.2	3721	
P3.17.2.2.69	Enclosure Humidity Status 3				DigIN Slot0.2	3722	
P3.17.2.2.70	Enclosure Humidity Status 4				DigIN Slot0.2	3723	
P3.17.2.2.71	Enclosure Temperature Status 1.1				DigIN Slot0.2	3724	
P3.17.2.2.72	Enclosure Temperature Status 1.2				DigIN Slot0.2	3725	
P3.17.2.2.73	Enclosure Temperature Status 1.3				DigIN Slot0.2	3726	
P3.17.2.2.74	Enclosure Temperature Status 2.1				DigIN Slot0.2	3727	
P3.17.2.2.75	Enclosure Temperature Status 2.2				DigIN Slot0.2	3728	
P3.17.2.2.76	Enclosure Temperature Status 2.3				DigIN Slot0.2	3729	
P3.17.2.2.77	Enclosure Temperature Status 3.1				DigIN Slot0.2	3730	
P3.17.2.2.78	Enclosure Temperature Status 3.2				DigIN Slot0.2	3731	
P3.17.2.2.79	Enclosure Temperature Status 3.3				DigIN Slot0.2	3732	
P3.17.2.2.80	Enclosure Temperature Status 4.1				DigIN Slot0.2	3733	
P3.17.2.2.81	Enclosure Temperature Status 4.2				DigIN Slot0.2	3734	
P3.17.2.2.82	Enclosure Temperature Status 4.3				DigIN Slot0.2	3735	

Table 89: Limits Parameters

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.17.3.1	Nom DC Precharge Voltage	5784.4	7862.0	V	0.0	3321	
P3.17.3.2	Min DC Precharge Voltage	0.0	6800.9	V	0.0	3322	
P3.17.3.3	Precharge Restart Limit	0.0	5784.4	V	500.0	3323	
P3.17.3.4	Max DC Slew Rate	0.0	8000.0	V/s	0.0	3324	
P3.17.3.5	Min DC Slew Rate	0.0	8000.0	V/s	0.0	3325	

Table 90: Timeouts parameters

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.17.4.1	Fault Clear Timeout	0.00	300.00	s	0.00	3330	
P3.17.4.2	MX Open Timeout	0.00	5.00	s	0.00	3331	
P3.17.4.3	MX Close Timeout	0.00	5.00	s	0.00	3332	
P3.17.4.4	KMX Open Timeout	0.00	5.00	s	0.00	3333	
P3.17.4.5	KMX Close Timeout	0.00	5.00	s	0.00	3334	

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.17.4.6	KPC Open Timeout	0.00	5.00	s	0.00	3335	
P3.17.4.7	Min Slew Rate Timeout	0.00	30.00	s	0.00	3336	
P3.17.4.8	DC Discharge Timeout	0.00	600.00	s	0.00	3337	
P3.17.4.9	DC Precharge Timeout	0.00	60.00	s	0.00	3338	
P3.17.4.10	Activate Timeout	0.00	60.00	s	0.00	3339	
P3.17.4.11	KPC Close Timeout			s	1.00	3342	
P3.17.4.12	Cooling Off Delay			s	300.00	3343	
P3.17.4.13	Cooling OK Timeout			s	15.00	3344	
P3.17.4.14	Breaker close pulse time			s	0.08	3345	
P3.17.4.15	Breaker open pulse time			s	0.08	3346	

Table 91: Switches Parameters

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.17.5.1	Precharge Master	0	1		0	3351	0 = No 1 = Yes
P3.17.5.2	Start Request Mode	0	1		0	3352	0 = Implicit 1 = Explicit
P3.17.5.3	Commissioning Test Mode	0	1		0	3353	0 = Disabled 1 = Enabled
P3.17.5.4	Test Mode - Disable MX	0	1		0	3354	0 = Disabled 1 = Enabled

4.6 Diagnostics Menu

4.6.1 Counters

4.6.1.1 Total Counters

Table 92: The Total Counter Parameters in the *Diagnostics* Menu

Index	Parameter	Min	Max	Unit	De-fault	ID	Description
V4.4.1	Energy Counter			Varies		2291	The quantity of energy taken from the supply network. The counter cannot be reset.
V4.4.3	Operating Time			a d hh:min		2298	The operating time of the control unit.

Index	Parameter	Min	Max	Unit	De-fault	ID	Description
V4.4.7	Run Time			a d hh:min		2293	The motor run time.
V4.4.11	Power On Time			a d hh:min		2294	The quantity of time that the power unit has been powered on. The counter cannot be reset.
V4.4.15	Start Command Counter					2295	The number of times that the power unit has been started.

4.6.1.2 Trip Counters

Table 93: The Trip Counter Parameters in the *Diagnostics* Menu

Index	Parameter	Min	Max	Unit	De-fault	ID	Description
P4.5.1	Energy Trip Counter			Varies		2296	This counter can be reset: • Push [OK]. A Reset counter page shows. Push [OK] again.
P4.5.3	Operating Time			a d hh:min		2299	This counter can be reset. See instructions in P4.5.1 above.

4.6.2 Software Info

Table 94: The Software Info Parameters in the *Diagnostics* Menu

Index	Parameter	Min	Max	Unit	Default	ID	Description
V4.6.1	Software Package					2524	The code for the software identification
V4.6.4	System Load	0	100	%		2300	The load on the control unit CPU
V4.6.5	Application Name					2525	The name of the application
V4.6.6	Application ID					837	The code of the application
V4.6.7	Application Version					838	
V4.6.8	Language Selections						Selected language package in software loading
V4.6.9	Keypad Software Version						

4.6.3 Drive Info

Table 95: The Drive Info Parameters in the *Diagnostics* Menu

Index	Parameter	Min	Max	Unit	Default	ID	Description
V4.7.1	Power Size						

4.6.4 Unit Status

Table 96: The Unit Status Parameters in the *Diagnostics* Menu

Index	Parameter	Min	Max	Unit	Default	ID	Description
V4.8.1	Control Unit					2540	Status of the control unit
V4.8.2	UNIT1					2541	Status of the power unit
V4.8.3–19	UNIT2–29					Defined based on connected power units	Status of the power unit

4.7 I/O and Hardware Menu

4.7.1 Basic I/O

Table 97: The Basic I/O Parameters in the I/O and Hardware Menu

Index	Parameter	Min	Max	Unit	Default	ID	Description
V5.1.1	Digital Input 1	0	1		0	2502	Status of the digital input signal
V5.1.2	Digital Input 2	0	1		0	2503	Status of the digital input signal
V5.1.3	Digital Input 3	0	1		0	2504	Status of the digital input signal
V5.1.4	Digital Input 4	0	1		0	2505	Status of the digital input signal
V5.1.5	Digital Input 5	0	1		0	2506	Status of the digital input signal
V5.1.6	Digital Input 6	0	1		0	2507	Status of the digital input signal
V5.1.7	Analog Input 1 Mode	1	3		3	2508	Shows the mode that is set for the analog input signal. The selection is made with a DIP switch on the control board. 1 = 0...20mA 3 = 0...10V
V5.1.8	Analog Input 1	0	100	%	0.00	2509	Status of the analog input signal
V5.1.9	Analog Input 2 Mode	1	3		3	2510	Shows the mode that is set for the analog input signal. The selection is made with a DIP switch on the control board. 1 = 0...20mA 3 = 0...10V
V5.1.10	Analog Input 2	0	100	%	0.00	2511	Status of the analog input signal
V5.1.11	Analog Output 1 Mode	1	3		1	2512	Shows the mode that is set for the analog input signal. The selection is made with a DIP switch on the control board. 1 = 0...20mA 3 = 0...10V
V5.1.12	Analog Output 1	0	100	%	0.00	2513	Status of the analog output signal
V5.1.13	Relay Output 1	0	1		0	2514	Status of the relay output signal
V5.1.14	Relay Output 2	0	1		0	2515	Status of the relay output signal
V5.1.15	Relay Output 3	0	1		0	2516	Status of the relay output signal

4.7.2 Option Board Slots

The parameters in this menu are different for all the option boards. The parameters of the installed option board is shown. If there is no option board in the slots C, D or E, no parameters are shown. See more about the location of the slots in chapter 3.1 General Information on the Programming.

When an option board is removed, the fault code 39 and the fault name *Device removed* show on the display.

Table 98: Option Board Related Parameters

Menu	Function	Description
Slot C	Settings	The settings that are related to the option board.
	Monitoring	Monitor the data that is related to the option board.
Slot D	Settings	The settings that are related to the option board.
	Monitoring	Monitor the data that is related to the option board.
Slot E	Settings	The settings that are related to the option board.
	Monitoring	Monitor the data that is related to the option board.

4.7.3 Real-time Clock

Table 99: The Real-time Clock Parameters in the I/O and Hardware Menu

Index	Parameter	Min	Max	Unit	De-fault	ID	Description
V5.5.1	Battery State	1	3			2205	Status of the battery. 1 = Not installed 2 = Installed 3 = Replace the battery
P5.5.2	Time			hh:mm:ss		2201	The current time of the day
P5.5.3	Date			dd.mm.		2202	The current date
P5.5.4	Year			yyyy		2203	The current year
P5.5.5	Daylight Sav-ing	1	4			2204	The daylight saving rule 1 = Off 2 = EU: starts on the last Sunday in March, ends on the last Sunday in October 3 = US: starts on the 2nd Sunday in March, ends on the 1st Sunday in November 4 = Russia (permanent)
P5.5.6	Time Offset					2614	

4.7.4 Simple Network Time Protocol (SNTP)

The simple network time protocol (SNTP) allows devices connected to a TCP/IP network receive precise time information from designated time servers. The time information can be received either by the client device polling the time servers or the time servers broadcasting the time.

Table 100: SNTP Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
V5.5.7.1.1	SNTP Mode					3162	
V5.5.7.1.2	Server 1 IP					3163	
V5.5.7.1.3	Server 2 IP					3164	
V5.5.7.1.4	SNTP Port					3165	
V5.5.7.1.5	Time Interval					3166	

Table 101: SNTP Monitoring

Index	Parameter	Min	Max	Unit	Default	ID	Description
V5.5.7.2.1	SNTP status					3167	
V5.5.7.2.2	Server IP					3168	
V5.5.7.2.3	Last update time					3169	

4.7.5 Power Unit Settings

This menu contains the settings of the fan, the sine-wave filter, and the harmonic filter.

The fan operates in the optimized or the always on mode. In the optimized mode, the internal logic of the drive receives data about the temperature and controls the fan speed. After the drive goes in the Ready state, the fan stops in 5 minutes. In the always on mode, the fan operates in full speed, and does not stop.

The sine-wave filter keeps the overmodulation depth in limits and does not let the thermal management functions decrease the switching frequency.

The harmonic filter can be enabled to avoid possible resonances in the DC link of the AC drive.

Table 102: Power Unit Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P5.6.1.1	Fan Control Mode	0	1		1	2377	0 = Always on 1 = Optimised
V5.6.1.5	Fan Lifetime ID					849	Lifetime of the fan of the drive
P5.6.1.6	Fan lifetime alarm limit	0	200000	h	50000	824	Alarm limit of the fan lifetime
B5.6.1.7	Fan lifetime reset ID					823	Reset the fan lifetime counter with this button.
P5.6.4.8	Belt count				0	6000	Number of phase module belts connected to the control unit.
P5.6.4.9	AUX Chain Unit Count				0	6001	Number of auxiliary connections to the control unit, for example, auxiliary I/O boards, DFE, or CCA board.
P5.6.5.1	Sine Filter	0	1		0	2527	0 = Disabled 1 = Enabled
P5.6.6.1	Harmonic Filter	0	1		0	2497	0 = Disabled 1 = Enabled

4.7.6 Keypad

Table 103: The Keypad Parameters in the I/O and Hardware Menu

Index	Parameter	Min	Max	Unit	De-fault	ID	Description
P5.7.1	Timeout Time	0	60	min	0	804	The time after which the display goes back to the page that is set with parameter P5.7.2. 0 = Not used
P5.7.2	Default Page	0	4		0	2318	The page that the display shows when the drive is powered up, or when the time that is set with P5.7.1 is expired. If the value is set to 0, the display shows the last page that it showed. 0 = None 1 = A menu index 2 = Main menu 3 = Control page 4 = Multimonitor
P5.7.3	Menu Index					2499	Set a page to be the menu index. (The selection 1 in P5.7.2.)
P5.7.4	Contrast	30	70	%	50	830	Set the contrast of the display.
P5.7.5	Backlight Time	0	60	min	5	818	Set the time after which the backlight of the display turns off. If the value is set to 0, the backlight is always on.

4.7.7 Fieldbus

In the I/O and Hardware menu, there are the parameters that are related to fieldbus boards. You can find the instructions on how to use these parameters in the related fieldbus manual.

Table 104: Fieldbus Menu Structure

Submenu level 1	Submenu level 2	Submenu level 3	Submenu level 4
RS-485	Common settings	Protocol	
Ethernet	Common settings	IP address mode	
		Duplicate IP detect	
		Speed/Duplex	
		Ethernet Fieldbus 1	
		Ethernet Fieldbus 2	
		Fixed IP	IP address
			Subnet mask
			Default gateway
		Speed/Duplex	
		IP address	
		Subnet mask	
		Default gateway	
		MAC address	

Submenu level 1	Submenu level 2	Submenu level 3	Submenu level 4
		Packet rate	
		Peak packet rate	
	Modbus TCP	Common settings	Connection limit
			Slave address
			Communication timeout
			IDMap
		Monitoring	Control word
			Status word
			Drive speed reference
			Drive speed actual
		Connection 1	Monitoring
		Connection 2	Monitoring
		Connection 3	Monitoring

4.7.8 Fieldbus General

Enabling Ethernet Fieldbus Protocol

Needed internal Ethernet based fieldbus protocols can be enabled with parameters *Ethernet Fieldbus 1* (ID 2622) and *Ethernet Fieldbus 2* (ID 2623).

Both parameters contain the same list with “PROFINET I/O, EtherNet/IP, BACnet/IP and Modbus TCP” protocols. PROFINET I/O and EtherNet/IP are visible only if included in the drive configuration. By default Modbus TCP is enabled, but if not used, it is recommended to turn it off.

If the same fieldbus is selected to both parameters, the fieldbus protocol is still activated only once. Protocol specific menu tree becomes visible only after enabling it from these parameters. When using VACON® Live, to see protocol specific menus, the M5.9 *Ethernet* menu tree must be reloaded after enabling the protocols.

When restoring parameters from older firmware version, drive checks on start-up which protocols were enabled in old firmware and sets up these new parameters accordingly. After having restored parameters, restart the drive. If more than two Ethernet fieldbuses were activated in old firmware, new firmware allows it. In this case, these two new parameters show “None”, but when the values are changed, all Ethernet fieldbuses are stopped, and only the enabled ones are started.

Table 105: Fieldbus Common Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P5.9.1.1	IP address mode	0	2		1	2482	0 = Fixed IP 1 = DHCP with AutoIP 2 = DCP
P5.9.1.2	Duplicate IP detection	0	1		1	2569	0 = Disabled 1 = Enabled
P5.9.1.3	Speed/duplex	0	4		0	2500	0 = Autonegotiation 1 = 10M HD 2 = 10M FD 3 = 100M HD 4 = 100M FD

Index	Parameter	Min	Max	Unit	Default	ID	Description
P5.9.1.4	Ethernet Fieldbus 1	0	4[1]		0	2622	2 Ethernet-based internal fieldbuses can be enabled at a time. Select fieldbus from the list. 0 = None 1 = PROFINET I/O 2 = EtherNet/IP 3 = Modbus TCP 4 = BACnet/IP
P5.9.1.5	Ethernet Fieldbus 2	0	4[1]		3	2623	
M5.9.1.6	Fixed IP						See Table 106.
V5.9.1.7	Speed/duplex	0	4				
V5.9.1.8	IP address	0	255				
V5.9.1.9	Subnet mask	0	255				
V5.9.1.10	Default gateway	0	255				
V5.9.1.11	MAC address						
V5.9.1.12	Packet rate						
V5.9.1.13	Peak packet rate						

[1] Depends on fieldbuses included in drive configuration

Table 106: Fixed IP

Index	Parameter	Min	Max	Unit	Default	ID	Description
P5.9.1.6.1	IP address					2529	
P5.9.1.6.2	Subnet mask					2530	
P5.9.1.6.3	Default gateway					2531	

Table 107: Fieldbus General

Index	Parameter	Min	Max	Unit	Default	ID	Description
P5.13.1	Controlling Fieldbus	0	5		0	2539	0 = Automatic 1 = Slot E 2 = PROFINET I/O 3 = EtherNet/IP 4 = Modbus TCP 5 = BACnet/IP
V5.13.2	Controlling Fieldbus	0	5			2610	

4.7.9 Fieldbus Redundancy

VACON® 3000 supports the usage of two fieldbus connections. The drive accepts control data only from the primary fieldbus. If the primary fieldbus connection fails, the control can be automatically switched to a secondary fieldbus using the fieldbus redundancy control. VACON® 3000 built-in fieldbus protocols support fieldbus redundancy control. The only exception is RS485 N2, which does not support fieldbus redundancy. Recent firmware versions of fieldbus option boards also support fieldbus redundancy.

When *switch on failing* mode is selected, and the current fieldbus connection detects missing communication from the controller, the switchover command is given to change to the other fieldbus connection. When *switch on faulted* mode is selected, and the current fieldbus connection gets a timeout, the switchover command is given to change to the other fieldbus connection.

The switchback functionality forces a change back to the primary fieldbus connection when it is in operational state and when the given time delay has elapsed. If the switchback functionality is deactivated, the switchover between the fieldbus connections is only performed when the currently controlling fieldbus begins to fail or becomes faulted.

The currently controlling fieldbus protocol can be checked from the monitoring value *V5.13.2 Controlling Fieldbus* (ID 2610).

Table 108: Fieldbus Redundancy

Index	Parameter	Min	Max	Unit	Default	ID	Description
P5.13.3.1	Redundancy Mode	0	2		0	2606	0 = Disabled 1 = Switch on failing 2 = Switch on faulted
P5.13.3.2	Primary Fieldbus Connection				0	2607	
P5.13.3.3	Secondary Fieldbus Connection				0	2608	
P5.13.3.4	Switchover Timeout	0	65535	ms	0	2609	
P5.13.3.5	Switchback Timeout	0	65535	s	10	2612	
V5.13.3.6	Switchover Counter					2611	

4.7.10 Aux Chain

The contents of the menu depend on the units connected to the aux chain. The number of units is configured with parameter *AUX Chain Unit Count* (ID 6001). The parameters in Table 97 are for the first unit connected to the Aux chain (Aux 14). Each connected unit has a similar menu and set of parameters (Aux 15, Aux 16, Aux 17).

Table 109: Aux 14 Parameters in the I/O and Hardware Menu

Index	Parameter	Min	Max	Unit	Default	ID	Description
V5.14.1.1	Board status					29001	
V5.14.1.2	Breaker enable status					29002	
V5.14.1.3	Breaker switch status					29003	
V5.14.1.4	Measurement configuration switch					29004	
V5.14.1.5	Digital input 1–16					29005	
V5.14.1.6	Digital input 17–32					29006	
V5.14.1.7	DigOUT AUX 14					29015	
V5.14.1.8	Analog input 1	0.00	100.00	%	0.00	29007	Status of the analog input signal
V5.14.1.9	Analog input 1 mode					29008	Shows the mode that is set for the analog input signal. The selection is made with a DIP switch on the board. 1 = 0...20 mA 3 = 0...10 V
V5.14.1.10	Analog input 2	0.00	100.00	%	0.00	29009	Status of the analog input signal
V5.14.1.11	Analog input 2 mode					29010	Shows the mode that is set for the analog input signal. The selection is made with a DIP switch on the board. 1 = 0...20 mA 3 = 0...10 V

Index	Parameter	Min	Max	Unit	Default	ID	Description
V5.14.1.12	Analog input 3	0.00	100.00	%	0.00	29011	Status of the analog input signal
V5.14.1.13	Analog input 3 mode					29012	Shows the mode that is set for the analog input signal. The selection is made with a DIP switch on the board. 1 = 0...20 mA 3 = 0...10 V
V5.14.1.14	Analog input 4	0.00	100.00	%	0.00	29013	Status of the analog input signal
V5.14.1.15	Analog input 4 mode					29014	Shows the mode that is set for the analog input signal. The selection is made with a DIP switch on the board. 1 = 0...20 mA 3 = 0...10 V
V5.14.1.16	Analog input 5	0.00	100.00	%	0.00	29015	
V5.14.1.17	Analog input 5 mode					29016	
V5.14.1.18	Analog input 6	0.00	100.00	%	0.00	29017	
V5.14.1.19	Analog input 6 mode					29018	
V5.14.1.20	Analog input 7	0.00	100.00	%	0.00	29019	
V5.14.1.21	Analog input 7 mode					29020	
V5.14.1.22	Board temperature	-20.0	100.0		0.0	29021	
V5.14.1.23	Supply voltage	0.0	30.0		0.0	29022	

The Unit 22 parameters are monitoring values for the DFE unit, which is only used in 12-pulse and 24-pulse drives.

Table 110: Unit 22 Parameters in the I/O and Hardware Menu

Index	Parameter	Min	Max	Unit	Default	ID	Description
V5.14.3.1	Board status					29401	
V5.14.3.2	Board temperature	-20.0	100.0		0.0	29423	
V5.14.3.3	Unit temperature	-20.0	125.0		0.0	29425	
V5.14.3.4	I/O					29426	

4.7.11 MV-star

Table 111: The MV-star Parameters in the I/O and Hardware Menu

Index	Parameter	Min	Max	Unit	Default	ID	Description
V5.15.1	Board status					28951	
V5.15.2	Digital inputs					28955	
V5.15.3	Digital outputs					28965	

Index	Parameter	Min	Max	Unit	Default	ID	Description
V5.15.4	Gated relays					28966	
V5.15.5	Board temperature	-20.0	100.0		0.0	28923	
V5.15.6	Supply voltage	0.0	30.0		0.0	28924	

4.8 User Settings

4.8.1 User Settings Parameters

Table 112: General Settings in the User Settings Menu

Index	Parameter	Min	Max	Unit	Default	ID	Description
P6.1	Language selection	Varies	Varies		Varies	802	The selection is different in all the language packages.
M6.5	Parameter backup						See 4.8.2 Parameter Backup Parameters.
M6.6	Parameter compare						See 4.8.3 Parameter Compare Parameters.
P6.7	Drive name					2528	Use VACONÆLive PC tool to give a name to the drive if necessary.
M6.8	Licenses						See 4.8.4 License Parameters.

4.8.2 Parameter Backup Parameters

Table 113: The Parameter Backup Parameters in the User Settings menu

Index	Parameter	Min	Max	Unit	De-fault	ID	Description
B6.5.1	Restore Factory De-faults					831	Restores the default parameter values and starts the Startup wizard.
B6.5.4	Save to Set 1					2489	Keeps a customized parameter set (that is, all the parame-ters included in the application).
B6.5.5	Restore from Set 1					2490	Loads the customized parameter set to the drive.
B6.5.6	Save to Set 2					2491	Keeps another customized parameter set (that is, all the pa-rameters included in the application).
B6.5.7	Restore from Set 2					2492	Loads the customized parameter set 2 to the drive.

4.8.3 Parameter Compare Parameters

Table 114: Parameter Compare Parameters in the User Settings Menu

Index	Parameter	Min	Max	Unit	Default	ID	Description
B6.6.1	Active set - Set 1					2493	
B6.6.2	Active set - Set 2					2494	
B6.6.3	Active set - Defaults					2495	
B6.6.4	Active set - Keypad Set					2496	

4.8.4 License Parameters

Table 115: License Parameters in the User Settings Menu

Index	Parameter	Min	Max	Unit	Default	ID	Description
P6.8.1	Insert License						Insert a drive-specific license to enable new features or remove added features.

5 AFE Application

5.1 Overview

The AFE application is used to control the AFE phase modules of the VACON® 3000.

It is possible to control the drive from the control panel (keypad), Fieldbus, or I/O terminal.

It is possible to configure all the drive outputs freely. There is 1 analog output and 3 relay outputs (Run, Fault, Ready) available on the basic I/O board.

5.2 Menu Structure

The data of the AC drive is in menus and submenus. To move between the menus, use the arrow buttons Up and Down in the keypad. To go into a group or an item, push the [OK] button. To go back to the level where you were before, push the [BACK/RESET] button.

On the display, you see your current location in the menu, for example M3.2.1. You also see the name of the group or item in your current location.

Table 116: Menu Structure

Menu	Function
M1 Quick setup	Quick setup
M2 Monitor	Multimonitor
	AFE monitor
	I/O
	Extras/Advanced
	Maintenance counters
	Fieldbus data
	Precharge
M3 Parameters	Basic parameters
	Control parameters
	Precharge
	Start/Stop setup
	I/O Configuration
	Fieldbus data mapping
	Supervisions
	Protections
	Automatic reset
	Application settings
	Maintenance counters
M4 Diagnostics	Active faults
	Reset faults
	Fault history
	Total counters

Menu	Function
	Trip counters
	Software info
	Drive info
	Unit status
M5 I/O and Hardware	Basic I/O
	Slot C
	Slot D
	Slot E
	Real-time clock
	Power unit settings
	RS485
	Ethernet
	Fieldbus general
	Aux chain
	MV-star
M6 User settings	Language selections
	Parameter backup
	Parameter compare
	Drive name
	Licenses
M7 Favorites	Favorites

5.3 Quick Setup

Table 117: M1 Quick Setup

Index	Parameter	Min	Max	Unit	Default	ID	Description
1.2	Grid voltage feedback mode	0	2		0	5020	0 = Source Voltage (pre-LCL) 1 = Shunt Capacitor Voltage 2 = PCC Voltage
1.3	Grid Voltage Feedback Channel A	0	12		7	5021	0 = Ground/Reference 1 = AN Phase Voltage 2 = NA Phase Voltage 3 = BN Phase Voltage 4 = NB Phase Voltage 5 = CN Phase Voltage 6 = NC Phase Voltage 7 = AB Line Voltage

Index	Parameter	Min	Max	Unit	Default	ID	Description
							8 = BA Line Voltage 9 = BC Line Voltage 10 = CB Line Voltage 11 = CA Line Voltage 12 = AC Line Voltage
1.4	Grid Voltage Feedback Channel B	0	12		0	5022	See ID 5020 above
1.5	Grid Voltage Feedback Channel C	0	12		9	5023	See ID 5020 above
1.6	Grid Voltage Feedback Scale	-10000.0	10000.0		120.0000	5024	
1.7	Filter Topology	0	2		0	5030	
1.8	Regen Filter Select	0	8		0	5039	0 = Special 1 = L20.3 2 = L20.3 HSI 3 = L20.4 4 = L20.4 HSI 5 = L30.3 6 = L30.3 HSI 7 = L30.4 8 = L30.4 HSI
1.9	Special Filter Index				21000	5040	

5.4 Monitor Menu

5.4.1 AFE Monitor

Table 118: AFE Monitoring

Index	Monitoring value	Unit	Scale	ID	Description
M2.3.1	DC link				See Table 119.
M2.3.2	Line PLL				See Table 120.
M2.3.3	Line filter observer				See Table 121.
V2.3.5	Precharge state		1	3510	0 = Reset 1 = Failed 2 = Not Ready 3 = Ready 4 = Charging 5 = Synchronizing 6 = Contactor Close 7 = Stabilizing 8 = Operational 9 = Loaded

Table 119: DC-Link Monitoring

Index	Monitoring value	Unit	Scale	ID	Description
V2.3.1.1	DC-link voltage	V	0.1	7	

Table 120: Line PLL Monitoring

Index	Monitoring value	Unit	Scale	ID	Description
V2.3.2.1	Line voltage	V	1	5510	
V2.3.2.2	Line frequency	Hz	0.01	5511	
V2.3.2.3	Line PLL locked		1	5512	0 = No 1 = Yes

Table 121: Line Filter Observer

Index	Monitoring value	Unit	Scale	ID	Description
V2.3.3.1	AFE Active Current	A	0.1	5513	
V2.3.3.2	AFE Reactive Current	A	0.1	5514	
V2.3.3.3	Grid Active Current	A	0.1	5515	
V2.3.3.4	Grid Reactive Current	A	0.1	5516	
V2.3.3.5	Cap Active Current	A	0.1	5517	
V2.3.3.6	Cap Reactive Current	A	0.1	5518	
V2.3.3.7	Cap Active Voltage	V	0.1	5519	
V2.3.3.8	Cap Reactive Voltage	V	0.1	5520	
V2.3.3.9	Grid Active Voltage	V	0.1	5521	
V2.3.3.10	Grid Reactive Voltage	V	0.1	5522	
V2.3.3.11	AFE output current	A	0.1	5530	

5.4.2 I/O Monitoring

Table 122: I/O Signal Monitoring

Index	Monitoring value	Unit	Scale	ID	Description
V2.4.1	Slot A DIN 1, 2, 3		1	15	
V2.4.2	Slot A DIN 4, 5, 6		1	16	
V2.4.3	Slot B RO 1, 2, 3		1	17	
V2.4.4	Analog input 1	%	0.00	59	Slot A.1 as default.
V2.4.5	Analog input 2	%	0.00	60	Slot A.2 as default.
V2.4.6	Analog input 3	%	0.00	61	Slot D.1 as default.
V2.4.7	Analog input 4	%	0.00	62	Slot D.2 as default.
V2.4.8	Analog input 5	%	0.00	75	Slot E.1 as default.
V2.4.9	Analog input 6	%	0.00	76	Slot E.2 as default.
V2.4.10	Slot A AO1	%	0.00	81	
V2.4.15	Analog input 7	%	0.00	5640	

Index	Monitoring value	Unit	Scale	ID	Description
V2.4.16	Analog input 8	%	0.00	5641	
V2.4.17	Analog input 9	%	0.00	5642	
V2.4.18	Analog input 10	%	0.00	5643	

5.4.3 Extras and Advanced

Table 123: Monitoring of the Advanced Values

Index	Monitoring value	Unit	Scale	ID	Description
V2.6.1	Drive Status Word		1	43	B1 = Ready B2 = Run B3 = Fault B6 = Run Enable B7 = Alarm Active B10 = DC current in stop B11 = DC brake active B12 = Run Request B13 = Regulator Active
V2.6.2	Ready status		1	78	B0 = Run Enable high B1 = No fault active B2 = Charge switch closed B3 = DC voltage within limits B4 = Power manager initialized B5 = Power unit is not blocking start B6 = System software is not blocking start
V2.6.3	Application Status Word1		1	89	B0 = Run Interlock 1 B1 = Run Interlock 2 B5 = I/O A control active B7 = Fieldbus Control Active B8 = Local control active B9 = PC control active B15 = Drive stopped from keypad
V2.6.4	DIN Status Word 1		1	56	
V2.6.5	DIN Status Word 2		1	57	
V2.6.6	Last active fault code		1	37	
V2.6.7	Last active fault ID		1	95	
V2.6.8	Last active alarm code		1	74	
V2.6.9	Last active alarm ID		1	94	
V2.6.12	Unit temperature	°C	0.1	8	
V2.6.13	MVS DIN Status Word		0	6043	
V2.6.14	Enclosure Humidity and Temperature		0	3586	

5.4.4 Maintenance Counters

Table 124: Maintenance Counter Monitoring

Index	Monitoring value	Unit	Scale	ID	Description
V2.7.1	Maintenance Counter 1	h/kRev	Varies	1101	

5.4.5 Fieldbus Process Data Monitoring

Table 125: Fieldbus Process Data Monitoring

Index	Monitoring value	Unit	Scale	ID	Description
V2.8.1	FB Control Word		1	874	
V2.8.2	FB status word		1	864	
V2.8.3	FB Speed Reference	Hz	0.01	875	
V2.8.4	FB Speed Actual	%	0.01	865	
V2.8.5	FB general control word		1	861	
V2.8.6	FB general status word		1	862	
M2.8.7	Data In				See Table 126
M2.8.8	Data Out				See Table 127

Table 126: Data In Monitoring

Index	Monitoring value	Unit	Scale	ID	Description
V2.8.7.1	FB Data In 1		1	876	
V2.8.7.2	FB Data In 2		1	877	
V2.8.7.3	FB Data In 3		1	878	
V2.8.7.4	FB Data In 4		1	879	
V2.8.7.5	FB Data In 5		1	880	
V2.8.7.6	FB Data In 6		1	881	
V2.8.7.7	FB Data In 7		1	882	
V2.8.7.8	FB Data In 8		1	883	
V2.8.7.9	FB Data In 9		1	229	
V2.8.7.10	FB Data In 10		1	230	
V2.8.7.11	FB Data In 11		1	231	
V2.8.7.12	FB Data In 12		1	232	
V2.8.7.13	FB Data In 13		1	233	
V2.8.7.14	FB Data In 14		1	234	
V2.8.7.15	FB Data In 15		1	235	
V2.8.7.16	FB Data In 16		1	236	

Table 127: Data Out Monitoring

Index	Monitoring value	Unit	Scale	ID	Description
V2.8.8.1	FB Data Out 1		1	866	
V2.8.8.2	FB Data Out 2		1	867	
V2.8.8.3	FB Data Out 3		1	868	
V2.8.8.4	FB Data Out 4		1	869	
V2.8.8.5	FB Data Out 5		1	870	
V2.8.8.6	FB Data Out 6		1	871	
V2.8.8.7	FB Data Out 7		1	872	
V2.8.8.8	FB Data Out 8		1	873	
V2.8.8.9	FB Data Out 9		1	245	
V2.8.8.10	FB Data Out 10		1	246	
V2.8.8.11	FB Data Out 11		1	247	
V2.8.8.12	FB Data Out 12		1	248	
V2.8.8.13	FB Data Out 13		1	249	
V2.8.8.14	FB Data Out 14		1	250	
V2.8.8.15	FB Data Out 15		1	251	
V2.8.8.16	FB Data Out 16		1	252	

5.4.6 Precharge Monitoring

Table 128: Precharge Monitoring Values

Index	Monitoring value	Unit	Scale	ID	Description
V2.10.1	Precharge state		1	3510	0 = Reset 1 = Failed 2 = Not Ready 3 = Ready 4 = Charging 5 = Synchronizing 6 = Contactor Close 7 = Stabilizing 8 = Operational 9 = Loaded
V2.10.2	Precharge inhibit		1	3511	
V2.10.3	Precharge error flags		1	3568	b0 = Software b1 = Main Pilot Open TO b2 = Mx Open TO b3 = PC Contactor Open TO b4 = DC-link Discharge TO b5 = Front End Fault Clear TO b6 = DC-link Overvoltage

Index	Monitoring value	Unit	Scale	ID	Description
					b7 = Front End Lost Phase Lock b8 = Front End Faulted b9 = Mx Premature Close b10 = Main Pilot Premature Close b11 = Precharge Premature Termination b12 = Max Charge Rate Exceeded b13 = Min Charge Rate Deficient b14 = Precharge TO b15 = DC-link Voltage Deficient b16 = Synchronization TO b17 = Main Pilot Close TO b18 = Front End Lost Synchronization b19 = Mx Close TO b20 = Mx Premature Open b21 = Stabilization TO b22 = Front End Deactivated b23 = Front End Lost Stabilization b24 = Unexpected Parameterization b25 = Invalid Parameterization b26 = Test Mode Activated While Hot b27 = INU Became Faulted
V2.10.4	Precharge Status Word		1	3513	b0 = Precharge Permissive b1 = Mx Permissive b2 = Mx Start b3 = PCC Interlock b4 = Precharge Inhibit b5 = Precharge Ready b6 = Precharge Started b7 = PCC Gating Enabled b8 = Kpc State b9 = Kmx State b10 = Mx State b11 = GSW Permissive b12 = Kpc Sub State b13 = Kmx Sub State b14 = Mx Sub State b15 = Reserved
M2.10.5	Internal control				See Table 129.
M2.10.6	Interlocks				See Table 130.
M2.10.7	Interlocks @ Last Fault				See Table 131.

Table 129: Internal Control Monitoring Values

Index	Monitoring value	Unit	Scale	ID	Description
V2.10.5.1	Power on state		1	3520	0 = Reset 1 = Failed 2 = Initializing 3 = Ready

Index	Monitoring value	Unit	Scale	ID	Description
					4 = Cooling 5 = Charging 6 = Contactor Close 7 = Stabilizing 8 = Operational
V2.10.5.2	Power on status word		1	3574	b0 = PowerOn Req b1 = Power Off b2 = Reset b3 = Run Cooling b4 = Precharge b5 = Power On b6 = Fault b7 = Precharge Ready b8 = PreStart OK (1) b9 = MCBs and Interlocks OK b10 = Leak Detection OK b11 = LCL OK (AFE) b12 = GSW AFR DSI OK b13 = Cooling OK (2) b14 = DC Capacitors OK (INU) b15 = Precharge Inhibit
V2.10.5.3	Power on state fault		1	3521	See ID 3520.
V2.10.5.4	Power On status word fault		1	3583	See ID 3574.
V2.10.5.5	Precharge status word fault		1	3514	See ID 3513.
V2.10.5.6	Precharge Error Flags @ Fault		1	3580	See ID 3568 in Table 128.

[1] PreStart OK requires that all of the following status words are OK: MCB Status (ID 3570), Leak Det. Status (ID 3571), GSW UFES Status (ID 3575), and LCL Status (ID 3569).

[2] Cooling OK requires that all of the following status words are OK: Enc HX Status (ID 3572), and HEX Status (ID 3573).

Table 130: Interlock Monitoring Values

Index	Monitoring value	Unit	Scale	ID	Description
V2.10.6.1	GSW UFES Status Word		1	3575	b0 = GSW Open 1 b1 = GSW Open 2 b2 = GSW Open 3 b3 = GSW Open 4 b4 = GSW Not Closed 1 b5 = GSW Not Closed 2 b6 = GSW Not Closed 3 b7 = GSW Not Closed 4 b8 = UFES Not in Test 1 b9 = UFES Not in Test 2 b10 = UFES Not in Test 3 b11 = UFES Not in Test 4 b12 = AFR Online

Index	Monitoring value	Unit	Scale	ID	Description
					b13 = AFR Not Faulted b14 = DSI Ok b15 = Always TRUE
V2.10.6.2	MCB status word		1	3570	b0 = ENC HX MCB 1 b1 = ENC HX MCB 2 b2 = ENC HX MCB 3 b3 = ENC HX MCB 4 b4 = TEMPCL MCB 1 b5 = TEMPCL MCB 2 b6 = TEMPCL MCB 3 b7 = TEMPCL MCB 4 b8 = Interlock Open 1 b9 = Interlock Open 2 b10 = Interlock Open 3 b11 = Interlock Open 4 b12 = Interlock Close 1 b13 = Interlock Close 2 b14 = Interlock Close 3 b15 = Interlock Close 4
V2.10.6.3	Leak detection status word		1	3571	b0 = LD Sys Ok 1 b1 = LD Sys Ok 2 b2 = LD Sys Ok 3 b3 = LD Sys Ok 4 b4 = LD No Leak 1 b5 = LD No Leak 2 b6 = LD No Leak 3 b7 = LD No Leak 4
V2.10.6.4	ENC HX status word		1	3572	b0 = ENC HX 1 b1 = ENC HX 2 b2 = ENC HX 3 b3 = ENC HX 4 b4 = ENC FAN 1.1 b5 = ENC FAN 1.2 b6 = ENC FAN 1.3 b7 = ENC FAN 2.1 b8 = ENC FAN 2.2 b9 = ENC FAN 2.3 b10 = ENC FAN 3.1 b11 = ENC FAN 3.2 b12 = ENC FAN 3.3 b13 = ENC FAN 4.1 b14 = ENC FAN 4.2 b15 = ENC FAN 4.3
V2.10.6.5	HEX status word		1	3573	b0 = HX Cooling Ok 1 b1 = HX Cooling Ok 2 b2 = HX Cooling Ok 3

Index	Monitoring value	Unit	Scale	ID	Description
					b3 = HX Cooling Ok 4
V2.10.6.6	LCL Status Word		1	3569	b0 = AFE Inductor OverT1 b1 = AFE Inductor OverT2 b2 = AFE Inductor OverT3 b3 = AFE Inductor OverT4 b4 = Grid Inductor OverT1 b5 = Grid Inductor OverT2 b6 = Grid Inductor OverT3 b7 = Grid Inductor OverT4 b8 = CMM Inductor OverT1 b9 = CMM Inductor OverT2 b10 = CMM Inductor OverT3 b11 = CMM Inductor OverT4

Table 131: Interlocks @ Last Fault Monitoring Values

Index	Monitoring value	Unit	Scale	ID	Description
V2.10.7.1	GSW UFES Status Word Fault		1	3582	See ID 3575 in Table 130.
V2.10.7.2	MCB status word fault		1	3576	See ID 3570 in Table 130.
V2.10.7.3	Leak detection status word fault		1	3577	See ID 3571 in Table 130.
V2.10.7.4	ENC HX status word fault		1	3578	See ID 3572 in Table 130.
V2.10.7.5	HEX status word fault		1	3579	See ID 3573 in Table 130.
V2.10.7.6	LCL Status Word Fault		1	3581	See ID 3569 in Table 130.

5.5 Parameters Menu

5.5.1 Group 3.1: Basic Parameters

Table 132: Line Configuration Parameters

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.1.1.1	Nominal Grid Voltage	0	4160	V	4160	5015	
P3.1.1.2	Nominal Grid Frequency	0	320	Hz	60	5016	
P3.1.1.3	Grid Voltage Feedback Mode	0	2		0	5020	0 = Source Voltage (pre-LCL) 1 = Shunt Capacitor Voltage 2 = PCC Voltage
P3.1.1.4	Grid Voltage Feedback Channel A	0	12		7	5021	0 = Ground/Reference 1 = AN Phase Voltage 2 = NA Phase Voltage 3 = BN Phase Voltage 4 = NB Phase Voltage 5 = CN Phase Voltage 6 = NC Phase Voltage 7 = AB Line Voltage 8 = BA Line Voltage

Index	Parameter	Min	Max	Unit	Default	ID	Description
							9 = BC Line Voltage 10 = CB Line Voltage 11 = CA Line Voltage 12 = AC Line Voltage
P3.1.1.5	Grid Voltage Feedback Channel B	0	12		0	5022	See ID 5020 above
P3.1.1.6	Grid Voltage Feedback Channel C	0	12		9	5023	See ID 5020 above
P3.1.1.7	Grid Voltage Feedback Scale	-10000.0	10000.0		120.0000	5024	
P3.1.1.8	Filter Topology	0	2		0	5030	0 = LCL 1 = LC
P3.1.1.9	Regen Filter Select	0	8		0	5039	0 = Special 1 = L20.3 2 = L20.3 HSI 3 = L20.4 4 = L20.4 HSI 5 = L30.3 6 = L30.3 HSI 7 = L30.4 8 = L30.4 HSI
P3.1.1.10	Special Filter Index				21000	5040	

5.5.2 Group 3.2: Control Parameters

Table 133: Control Parameters

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.2.1	Control Mode	0	9		9	600	0 = Frequency Control (open loop) 1 = Speed Control (open loop) 2 = Torque Control (open loop) 9 = AFE Ctrl
M3.2.2	Current Control						See Table 134.
M3.2.3	DC Voltage Control						See Table 135.
M3.2.4	Line Filter Observer						See Table 136.
M3.2.5	PLL Parameters						See Table 137.
M3.2.7	Reactive Power Control						See Table 138.
M3.2.8	Modulation						See Table 139.

Table 134: Current Control Parameters

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.2.2.1	Current Control Kp	1.0	800.0	%	50.0	617	
P3.2.2.2	Current Control Ti	0.0000	1.0000	s	0.0040	657	
P3.2.2.3	Current Limit	34	540	A	0	107	

Table 135: DC Voltage Control Parameters

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.2.3.1	DC Voltage Reference	105.00	120.00	%	120.00	5001	
P3.2.3.2	DC Voltage Control Kp	1.00	800.00	%	300.00	5002	
P3.2.3.3	DC Voltage Control Ti	0.0000	1.0000	s	0.0060	5003	
P3.2.3.4	Motoring Current Limit	0.0	150.0	%	150.0	5005	
P3.2.3.5	Regen Current Limit	0.0	150.0	%	150.0	5004	

Table 136: Line Filter Observer Parameters

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.2.4.1	Active Damp Resistance	0.000	100 000		5 000	5054	
P3.2.4.5	Virtual LCCL Mix	0.000	100 000	%	41 000	5053	

Table 137: PLL Parameters

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.2.5.1	Line PLL Gain	0.00	800.00	%	1.25	5060	
P3.2.5.2	Line PLL Integration Time	0.0000	1.0000	s	0.5000	5061	
P3.2.5.3	PLL Minimum Frequency	0	320	Hz	45	5062	
P3.2.5.4	PLL Maximum Frequency	45	320	Hz	65	5063	
P3.2.5.5	Ref Frame Adapt Angle	-90.00	90.00		-1.00	5064	

Table 138: Reactive Power Control Parameters

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.2.6.1	Reactive Current Reference	-75.00	75.00	%	0.00	5010	
P3.2.6.2	Reactive Current Limit	0.0	70.0	%	50.0	5012	
P3.2.6.3	PFC Control Ki	0.00	800.00	%	25.00	5011	

Table 139: Modulation Parameters

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.2.7.1	Switching Frequency	0.5	2.5	kHz	1.2	601	
P3.2.7.2	Overmodulation	0	1		0	1515	0 = Disabled 1 = Enabled
P3.2.7.3	Modulator Options	0	3		0	3301	1 = Deadtime Compensation 2 = Startup Switching Frequency Reduce
P3.2.7.4	Synchronous Modulation	0	4		2	3302	0 = Synchronous Modulation 1 = Asynchronous Modulation 2 = Symmetric Synchronous Modulation

Index	Parameter	Min	Max	Unit	Default	ID	Description
							4 = SoftSync Modulation
P3.2.7.5	Modulator Type	0	4		1	648	1 = SVPWM 2 = DPWM 1 3 = DPWM MIN 4 = SPWM

5.5.3 Group 3.3: Precharge Parameters

Table 140: Precharge Parameters

Index	Parameter	Min	Max	Unit	Default	ID	Description
M3.3.1	Digital outputs						See Table 141.
M3.3.2	Digital inputs						See Table 142.
M3.3.3	Limits						See Table 145.
M3.3.4	Timeouts						See Table 146.
M3.3.5	Switches						See Table 147.
V3.3.6	Precharge State	0	9		0	3510	0 = Reset 1 = Failed 2 = Not Ready 3 = Ready 4 = Charging 5 = Synchronizing 6 = Contactor Close 7 = Stabilizing 8 = Operational 9 = Loaded
V3.3.7	Precharge inhibit	0	1		0	3511	0 = No 1 = Yes

Table 141: Digital Output Parameters

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.3.1.1	MVS relay configuration				0	3403	
P3.3.1.2	Aux 1A relay configuration				0	3407	

Table 142: Digital Input Parameters

Index	Parameter	Min	Max	Unit	Default	ID	Description
M3.3.2.1	Common						See Table 143.
M3.3.2.2	Internal control						See Table 144.

Table 143: Digital Input Common Parameters

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.3.2.1.1	PCC FB INU Run				DigIN Slot0.1	3310	
P3.3.2.1.2	PCC FB Rem No Fault				DigIN Slot0.2	3314	
P3.3.2.1.3	PCC Interlock				DigIN Slot0.2	3315	
P3.3.2.1.4	Enable PC feedback MVS DIN1				Disabled	3400	
P3.3.2.1.5	Enable MX feedback MVS DIN2				Disabled	3401	
P3.3.2.1.6	Enable KMX feedback MVS DIN3				Disabled	3402	
P3.3.2.1.7	Aux1A KPC feedback configuration				0	3404	
P3.3.2.1.8	Aux1A MX feedback configuration				0	3405	
P3.3.2.1.9	Aux1A KMX feedback configuration				0	3406	

Table 144: Digital Input Internal Control Parameters

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.3.2.2.1	Power on				DigIN Slot0.1	3550	
P3.3.2.2.2	Power off				DigIN Slot0.1	3551	
P3.3.2.2.3	Reset power on state				DigIN Slot0.1	3552	
P3.3.2.2.4	Arc Fault Relay Online				DigIN Slot0.2	3607	
P3.3.2.2.5	Arc Fault Relay Fault				DigIN Slot0.1	3608	
P3.3.2.2.6	Door Safety Interlock				DigIN Slot0.2	3609	
P3.3.2.2.7	GSW Unlock				DigIN Slot0.1	3553	
P3.3.2.2.8	GSW open 1				DigIN Slot0.2	3610	
P3.3.2.2.9	GSW open 2				DigIN Slot0.2	3611	
P3.3.2.2.10	GSW open 3				DigIN Slot0.2	3612	
P3.3.2.2.11	GSW open 4				DigIN Slot0.2	3613	
P3.3.2.2.12	GSW closed 1				DigIN Slot0.2	3614	
P3.3.2.2.13	GSW closed 2				DigIN Slot0.2	3615	
P3.3.2.2.14	GSW closed 3				DigIN Slot0.2	3616	
P3.3.2.2.15	GSW closed 4				DigIN Slot0.2	3617	
P3.3.2.2.16	UFES Test 1				DigIN Slot0.1	3618	
P3.3.2.2.17	UFES Test 2				DigIN Slot0.1	3619	
P3.3.2.2.18	UFES Test 3				DigIN Slot0.1	3620	
P3.3.2.2.19	UFES Test 4				DigIN Slot0.1	3621	
P3.3.2.2.20	Interlock NC 1				DigIN Slot0.2	3624	
P3.3.2.2.21	Interlock NC 2				DigIN Slot0.2	3625	

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.3.2.2.22	Interlock NC 3				DigIN Slot0.2	3626	
P3.3.2.2.23	Interlock NC 4				DigIN Slot0.2	3627	
P3.3.2.2.24	Interlock NO 1				DigIN Slot0.1	3628	
P3.3.2.2.25	Interlock NO 2				DigIN Slot0.1	3629	
P3.3.2.2.26	Interlock NO 3				DigIN Slot0.1	3630	
P3.3.2.2.27	Interlock NO 4				DigIN Slot0.1	3631	
P3.3.2.2.28	Enc HX breaker status 1				DigIN Slot0.2	3632	
P3.3.2.2.29	Enc HX breaker status 2				DigIN Slot0.2	3633	
P3.3.2.2.30	Enc HX breaker status 3				DigIN Slot0.2	3634	
P3.3.2.2.31	Enc HX breaker status 4				DigIN Slot0.2	3635	
P3.3.2.2.32	Temperature control breaker status 1				DigIN Slot0.2	3636	
P3.3.2.2.33	Temperature control breaker status 2				DigIN Slot0.2	3637	
P3.3.2.2.34	Temperature control breaker status 3				DigIN Slot0.2	3638	
P3.3.2.2.35	Temperature control breaker status 4				DigIN Slot0.2	3639	
P3.3.2.2.36	Cab HX status 1				DigIN Slot0.2	3640	
P3.3.2.2.37	Cab HX status 2				DigIN Slot0.2	3641	
P3.3.2.2.38	Cab HX status 3				DigIN Slot0.2	3642	
P3.3.2.2.39	Cab HX status 4				DigIN Slot0.2	3643	
P3.3.2.2.40	LD system OK 1				DigIN Slot0.2	3644	
P3.3.2.2.41	LD system OK 2				DigIN Slot0.2	3645	
P3.3.2.2.42	LD system OK 3				DigIN Slot0.2	3646	
P3.3.2.2.43	LD system OK 4				DigIN Slot0.2	3647	
P3.3.2.2.44	LD no leak 1				DigIN Slot0.2	3648	
P3.3.2.2.45	LD no leak 2				DigIN Slot0.2	3649	
P3.3.2.2.46	LD no leak 3				DigIN Slot0.2	3650	
P3.3.2.2.47	LD no leak 4				DigIN Slot0.2	3651	
P3.3.2.2.48	Hex fan status 1.1				DigIN Slot0.2	3656	
P3.3.2.2.49	Hex fan status 1.2				DigIN Slot0.2	3657	
P3.3.2.2.50	Hex fan status 1.3				DigIN Slot0.2	3658	
P3.3.2.2.51	Hex fan status 2.1				DigIN Slot0.2	3659	
P3.3.2.2.52	Hex fan status 2.2				DigIN Slot0.2	3660	
P3.3.2.2.53	Hex fan status 2.3				DigIN Slot0.2	3661	

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.3.2.2.54	Hex fan status 3.1				DigIN Slot0.2	3662	
P3.3.2.2.55	Hex fan status 3.2				DigIN Slot0.2	3663	
P3.3.2.2.56	Hex fan status 3.3				DigIN Slot0.2	3664	
P3.3.2.2.57	Hex fan status 4.1				DigIN Slot0.2	3665	
P3.3.2.2.58	Hex fan status 4.2				DigIN Slot0.2	3666	
P3.3.2.2.59	Hex fan status 4.3				DigIN Slot0.2	3667	
P3.3.2.2.60	Cooling Monitor 1				DigIN Slot0.2	3670	
P3.3.2.2.61	Cooling Monitor 2				DigIN Slot0.2	3671	
P3.3.2.2.62	Cooling Monitor 3				DigIN Slot0.2	3672	
P3.3.2.2.63	Cooling Monitor 4				DigIN Slot0.2	3673	
P3.3.2.2.64	AFE inductor temperature SW1				DigIN Slot0.2	3680	
P3.3.2.2.65	AFE inductor temperature SW2				DigIN Slot0.2	3681	
P3.3.2.2.66	AFE inductor temperature SW3				DigIN Slot0.2	3682	
P3.3.2.2.67	AFE inductor temperature SW4				DigIN Slot0.2	3683	
P3.3.2.2.68	Grid inductor temperature SW1				DigIN Slot0.2	3684	
P3.3.2.2.69	Grid inductor temperature SW2				DigIN Slot0.2	3685	
P3.3.2.2.70	Grid inductor temperature SW3				DigIN Slot0.2	3686	
P3.3.2.2.71	Grid inductor temperature SW4				DigIN Slot0.2	3687	
P3.3.2.2.72	CMM inductor temperature SW1				DigIN Slot0.2	3688	
P3.3.2.2.73	CMM inductor temperature SW2				DigIN Slot0.2	3689	
P3.3.2.2.74	CMM inductor temperature SW3				DigIN Slot0.2	3690	
P3.3.2.2.75	CMM inductor temperature SW4				DigIN Slot0.2	3691	
P3.3.2.2.76	Enclosure Humidity, Temp Status Invert				0	3736	
P3.3.2.2.77	Enclosure Humidity Status 1				DigIN Slot0.2	3720	
P3.3.2.2.78	Enclosure Humidity Status 2				DigIN Slot0.2	3721	
P3.3.2.2.79	Enclosure Humidity Status 3				DigIN Slot0.2	3722	
P3.3.2.2.80	Enclosure Humidity Status 4				DigIN Slot0.2	3723	
P3.3.2.2.81	Enclosure Temperature Status 1.1				DigIN Slot0.2	3724	
P3.3.2.2.82	Enclosure Temperature Status 1.2				DigIN Slot0.2	3725	
P3.3.2.2.83	Enclosure Temperature Status 1.3				DigIN Slot0.2	3726	
P3.3.2.2.84	Enclosure Temperature Status 2.1				DigIN Slot0.2	3727	
P3.3.2.2.85	Enclosure Temperature Status 2.2				DigIN Slot0.2	3728	

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.3.2.2.86	Enclosure Temperature Status 2.3				DigIN Slot0.2	3729	
P3.3.2.2.87	Enclosure Temperature Status 3.1				DigIN Slot0.2	3730	
P3.3.2.2.88	Enclosure Temperature Status 3.2				DigIN Slot0.2	3731	
P3.3.2.2.89	Enclosure Temperature Status 3.3				DigIN Slot0.2	3732	
P3.3.2.2.90	Enclosure Temperature Status 4.1				DigIN Slot0.2	3733	
P3.3.2.2.91	Enclosure Temperature Status 4.2				DigIN Slot0.2	3734	
P3.3.2.2.92	Enclosure Temperature Status 4.3				DigIN Slot0.2	3735	

Table 145: Limits Parameters

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.3.3.1	Nom DC Precharge Voltage	5784.4	7862.0	V	0.0	3321	
P3.3.3.2	Min DC Precharge Voltage	0.0	6800.9	V	0.0	3322	
P3.3.3.3	Precharge Restart Limit	0.0	5784.4	V	500.0	3323	
P3.3.3.4	Max DC Slew Rate	0.0	8000.0	V/s	0.0	3324	
P3.3.3.5	Min DC Slew Rate	0.0	8000.0	V/s	0.0	3325	

Table 146: Timeouts parameters

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.3.4.1	Fault Clear Timeout	0.00	300.00	s	0.00	3330	
P3.3.4.2	MX Open Timeout	0.00	5.00	s	0.00	3331	
P3.3.4.3	MX Close Timeout	0.00	5.00	s	0.00	3332	
P3.3.4.4	KMX Open Timeout	0.00	5.00	s	0.00	3333	
P3.3.4.5	KMX Close Timeout	0.00	5.00	s	0.00	3334	
P3.3.4.6	KPC Open Timeout	0.00	5.00	s	0.00	3335	
P3.3.4.7	Min Slew Rate Timeout	0.00	30.00	s	0.00	3336	
P3.3.4.8	DC Discharge Timeout	0.00	600.00	s	0.00	3337	
P3.3.4.9	DC Precharge Timeout	0.00	60.00	s	0.00	3338	
P3.3.4.10	Activate Timeout	0.00	60.00	s	0.00	3339	
P3.3.4.11	Synch Timeout	0.00	60.00	s	0.00	3340	
P3.3.4.12	Stabilize Timeout	0.00	60.00	s	0.00	3341	
P3.3.4.13	KPC Close Timeout			s	1.00	3342	
P3.3.4.14	Cooling Off Delay			s	300.00	3343	

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.3.4.15	Cooling OK Timeout			s	15.00	3344	
P3.3.4.16	Breaker close pulse time			s	0.08	3345	
P3.3.4.17	Breaker open pulse time			s	0.08	3346	

Table 147: Switches Parameters

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.3.5.1	Precharge Master	0	1		0	3351	0 = No 1 = Yes
P3.3.5.2	Start Request Mode	0	1		0	3352	0 = Implicit 1 = Explicit
P3.3.5.3	Commissioning Test Mode	0	1		0	3353	0 = Disabled 1 = Enabled
P3.3.5.4	Synchronization Test Mode	0	1		0	3354	0 = Disabled 1 = Enabled

5.5.4 Group 3.4: Start/Stop Setup

Table 148: Start/Stop Setup

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.4.1	Remote Control Place	0	1		0	172	0 = I/O control 1 = Fieldbus control
P3.4.2	Local/Remote	0	1		0	211	0 = Remote 1 = Local
P3.4.3	Keypad Stop Button	0	1		1	114	0 = No 1 = Yes
P3.4.4	Stop Function	0	1		0	506	0 = Coasting 1 = Ramping
P3.4.5	I/O A Start/Stop Logic	0	4		2	300	**Logic = 0** • Ctrl sgn 1 = Forward • Ctrl sgn 2 = Backward **Logic = 1** • Ctrl sgn 1 = Forward (edge) • Ctrl sgn 2 = Inverted Stop • Ctrl sgn 3 = Bckwrd (edge) **Logic = 2** • Ctrl sgn 1 = Forward (edge) • Ctrl sgn 2 = Bckwrd (edge) **Logic = 3**

Index	Parameter	Min	Max	Unit	Default	ID	Description
							• Ctrl sgn 1 = Start • Ctrl sgn 2 = Reverse **Logic = 4** • Ctrl sgn 1 = Start (edge) • Ctrl sgn 2 = Reverse
P3.4.6	Fieldbus Start Logic	0	1		0	889	0 = A rising edge is necessary 1 = State
P3.4.7	Remote to Local Function	0	2		0	181	0 = Keep Run 1 = Keep Run & Reference 2 = Stop

5.5.5 Group 3.5: I/O Configuration

Table 149: Digital Input Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.5.1.1	Control Signal 1 A				DigIN Slot0.1	403	
P3.5.1.2	Control Signal 2 A				DigIN Slot0.1	404	
P3.5.1.3	Control Signal 3 A				DigIN Slot0.1	434	
P3.5.1.4	Fieldbus Control Force				DigIN Slot0.1	411	
P3.5.1.5	Keypad Control Force				DigIN Slot0.1	410	
P3.5.1.6	External Fault Close				DigIN Slot0.1	405	OPEN = OK CLOSED = External fault
P3.5.1.7	External Fault Open				DigIN Slot0.2	406	OPEN = External fault CLOSED = OK
P3.5.1.8	Fault Reset Close				DigIN Slot0.1	414	CLOSED = Resets all active faults
P3.5.1.9	Fault Reset Open				DigIN Slot0.1	213	OPEN = Resets all active faults
P3.5.1.10	Run Enable				DigIN Slot0.2	407	
P3.5.1.11	Run Interlock 1				DigIN Slot0.2	1041	
P3.5.1.12	Run Interlock 2				DigIN Slot0.2	1042	
P3.5.1.13	Maintenance counter 1 reset				DigIN Slot0.1	490	
P3.5.1.14	Parameter Set 1/2 Selection				DigIN Slot0.1	496	OPEN = Parameter set 1 CLOSED = Parameter set 2
P3.5.1.15	Power on				DigIN Slot0.1	3550	

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.5.1.16	Power off				DigIN Slot0.1	3551	
P3.5.1.17	Reset power on state				DigIN Slot0.1	3552	
P3.5.1.18	GSW Unlock				DigIN Slot0.1	3553	

Table 150: Analog Input 1 Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.5.2.1.1	AI1 Signal Selection				AnIN SlotA.1	377	
P3.5.2.1.2	AI1 Signal Filter Time	0.00	300.00	s	0.10	378	
P3.5.2.1.3	AI1 Signal Range	0	1		0	379	0 = 0…10 V / 0…20 mA 1 = 2…10 V / 4…20 mA
P3.5.2.1.4	AI1 Custom. Min	-160.00	160.00	%	0.00	380	
P3.5.2.1.5	AI1 Custom. Max	-160.00	160.00	%	100.00	381	
P3.5.2.1.6	AI1 Signal Inversion	0	1		0	387	0 = Normal 1 = Signal inverted

Table 151: Analog Input 2 Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.5.2.2.1	AI2 Signal Selection				AnIN SlotA.2	388	See P3.5.2.1.1.
P3.5.2.2.2	AI2 Signal Filter Time	0.00	300.00	s	0.10	389	See P3.5.2.1.2.
P3.5.2.2.3	AI2 Signal Range	0	1		1	390	See P3.5.2.1.3.
P3.5.2.2.4	AI2 Custom. Min	-160.00	160.00	%	0.00	391	See P3.5.2.1.4.
P3.5.2.2.5	AI2 Custom. Max	-160.00	160.00	%	100.00	392	See P3.5.2.1.5.
P3.5.2.2.6	AI2 Signal Inversion	0	1		0	398	See P3.5.2.1.6.

Table 152: Analog Input 3 Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.5.2.3.1	AI3 Signal Selection				AnIN SlotD.1	141	See P3.5.2.1.1.
P3.5.2.3.2	AI3 Signal Filter Time	0.00	300.00	s	0.10	142	See P3.5.2.1.2.
P3.5.2.3.3	AI3 Signal Range	0	1		0	143	See P3.5.2.1.3.

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.5.2.3.4	AI3 Custom. Min	-160.00	160.00	%	0.00	144	See P3.5.2.1.4.
P3.5.2.3.5	AI3 Custom. Max	-160.00	160.00	%	100.00	145	See P3.5.2.1.5.
P3.5.2.3.6	AI3 Signal Inversion	0	1		0	151	See P3.5.2.1.6.

Table 153: Analog Input 4 Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.5.2.4.1	AI4 Signal Selection				AnIN SlotD.2	152	See P3.5.2.1.1.
P3.5.2.4.2	AI4 Signal Filter Time	0.00	300.00	s	0.10	153	See P3.5.2.1.2.
P3.5.2.4.3	AI4 Signal Range	0	1		0	154	See P3.5.2.1.3.
P3.5.2.4.4	AI4 Custom. Min	-160.00	160.00	%	0.00	155	See P3.5.2.1.4.
P3.5.2.4.5	AI4 Custom. Max	-160.00	160.00	%	100.00	156	See P3.5.2.1.5.
P3.5.2.4.6	AI4 Signal Inversion	0	1		0	162	See P3.5.2.1.6.

Table 154: Analog Input 5 Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.5.2.5.1	AI5 Signal Selection				AnIN SlotE.1	188	See P3.5.2.1.1.
P3.5.2.5.2	AI5 Signal Filter Time	0.00	300.00	s	0.10	189	See P3.5.2.1.2.
P3.5.2.5.3	AI5 Signal Range	0	1		0	190	See P3.5.2.1.3.
P3.5.2.5.4	AI5 Custom. Min	-160.00	160.00	%	0.00	191	See P3.5.2.1.4.
P3.5.2.5.5	AI5 Custom. Max	-160.00	160.00	%	100.00	192	See P3.5.2.1.5.
P3.5.2.5.6	AI5 Signal Inversion	0	1		0	198	See P3.5.2.1.6.

Table 155: Analog Input 6 Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.5.2.6.1	AI6 Signal Selection				AnIN SlotE.2	199	See P3.5.2.1.1.
P3.5.2.6.2	AI6 Signal Filter Time	0.00	300.00	s	0.10	200	See P3.5.2.1.2.
P3.5.2.6.3	AI6 Signal Range	0	1		0	201	See P3.5.2.1.3.
P3.5.2.6.4	AI6 Custom. Min	-160.00	160.00	%	0.00	203	See P3.5.2.1.4.
P3.5.2.6.5	AI6 Custom. Max	-160.00	160.00	%	100.00	204	See P3.5.2.1.5.
P3.5.2.6.6	AI6 Signal Inversion	0	1		0	209	See P3.5.2.1.6.

Table 156: Analog Input 7 Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.5.2.7.1	AI7 Signal Selection				AnIN AUX 14.1	5600	See P3.5.2.1.1.
P3.5.2.7.2	AI7 Signal Filter Time	0.00	300.00	s	0.10	5601	See P3.5.2.1.2.
P3.5.2.7.3	AI7 Signal Range	0	1		0	5602	See P3.5.2.1.3.
P3.5.2.7.4	AI7 Custom. Min	-160.00	160.00	%	0.00	5603	See P3.5.2.1.4.
P3.5.2.7.5	AI7 Custom. Max	-160.00	160.00	%	100.00	5604	See P3.5.2.1.5.
P3.5.2.7.6	AI7 Signal Inversion	0	1		0	5605	See P3.5.2.1.6.

Table 157: Analog Input 8 Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.5.2.8.1	AI8 Signal Selection				AnIN AUX 14.2	5610	See P3.5.2.1.1.
P3.5.2.8.2	AI8 Signal Filter Time	0.00	300.00	s	0.10	5611	See P3.5.2.1.2.
P3.5.2.8.3	AI8 Signal Range	0	1		0	5612	See P3.5.2.1.3.
P3.5.2.8.4	AI8 Custom. Min	-160.00	160.00	%	0.00	5613	See P3.5.2.1.4.
P3.5.2.8.5	AI8 Custom. Max	-160.00	160.00	%	100.00	5614	See P3.5.2.1.5.
P3.5.2.8.6	AI8 Signal Inversion	0	1		0	5615	See P3.5.2.1.6.

Table 158: Analog Input 9 Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.5.2.9.1	AI9 Signal Selection				AnIN AUX 14.3	5620	See P3.5.2.1.1.
P3.5.2.9.2	AI9 Signal Filter Time	0.00	300.00	s	0.10	5621	See P3.5.2.1.2.
P3.5.2.9.3	AI9 Signal Range	0	1		0	5622	See P3.5.2.1.3.
P3.5.2.9.4	AI9 Custom. Min	-160.00	160.00	%	0.00	5623	See P3.5.2.1.4.
P3.5.2.9.5	AI9 Custom. Max	-160.00	160.00	%	100.00	5624	See P3.5.2.1.5.
P3.5.2.9.6	AI9 Signal Inversion	0	1		0	5625	See P3.5.2.1.6.

Table 159: Analog Input 10 Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.5.2.10.1	AI10 Signal Selection				AnIN AUX 14.4	5630	See P3.5.2.1.1.
P3.5.2.10.2	AI10 Signal Filter Time	0.00	300.00	s	0.10	5631	See P3.5.2.1.2.

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.5.2.10.3	AI10 Signal Range	0	1		0	5632	See P3.5.2.1.3.
P3.5.2.10.4	AI10 Custom. Min	-160.00	160.00	%	0.00	5633	See P3.5.2.1.4.
P3.5.2.10.5	AI10 Custom. Max	-160.00	160.00	%	100.00	5634	See P3.5.2.1.5.
P3.5.2.10.6	AI10 Signal Inversion	0	1		0	5635	See P3.5.2.1.6.

N O T I C E

Shows only the parameters for the outputs on option boards in slots C, D, and E. Make the selections as in RO1 Function (P3.5.3.2.1). This group or these parameters are not visible if there are no digital outputs in slots C, D, or E.

Table 160: Digital Output Settings on Standard I/O Board

Index	Parameter	Min	Max	Unit	De-fault	ID	Description
P3.5.3.2.1	RO1 Func-tion	0	40		29	11001	0 = Not used 1 = Test (always closed) 2 = Ready 3 = Run 4 = Fault 5 = Fault inverted 6 = Alarm 7 = Reverse 8 = At speed 9 = Thermistor fault 10 = Motor regulator active 11 = Start signal active 12 = Keypad control active 14 = Limit supervision1 15 = Limit supervision2 20 = Fieldbus Control- Word B13 21 = Fieldbus Control- Word B14 22 = Fieldbus Control- Word B15 23 = Fieldbus Process- Data1.B0 24 = Fieldbus Process- Data1.B1 25 = Fieldbus Process- Data1.B2 29 = Mains contactor permissive 30 = Mains contactor close 31 = Precharge permissive 32 = INU run enable 33 = Precharge ready 34 = Precharge started 35 = Precharge inhibit 36 = Precharge coil 37 = HXL coil 38 = MV HX coil 39 = LV HX coil

Index	Parameter	Min	Max	Unit	De-fault	ID	Description
							40 = MCB coil
P3.5.3.2.2	RO1 ON De-lay	0.00	320.00	s	0.00	11002	
P3.5.3.2.3	RO1 OFF Delay	0.00	320.00	s	0.00	11003	
P3.5.3.2.4	RO2 Func-tion	0	56		30	11004	See P3.5.3.2.1.
P3.5.3.2.5	RO2 ON De-lay	0.00	320.00	s	0.00	11005	See P3.5.3.2.2.
P3.5.3.2.6	RO2 OFF Delay	0.00	320.00	s	0.00	11006	See P3.5.3.2.3.
P3.5.3.2.7	RO3 Func-tion	0	56		31	11007	See P3.5.3.2.1. Not visible if only 2 output relays are instal-led.

Table 161: Digital Output Settings on MV Star Board

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.5.3.6.1	RO1 Function	0	21		0	6040	0 = Not used 1 = Test (always closed) 2 = Ready 3 = Run 4 = Fault 5 = Fault inverted 6 = Alarm 7 = Fieldbus Control- Word B13 8 = Fieldbus Control- Word B14 9 = Fieldbus Control- Word B15 10 = Fieldbus Process- Data1.B0 11 = Fieldbus Process- Data1.B1 12 = Fieldbus Process- Data1.B2 13 = Main contactor permissive 14 = Main contactor close 15 = Precharge permissive 16 = GSW unlock 17 = Run cooling 18 = Close breaker 19 = STO active 20 = Pulse close breaker 21 = Pulse open breaker
P3.5.3.6.2	RO2 Function	0	21		0	6041	See ID 6040.
P3.5.3.6.3	RO3 Function	0	21		0	6042	See ID 6040.

⚠ W A R N I N G ⚠

Do not close the main breaker manually or through a control place other than the VACON® 3000.

N O T I C E

Shows only the parameters for the outputs on option boards in slots C, D, and E. Make the selections as in Basic AO1 Function (P3.5.4.1.1). This group or these parameters are not visible if there are no digital outputs in slots C, D, or E.

Table 162: Analog Output Settings on Standard I/O board

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.5.4.1.1	AO1 function	0	31		2	10050	0 = TEST 0% 1 = TEST 100% 2 = Output freq (0 - fmax) 3 = Freq reference (0 - fmax) 4 = Motor speed (0 - Motor nominal speed) 5 = Output current (0 - InMotor) 6 = Motor torque (0 - TnMotor) 7 = Motor power (0 - PnMotor) 8 = Motor voltage (0 - UnMotor) 9 = DC-link voltage (0 - 1000V) 10 = PID Setpoint (0-100%) 13 = ProcessDataIn1 (0-100%) 14 = ProcessDataIn2 (0-100%) 15 = ProcessDataIn3 (0-100%) 16 = ProcessDataIn4 (0-100%) 17 = ProcessDataIn5 (0-100%) 18 = ProcessDataIn6 (0-100%) 19 = ProcessDataIn7 (0-100%) 20 = ProcessDataIn8 (0-100%)
P3.5.4.1.2	AO1 filter time	0.0	300.0	s	1.00	10051	0 = No filtering
P3.5.4.1.3	AO1 minimum signal	0	1		0	10052	0 = 0 mA / 0 V 1 = 4 mA / 2 V
P3.5.4.1.4	AO1 minimum scale			Hz	0.00	10053	
P3.5.4.1.5	AO1 maximum scale			Hz	0.00	10054	

5.5.6 Group 3.6: Fieldbus Data Mapping

Table 163: Fieldbus Data Mapping parameters

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.6.1	Fieldbus Data Out 1 Selection	0	35000		5515	852	
P3.6.2	Fieldbus Data Out 2 Selection	0	35000		74	853	
P3.6.3	Fieldbus Data Out 3 Selection	0	35000		37	854	
P3.6.4	Fieldbus Data Out 4 Selection	0	35000		37	855	

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.6.5	Fieldbus Data Out 5 Selection	0	35000		56	856	
P3.6.6	Fieldbus Data Out 6 Selection	0	35000		7	857	
P3.6.7	Fieldbus Data Out 7 Selection	0	35000		5511	858	
P3.6.8	Fieldbus Data Out 8 Selection	0	35000		5510	859	
P3.6.9	Fieldbus Data Out 9 Selection	0	35000		0	890	
P3.6.10	Fieldbus Data Out 10 Selection	0	35000		0	891	
P3.6.11	Fieldbus Data Out 11 Selection	0	35000		0	892	
P3.6.12	Fieldbus Data Out 12 Selection	0	35000		0	893	
P3.6.13	Fieldbus Data Out 13 Selection	0	35000		0	894	
P3.6.14	Fieldbus Data Out 14 Selection	0	35000		0	895	
P3.6.15	Fieldbus Data Out 15 Selection	0	35000		0	896	
P3.6.16	Fieldbus Data Out 16 Selection	0	35000		0	897	
P3.6.17	Fieldbus Data In 1 Selection				0	6400	
P3.6.18	Fieldbus Data In 2 Selection				0	6401	
P3.6.19	Fieldbus Data In 3 Selection				0	6402	
P3.6.20	Fieldbus Data In 4 Selection				0	6403	
P3.6.21	Fieldbus Data In 5 Selection				0	6404	
P3.6.22	Fieldbus Data In 6 Selection				0	6405	
P3.6.23	Fieldbus Data In 7 Selection				0	6406	
P3.6.24	Fieldbus Data In 8 Selection				0	6407	
P3.6.25	Fieldbus Data In 9 Selection				0	6408	
P3.6.26	Fieldbus Data In 10 Selection				0	6409	
P3.6.27	Fieldbus Data In 11 Selection				0	6410	
P3.6.28	Fieldbus Data In 12 Selection				0	6411	
P3.6.29	Fieldbus Data In 13 Selection				0	6412	
P3.6.30	Fieldbus Data In 14 Selection				0	6413	
P3.6.31	Fieldbus Data In 15 Selection				0	6414	
P3.6.32	Fieldbus Data In 16 Selection				0	6415	
P3.6.33	Fieldbus profile				1	6417	1 = Standard 2 = Bypass

Table 164: The default values for Process Data Out in fieldbus

Data	Default Value	Scale
Process Data Out 1	Grid active current	0.1 A
Process Data Out 2	Last active alarm code	1
Process Data Out 3	Last active fault code	1
Process Data Out 4	AFE output current	0.1 A
Process Data Out 5	DIN status word 1	1
Process Data Out 6	DC-link voltage	1 V
Process Data Out 7	Line frequency	0.01 Hz
Process Data Out 8	Line voltage	1 V

Example

The value 5000 for Line frequency equals 50.00 Hz, because the scale is 0.01. All the monitoring values that you can find in the Monitor menu are given the scale value.

5.5.7 Group 3.7 Supervisions

Table 165: Supervision Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.7.1	Supervision #1 Item Selection	5	14		0	1431	5 = DC-link voltage 6 = Analogue input 1 7 = Analogue input 2 8 = Analogue input 3 9 = Analogue input 4 10 = Analogue input 5 11 = Analogue input 6 12 = Temperature input 1 13 = Temperature input 2 14 = Temperature input 3
P3.7.2	Supervision #1 Mode	0	2		0	1432	0 = Not used 1 = Low limit supervision 2 = High limit supervision
P3.7.3	Supervision #1 Limit	-50.00	50.00	Varies	25.00	1433	
P3.7.4	Supervision #1 Limit Hysteresis	0.00	50.00	Varies	5.00	1434	
P3.7.5	Supervision #2 Item Selection	0	17		1	1435	See P3.8.1
P3.7.6	Supervision #2 Mode	0	2		0	1436	See P3.8.2
P3.7.7	Supervision #2 Limit	-50.00	50.00	Varies	40.00	1437	
P3.7.8	Supervision #2 Limit Hysteresis	0.00	50.00	Varies	5.00	1438	

5.5.8 Group 3.8: Protections

Table 166: General protection settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.8.1.2	Response to External Fault	0	3		2	701	0 = No action 1 = Alarm 2 = Fault (Stop according to stop function) 3 = Fault (Stop by coasting)
P3.8.1.3	Undervoltage Fault	0	1		0	727	0 = Fault stored in history 1 = Fault not stored in history
P3.8.1.4	Response to Output Phase Fault	0	3		2	702	See P3.8.1.2.
P3.8.1.5	Response to Fieldbus Communication Fault	0	5		3	733	0 = No action 1 = Alarm 2 = Alarm + preset fault frequency (P3.8.1.10) 3 = Fault (Stop according to stop function) 4 = Fault (Stop by coasting)
P3.8.1.6	Slot Communication Fault	0	3		2	734	See P3.8.1.2.
P3.8.1.7	Thermistor Fault	0	3		0	732	See P3.8.1.2.
P3.8.1.8	Earth Fault	0	3		3	703	See P3.8.1.2.
P3.8.1.9	Preset Alarm Frequency	P3.3.1.1	P3.3.1.2	Hz	25.00	183	
P3.8.1.10	HS Cap Vrms Enable				0	3304	
P3.8.1.11	Enclosure Humidity and Temperature	0	3		1	3360	0 = No action 1 = Alarm 2 = Fault (Stop according to stop function) 3 = Fault (Stop by coasting)
P3.8.1.12	Input phase fault ripple limit			V	150.0	4007	
P3.8.1.13	Current imbalance - belt	0	2		2	4039	0 = No action 1 = Alarm 2 = Fault, coast
P3.8.1.14	Neutral to ground fault response	0	1		1	4040	0 = No action 1 = Fault, coast
P3.8.1.15	Redundant switchover indication	0	2		1	750	0 = No action 1 = Alarm 2 = Alarm + Autoreset

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.8.1.16	FB communication fault force delay			s	0.00	751	
P3.8.1.17	FB communication fault clear delay			s	0.00	752	
P3.8.1.18	FBWD delay			s	2.00	1808	
P3.8.1.19	FBWD fault mode					1807	See ID 701

Table 167: AI low protection settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.8.4.1	Analog Input Low Protection	0	2		2	767	0 = No protection 1 = Protection enabled in Run state 2 = Protection enabled in Run and Stop state
P3.8.4.2	Analog Input Low Fault	0	5		0	700	0 = No action 1 = Alarm 2 = Alarm + preset fault frequency (P3.9.1.1) 3 = Alarm + previous frequency reference 4 = Fault (Stop according to stop mode) 5 = Fault (Stop by coasting)

Table 168: Thermal protection settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.8.5.1	Coolant temperature input selection	0	14		0	3308	0 = Not used 1 = AI1 2 = AI2 3 = AI3 4 = AI4 5 = AI5 6 = AI6 7 = ProcessDataIn1 8 = ProcessDataIn2 9 = ProcessDataIn3 10 = ProcessDataIn4 11 = ProcessDataIn5 12 = ProcessDataIn6 13 = ProcessDataIn7 14 = ProcessDataIn8
P3.8.5.2	Coolant scale minimum			°C	0.0	3366	
P3.8.5.3	Coolant scale maximum			°C	100.0	3367	
P3.8.5.4	FB coolant decimal places	0	1		0	3365	0 = 2D 1 = 1D
P3.8.5.5	DTM back compatibility mode	0	1		0	3307	0 = Disabled

Index	Parameter	Min	Max	Unit	Default	ID	Description
							1 = Enabled
P3.8.5.6	PHM temperature sensor disable				0	3306	Bit value 1 = Disable b0 = Module #2 b1 = Module #3 b2 = Module #4 b3 = Module #5 b4 = Module #6 b5 = Module #7

5.5.9 Group 3.9: Automatic Reset

Table 169: Automatic Reset Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.9.1	Automatic Reset	0	1		0	731	0 = Disabled 1 = Enabled
P3.9.2	Restart Function	0	1		1	719	0 = Flying start 1 = Start function
P3.9.3	Wait Time	0.10	10000.00	s	0.50	717	
P3.9.4	Trial Time	0.00	10000.00	s	60.00	718	
P3.9.5	Number of Trials	1	10		4	759	
P3.9.6	Autoreset: Undervoltage	0	1		1	720	0 = No 1 = Yes
P3.9.7	Autoreset: Overvoltage	0	1		1	721	0 = No 1 = Yes
P3.9.8	Autoreset: Overcurrent	0	1		1	722	0 = No 1 = Yes
P3.9.9	Autoreset: AI Low	0	1		1	723	0 = No 1 = Yes
P3.9.10	Autoreset: Unit Overtemperature	0	1		1	724	0 = No 1 = Yes
P3.9.11	Autoreset: Motor Overtemperature	0	1		1	725	0 = No 1 = Yes
P3.9.12	Autoreset: External Fault	0	1		0	726	0 = No 1 = Yes
P3.9.13	Autoreset: Underload Fault	0	1		0	738	0 = No 1 = Yes

5.5.10 Group 3.10: Application Settings

Table 170: Application Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.10.1	Password	0	9999		0	1806	
P3.10.2	C/F Selection	0	1		0[1]	1197	0 = Celsius 1 = Fahrenheit
P3.10.3	kW/hp Selection	0	1		0[1]	1198	0 = kW 1 = hp
P3.10.4	Multimonitor View	0	2		1	1196	0 = 2x2 sections 1 = 3x2 sections 2 = 3x3 sections
P3.10.5	FUNCT Button Configuration	0	15		15	1195	B0 = Local / Remote B1 = Control Page B2 = Change Direction B3 = Quick Edit

[1] The default value in the US is 1.

5.5.11 Group 3.11: Maintenance Counters

Table 171: Maintenance Counters

Index	Parameter	Min	Max	Unit	Default	ID	Description
P3.11.1	Counter 1 Mode	0	2		0	1104	0 = Not used 1 = Hours 2 = Revolutions * 1000
P3.11.2	Counter 1 Alarm Limit	0	2147483647	h/kRev	0	1105	0 = Not used
P3.11.3	Counter 1 Fault Limit	0	2147483647	h/kRev	0	1106	0 = Not used
P3.11.4	Counter 1 Reset				0	1107	
P3.11.5	Counter 1 DI Reset				DigIN Slot0.1	490	CLOSED = Reset

5.6 Diagnostics Menu

5.6.1 Counters

5.6.1.1 Total Counters

Table 172: The Total Counter Parameters in the *Diagnostics* Menu

Index	Parameter	Min	Max	Unit	Default	ID	Description
V4.4.1	Energy Counter			Varies		2291	The quantity of energy taken from the supply network. The counter cannot be reset.
V4.4.3	Operating Time			a d hh:min		2298	The operating time of the control unit.
V4.4.7	Run Time			a d hh:min		2293	The motor run time.
V4.4.11	Power On Time			a d hh:min		2294	The quantity of time that the power unit has been powered on. The counter cannot be reset.
V4.4.15	Start Command Counter					2295	The number of times that the power unit has been started.

5.6.1.2 Trip Counters

Table 173: The Trip Counter Parameters in the *Diagnostics* Menu

Index	Parameter	Min	Max	Unit	Default	ID	Description
P4.5.1	Energy Trip Counter			Varies		2296	This counter can be reset: • Push [OK]. A Reset counter page shows. Push [OK] again.
P4.5.3	Operating Time			a d hh:min		2299	This counter can be reset. See instructions in P4.5.1 above.

5.6.2 Software Info

Table 174: The Software Info Parameters in the *Diagnostics* Menu

Index	Parameter	Min	Max	Unit	Default	ID	Description
V4.6.1	Software Package					2524	The code for the software identification
V4.6.4	System Load	0	100	%		2300	The load on the control unit CPU
V4.6.5	Application Name					2525	The name of the application
V4.6.6	Application ID					837	The code of the application
V4.6.7	Application Version					838	
V4.6.8	Language Selections						Selected language package in software loading
V4.6.9	Keypad Software Version						

5.6.3 Drive Info

Table 175: The Drive Info Parameters in the *Diagnostics* Menu

Index	Parameter	Min	Max	Unit	Default	ID	Description
V4.7.1	Power Size						

5.6.4 Unit Status

Table 176: The Unit Status Parameters in the *Diagnostics* Menu

Index	Parameter	Min	Max	Unit	Default	ID	Description
V4.8.1	Control Unit					2540	Status of the control unit
V4.8.2	UNIT1					2541	Status of the power unit
V4.8.3–19	UNIT2–29					Defined based on connected power units	Status of the power unit

5.7 I/O and Hardware Menu

5.7.1 Basic I/O

Table 177: The Basic I/O Parameters in the I/O and Hardware Menu

Index	Parameter	Min	Max	Unit	Default	ID	Description
V5.1.1	Digital Input 1	0	1		0	2502	Status of the digital input signal
V5.1.2	Digital Input 2	0	1		0	2503	Status of the digital input signal
V5.1.3	Digital Input 3	0	1		0	2504	Status of the digital input signal
V5.1.4	Digital Input 4	0	1		0	2505	Status of the digital input signal
V5.1.5	Digital Input 5	0	1		0	2506	Status of the digital input signal
V5.1.6	Digital Input 6	0	1		0	2507	Status of the digital input signal
V5.1.7	Analogue Input 1 Mode	1	3		3	2508	Shows the mode that is set for the analog input signal. The selection is made with a DIP switch on the control board. 1 = 0...20mA 3 = 0...10V
V5.1.8	Analogue Input 1	0	100	%	0.00	2509	Status of the analog input signal
V5.1.9	Analogue Input 2 Mode	1	3		3	2510	Shows the mode that is set for the analog input signal. The selection is made with a DIP switch on the control board. 1 = 0...20mA 3 = 0...10V
V5.1.10	Analogue Input 2	0	100	%	0.00	2511	Status of the analog input signal
V5.1.11	Analogue Output 1 Mode	1	3		1	2512	Shows the mode that is set for the analog input signal. The selection is made with a DIP switch on the control board. 1 = 0...20mA 3 = 0...10V

Index	Parameter	Min	Max	Unit	Default	ID	Description
V5.1.12	Analogue Output 1	0	100	%	0.00	2513	Status of the analog output signal
V5.1.13	Relay Output 1	0	1		0	2514	Status of the relay output signal
V5.1.14	Relay Output 2	0	1		0	2515	Status of the relay output signal
V5.1.15	Relay Output 3	0	1		0	2516	Status of the relay output signal

5.7.2 Option Board Slots

The parameters in this menu are different for all the option boards. The parameters of the installed option board is shown. If there is no option board in the slots C, D or E, no parameters are shown. See more about the location of the slots in chapter 3.1 General Information on the Programming.

When an option board is removed, the fault code 39 and the fault name *Device removed* show on the display.

Table 178: Option Board Related Parameters

Menu	Function	Description
Slot C	Settings	The settings that are related to the option board.
	Monitoring	Monitor the data that is related to the option board.
Slot D	Settings	The settings that are related to the option board.
	Monitoring	Monitor the data that is related to the option board.
Slot E	Settings	The settings that are related to the option board.
	Monitoring	Monitor the data that is related to the option board.

5.7.3 Real Time Clock

Table 179: The Real Time Clock Parameters in the I/O and Hardware Menu

Index	Parameter	Min	Max	Unit	De-fault	ID	Description
V5.5.1	Battery State	1	3			2205	Status of the battery. 1 = Not installed 2 = Installed 3 = Replace the battery
P5.5.2	Time			hh:mm:ss		2201	The current time of the day
P5.5.3	Date			dd.mm.		2202	The current date
P5.5.4	Year			yyyy		2203	The current year
P5.5.5	Daylight Sav-ing	1	4			2204	The daylight saving rule 1 = Off 2 = EU: starts on the last Sunday in March, ends on the last Sunday in October 3 = US: starts on the 2nd Sunday in March, ends on the 1st Sunday in November 4 = Russia (permanent)
P5.5.6	Time Offset					2614	

5.7.4 Simple Network Time Protocol (SNTP)

The simple network time protocol (SNTP) allows devices connected to a TCP/IP network receive precise time information from designated time servers. The time information can be received either by the client device polling the time servers or the time servers broadcasting the time.

Table 180: SNTP Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
V5.5.7.1.1	SNTP Mode					3162	
V5.5.7.1.2	Server 1 IP					3163	
V5.5.7.1.3	Server 2 IP					3164	
V5.5.7.1.4	SNTP Port					3165	
V5.5.7.1.5	Time Interval					3166	

Table 181: SNTP Monitoring

Index	Parameter	Min	Max	Unit	Default	ID	Description
V5.5.7.2.1	SNTP status					3167	
V5.5.7.2.2	Server IP					3168	
V5.5.7.2.3	Last update time					3169	

5.7.5 Power Unit Settings

This menu contains the settings of the fan, the sine-wave filter, and the harmonic filter.

The fan operates in the optimized or the always on mode. In the optimized mode, the internal logic of the drive receives data about the temperature and controls the fan speed. After the drive goes in the Ready state, the fan stops in 5 minutes. In the always on mode, the fan operates in full speed, and does not stop.

The sine-wave filter keeps the overmodulation depth in limits and does not let the thermal management functions decrease the switching frequency.

The harmonic filter can be enabled to avoid possible resonances in the DC link of the AC drive.

Table 182: Power Unit Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P5.6.1.1	Fan Control Mode	0	1		1	2377	0 = Always on 1 = Optimised
V5.6.1.5	Fan Lifetime ID					849	Lifetime of the fan of the drive
P5.6.1.6	Fan lifetime alarm limit	0	200000	h	50000	824	Alarm limit of the fan lifetime
B5.6.1.7	Fan lifetime reset ID					823	Reset the fan lifetime counter with this button.
P5.6.4.8	Belt count				0	6000	Number of phase module belts connected to the control unit.
P5.6.4.9	AUX Chain Unit Count				0	6001	Number of auxiliary connections to the control unit, for example, auxiliary I/O boards, DFE, or CCA board.
P5.6.5.1	Sine Filter	0	1		0	2527	0 = Disabled 1 = Enabled
P5.6.6.1	Harmonic Filter	0	1		0	2497	0 = Disabled

Index	Parameter	Min	Max	Unit	Default	ID	Description
							1 = Enabled

5.7.6 Keypad

Table 183: The Keypad Parameters in the I/O and Hardware Menu

Index	Parameter	Min	Max	Unit	De-fault	ID	Description
P5.7.1	Timeout Time	0	60	min	0	804	The time after which the display goes back to the page that is set with parameter P5.7.2. 0 = Not used
P5.7.2	Default Page	0	4		0	2318	The page that the display shows when the drive is powered up, or when the time that is set with P5.7.1 is expired. If the value is set to 0, the display shows the last page that it showed. 0 = None 1 = A menu index 2 = Main menu 3 = Control page 4 = Multimonitor
P5.7.3	Menu Index					2499	Set a page to be the menu index. (The selection 1 in P5.7.2.)
P5.7.4	Contrast	30	70	%	50	830	Set the contrast of the display.
P5.7.5	Backlight Time	0	60	min	5	818	Set the time after which the backlight of the display turns off. If the value is set to 0, the backlight is always on.

5.7.7 Fieldbus

In the I/O and Hardware menu, there are the parameters that are related to fieldbus boards. You can find the instructions on how to use these parameters in the related fieldbus manual.

Table 184: Fieldbus Menu Structure

Submenu level 1	Submenu level 2	Submenu level 3	Submenu level 4
RS-485	Common settings	Protocol	
Ethernet	Common settings	IP address mode	
		Duplicate IP detect	
		Speed/Duplex	
		Ethernet Fieldbus 1	
		Ethernet Fieldbus 2	
		Fixed IP	IP address
			Subnet mask
			Default gateway
		Speed/Duplex	
		IP address	

Submenu level 1	Submenu level 2	Submenu level 3	Submenu level 4
		Subnet mask	
		Default gateway	
		MAC address	
		Packet rate	
		Peak packet rate	
	Modbus TCP	Common settings	Connection limit
			Slave address
			Communication timeout
			IDMap
		Monitoring	Control word
			Status word
			Drive speed reference
			Drive speed actual
		Connection 1	Monitoring
		Connection 2	Monitoring
		Connection 3	Monitoring

5.7.8 Fieldbus General

Enabling Ethernet Fieldbus Protocol

Needed internal Ethernet based fieldbus protocols can be enabled with parameters *Ethernet Fieldbus 1* (ID 2622) and *Ethernet Fieldbus 2* (ID 2623).

Both parameters contain the same list with “PROFINET I/O, EtherNet/IP, BACnet/IP and Modbus TCP” protocols. PROFINET I/O and EtherNet/IP are visible only if included in the drive configuration. By default Modbus TCP is enabled, but if not used, it is recommended to turn it off.

If the same fieldbus is selected to both parameters, the fieldbus protocol is still activated only once. Protocol specific menu tree becomes visible only after enabling it from these parameters. When using VACONÆLive, to see protocol specific menus, the M5.9 *Ethernet* menu tree must be reloaded after enabling the protocols.

When restoring parameters from older firmware version, drive checks on start-up which protocols were enabled in old firmware and sets up these new parameters accordingly. After having restored parameters, restart the drive. If more than two Ethernet fieldbuses were activated in old firmware, new firmware allows it. In this case, these two new parameters show “None”, but when the values are changed, all Ethernet fieldbuses are stopped, and only the enabled ones are started.

Table 185: Fieldbus Common Settings

Index	Parameter	Min	Max	Unit	Default	ID	Description
P5.9.1.1	IP address mode	0	2		1	2482	0 = Fixed IP 1 = DHCP with AutoIP 2 = DCP
P5.9.1.2	Duplicate IP detection	0	1		1	2569	0 = Disabled 1 = Enabled
P5.9.1.3	Speed/duplex	0	4		0	2500	0 = Autonegotiation 1 = 10M HD

Index	Parameter	Min	Max	Unit	Default	ID	Description
							2 = 10M FD 3 = 100M HD 4 = 100M FD
P5.9.1.4	Ethernet Fieldbus 1	0	4[1]		0	2622	2 Ethernet-based internal fieldbuses can be enabled at a time. Select fieldbus from the list. 0 = None 1 = PROFINET I/O 2 = EtherNet/IP 3 = Modbus TCP 4 = BACnet/IP
P5.9.1.5	Ethernet Fieldbus 2	0	4[1]		3	2623	
M5.9.1.6	Fixed IP						See Table 186.
V5.9.1.7	Speed/duplex	0	4				
V5.9.1.8	IP address	0	255				
V5.9.1.9	Subnet mask	0	255				
V5.9.1.10	Default gateway	0	255				
V5.9.1.11	MAC address						
V5.9.1.12	Packet rate						
V5.9.1.13	Peak packet rate						

[1] Depends on fieldbuses included in drive configuration

Table 186: Fixed IP

Index	Parameter	Min	Max	Unit	Default	ID	Description
P5.9.1.6.1	IP address					2529	
P5.9.1.6.2	Subnet mask					2530	
P5.9.1.6.3	Default gateway					2531	

Table 187: Fieldbus General

Index	Parameter	Min	Max	Unit	Default	ID	Description
P5.13.1	Controlling Fieldbus	0	5		0	2539	0 = Automatic 1 = Slot E 2 = PROFINET I/O 3 = EtherNet/IP 4 = Modbus TCP 5 = BACnet/IP
V5.13.2	Controlling Fieldbus	0	5			2610	

5.7.9 Fieldbus Redundancy

VACON® 3000 supports the usage of two fieldbus connections. The drive accepts control data only from the primary fieldbus. If the primary fieldbus connection fails, the control can be automatically switched to a secondary fieldbus using the fieldbus redundancy control. VACON® 3000 built-in fieldbus protocols support fieldbus redundancy control. The only exception is RS485 N2, which does not support fieldbus redundancy. Recent firmware versions of fieldbus option boards also support fieldbus redundancy.

When *switch on failing* mode is selected, the primary fieldbus connection begins to fail sending messages to the drive. Then the switchover command is given to change to the secondary fieldbus connection. When *switch on faulted* mode is selected, and the primary fieldbus connection gets a timeout, the switchover command is given to change to the secondary fieldbus connection.

The switchback functionality forces a change back to the primary fieldbus connection when it is in operational state and when the given time delay has elapsed. If the switchback functionality is deactivated, the switchover between the fieldbus connections is only performed when the currently controlling fieldbus begins to fail or becomes faulted.

The currently controlling fieldbus protocol can be checked from the monitoring value *V5.13.2 Controlling Fieldbus* (ID 2610).

Table 188: Fieldbus Redundancy

Index	Parameter	Min	Max	Unit	Default	ID	Description
P5.13.3.1	Redundancy Mode	0	2		0	2606	0 = Disabled 1 = Switch on failing 2 = Switch on faulted
P5.13.3.2	Primary Fieldbus Connection				0	2607	
P5.13.3.3	Secondary Fieldbus Connection				0	2608	
P5.13.3.4	Switchover Timeout	0	65535	ms	0	2609	
P5.13.3.5	Switchback Timeout	0	65535	s	10	2612	
V5.13.3.6	Switchover Counter					2611	

5.7.10 Aux Chain

The contents of the menu depend on the units connected to the aux chain. The number of units is configured with parameter *AUX Chain Unit Count* (ID 6001). The parameters in Table 189 are for the first unit connected to the Aux chain (Aux 14). Each connected unit has a similar menu and set of parameters (Aux 15, Aux 16, Aux 17).

Table 189: Aux 14 Parameters in the I/O and Hardware Menu

Index	Parameter	Min	Max	Unit	Default	ID	Description
V5.14.1.1	Board status					29001	
V5.14.1.2	Breaker enable status					29002	
V5.14.1.3	Breaker switch status					29003	
V5.14.1.4	Measurement configuration switch					29004	
V5.14.1.5	Digital input 1–16					29005	
V5.14.1.6	Digital input 17–32					29006	
V5.14.1.7	DigOUT AUX 14					29015	
V5.14.1.8	Analog input 1	0.00	100.00	%	0.00	29007	Status of the analog input signal
V5.14.1.9	Analog input 1 mode					29008	Shows the mode that is set for the analog input signal. The selection is made with a DIP switch on the board. 1 = 0...20 mA 3 = 0...10 V
V5.14.1.10	Analog input 2	0.00	100.00	%	0.00	29009	Status of the analog input signal
V5.14.1.11	Analog input 2 mode					29010	Shows the mode that is set for the analog input signal. The selection is made with a DIP switch on the board.

Index	Parameter	Min	Max	Unit	Default	ID	Description
							1 = 0...20 mA 3 = 0...10 V
V5.14.1.12	Analog input 3	0.00	100.00	%	0.00	29011	Status of the analog input signal
V5.14.1.13	Analog input 3 mode					29012	Shows the mode that is set for the analog input signal. The selection is made with a DIP switch on the board. 1 = 0...20 mA 3 = 0...10 V
V5.14.1.14	Analog input 4	0.00	100.00	%	0.00	29013	Status of the analog input signal
V5.14.1.15	Analog input 4 mode					29014	Shows the mode that is set for the analog input signal. The selection is made with a DIP switch on the board. 1 = 0...20 mA 3 = 0...10 V
V5.14.1.16	Analog input 5	0.00	100.00	%	0.00	29015	
V5.14.1.17	Analog input 5 mode					29016	
V5.14.1.18	Analog input 6	0.00	100.00	%	0.00	29017	
V5.14.1.19	Analog input 6 mode					29018	
V5.14.1.20	Analog input 7	0.00	100.00	%	0.00	29019	
V5.14.1.21	Analog input 7 mode					29020	
V5.14.1.22	Board temperature	-20.0	100.0		0.0	29021	
V5.14.1.23	Supply voltage	0.0	30.0		0.0	29022	

5.7.11 MV-star

Table 190: The MV-star Parameters in the I/O and Hardware Menu

Index	Parameter	Min	Max	Unit	Default	ID	Description
V5.15.1	Board status					28951	
V5.15.2	Digital inputs					28955	
V5.15.3	Digital outputs					28965	
V5.15.4	Gated relays					28966	
V5.15.5	Board temperature	-20.0	100.0		0.0	28923	
V5.15.6	Supply voltage	0.0	30.0		0.0	28924	

5.8 User Settings

5.8.1 User Settings Parameters

Table 191: General Settings in the User Settings Menu

Index	Parameter	Min	Max	Unit	Default	ID	Description
P6.1	Language selection	Varies	Varies		Varies	802	The selection is different in all the language packages.
M6.5	Parameter backup						See 5.8.2 Parameter Backup Parameters.
M6.6	Parameter compare						See 5.8.3 Parameter Compare Parameters.
P6.7	Drive name					2528	Use VACON® Live PC tool to give a name to the drive if necessary.
M6.8	Licenses						See 5.8.4 License Parameters.

5.8.2 Parameter Backup Parameters

Table 192: The Parameter Backup Parameters in the User Settings menu

Index	Parameter	Min	Max	Unit	Default	ID	Description
B6.5.1	Restore Factory Defaults					831	Restores the default parameter values and starts the Startup wizard.
B6.5.4	Save to Set 1					2489	Keeps a customized parameter set (that is, all the parameters included in the application).
B6.5.5	Restore from Set 1					2490	Loads the customized parameter set to the drive.
B6.5.6	Save to Set 2					2491	Keeps another customized parameter set (that is, all the parameters included in the application).
B6.5.7	Restore from Set 2					2492	Loads the customized parameter set 2 to the drive.

5.8.3 Parameter Compare Parameters

Table 193: Parameter Compare Parameters in the User Settings Menu

Index	Parameter	Min	Max	Unit	Default	ID	Description
B6.6.1	Active set - Set 1					2493	
B6.6.2	Active set - Set 2					2494	
B6.6.3	Active set - Defaults					2495	
B6.6.4	Active set - Keypad Set					2496	

5.8.4 License Parameters

Table 194: License Parameters in the User Settings Menu

Index	Parameter	Min	Max	Unit	Default	ID	Description
P6.8.1	Insert License						Insert a drive-specific license to enable new features or remove added features.

6 Monitoring value descriptions

6.1 (ID 1) Output Frequency

Location in the menu:

- Standard application: **V2.1.2** and **V2.3.1**
- AFE application: **V1.2.5**

This monitoring value shows the actual output frequency to the motor.

6.2 (ID 2) Motor Speed

Location in the menu:

- Standard application: **V2.1.4** and **V2.3.3**

This monitoring value shows the actual speed of the motor in RPM (calculated value).

6.3 (ID 3) Motor/Total Current

Location in the menu:

- INU application: **V2.1.3** and **V2.3.4**
- BCU application: **V2.2.1**

In the INU application, this parameter is named Motor Current, and shows the measured current of the motor.
In the BCU application, this parameter is named Total Current, and shows the measured current of the BCU.

6.4 (ID 4) Motor Torque

Location in the menu:

- Standard application: **V2.1.5** and **V2.3.5**

This monitoring value shows the actual torque of the motor (calculated value).
When the torque is in counterclockwise direction, the value is negative.

6.5 (ID 5) Motor Shaft Power

Location in the menu:

- Standard application: **V2.1.6** and **V2.3.7**

This monitoring value shows the actual shaft power of the motor (calculated value) as a percentage of the motor nominal power.

6.6 (ID 6) Motor Voltage

Location in the menu:

- Standard application: **V2.1.7** and **V2.3.9**

This monitoring value shows the actual output voltage to the motor.

6.7 (ID 7) DC-link Voltage

Location in the menu:

- INU application: **V2.1.9** and **V2.3.10**
- AFE application: **V2.1.1** and **V2.3.1.1**
- BCU application: **V2.1.2** and **V2.2.3**

This monitoring value shows the measured voltage in the DC link of the drive.

6.8 (ID 8) Unit Temperature

Location in the menu:

- INU application: **V2.3.11**
- AFE application: **V2.6.12**
- BCU application: **V2.1.8** and **V2.2.4**

This monitoring value shows the measured heat sink temperature of the drive.

The unit of measurement is degrees Celsius or Fahrenheit, depending on parameter C/F Selection (ID 1197) value.

6.9 (ID 9) Motor Temperature

Location in the menu:

- Standard application: **V2.1.10** and **V2.3.12**

This monitoring value shows the calculated motor temperature in percentage of the nominal working temperature.
When the value rises above 105%, motor thermal protection fault occurs.

6.10 (ID 15) SlotA DIN 1,2,3

Location in the menu:

- INU application: **V2.4.1**
- AFE application: **V2.4.1**
- BCU application: **V2.3.1**

This monitoring value shows the status of the digital inputs 1–3 in slot A (standard I/O).

6.11 (ID 16) SlotA DIN 4,5,6

Location in the menu:

- INU application: **V2.4.2**
- AFE application: **V2.4.2**
- BCU application: **V2.3.2**

This monitoring value shows the status of the digital inputs 4–6 in slot A (standard I/O).

6.12 (ID 17) SlotB RO 1,2,3

Location in the menu:

- INU application: **V2.4.3**
- AFE application: **V2.4.3**
- BCU application: **V2.3.3**

This monitoring value shows the status of the relay outputs 1–3 in slot B.

6.13 (ID 18) Torque Reference

Location in the menu:

- Standard application: **V2.3.14**

This monitoring value shows the final torque reference for motor control.

6.14 (ID 20) PID Setpoint

Location in the menu:

- Standard application: **V2.1.11** and **V2.7.1**

This monitoring value shows the value of the PID setpoint signal in process units. You can use the Process Unit Selection parameter (ID 1036) to select the process unit (see 7.221 (ID 1036) Process Unit Selection).

6.15 (ID 21) PID Feedback

Location in the menu:

- Standard application: **V2.1.12** and **V2.7.2**

This monitoring value shows the value of the PID feedback signal in process units. You can use the Process Unit Selection parameter (ID 1036) to select the process unit (see 7.221 (ID 1036) Process Unit Selection).

6.16 (ID 22) PID Error

Location in the menu:

- Standard application: **V2.1.13** and **V2.7.3**

This monitoring value shows the error value of the PID controller.

The error value is the deviation of PID feedback from the PID setpoint in process unit. You can use the Process Unit Selection parameter (ID 1036) to select the process unit (see 7.221 (ID 1036) Process Unit Selection).

6.17 (ID 23) PID Output

Location in the menu:

- Standard application: **V2.1.14** and **V2.7.4**

This monitoring value shows the output of the PID controller as a percentage (0–100%).

You can give this value to the motor control (frequency reference) or to an analog output.

6.18 (ID 24) PID Status

Location in the menu:

- Standard application: **V2.7.5**

This monitoring value shows the state of the PID controller.

6.19 (ID 25) Frequency Reference

Location in the menu:

- Standard application: **V2.1.1** and **V2.3.2**

This monitoring value shows the actual frequency reference to the motor control.

The value is updated at 10 ms intervals.

6.20 (ID 37) Last Active Fault Code

Location in the menu:

- INU application: **V2.6.9**
- AFE application: **V2.6.6**
- BCU application: **V2.2.5**

This monitoring value shows the fault code of latest activated fault that is not reset.

6.21 (ID 43) Drive Status Word

Location in the menu:

- INU application: **V2.6.1**
- AFE application: **V2.6.1**
- BCU application: **V2.4.1**

This monitoring value shows the bit-coded status of the drive.

6.22 (ID 45) Motor Current 1 Deci

Location in the menu:

- INU application: **V2.6.7**
- BCU application: **V2.4.6**

This monitoring value shows the measured current of the motor with the fixed number of decimals and that is less filtered. This monitoring value can be used, for example, with fieldbus to get the correct value so that the enclosure size does not have an effect, or for monitoring when less filtering time is needed for the motor current.

6.23 (ID 56) DIN Status Word 1

Location in the menu:

- INU application: **V2.6.5**
- AFE application: **V2.6.4**
- BCU application: **V2.4.4**

This monitoring value shows the bit-coded status of the digital input signals.

The monitoring value is a 16-bit word, where each bit shows the status of 1 digital input. From each slot, 6 digital inputs are read. Word 1 starts from the input 1 in slot A (bit0) and ends with input 4 in slot C (bit15).

6.24 (ID 57) DIN Status Word 2

Location in the menu:

- INU application: **V2.6.6**
- AFE application: **V2.6.5**
- BCU application: **V2.4.5**

This monitoring value shows the bit-coded status of the digital input signals.

The monitoring value is a 16-bit word, where each bit shows the status of 1 digital input. From each slot, 6 digital inputs are read. Word 2 starts from the input 5 in slot C (bit0) and ends with input 6 in slot E (bit13).

6.25 (ID 59) Analog Input 1

Location in the menu:

- INU application: **V2.4.4**
- AFE application: **V2.4.4**
- BCU application: **V2.3.4**

This monitoring value shows the value of the analog input signal as a percentage of the used range.

6.26 (ID 60) Analog Input 2

Location in the menu:

- INU application: **V2.4.5**
- AFE application: **V2.4.5**
- BCU application: **V2.3.5**

This monitoring value shows the value of the analog input signal as a percentage of the used range.

6.27 (ID 61) Analog Input 3

Location in the menu:

- INU application: **V2.4.6**
- AFE application: **V2.4.6**

This monitoring value shows the value of the analog input signal as a percentage of the used range.

6.28 (ID 62) Analog Input 4

Location in the menu:

- INU application: **V2.4.7**
- AFE application: **V2.4.7**

This monitoring value shows the value of the analog input signal as a percentage of the used range.

6.29 (ID 68) Cos Phi Actual

Location in the menu:

- Standard application: **V2.6.17**

This monitoring value shows the actual Cos Phi value of the motor.

6.30 (ID 73) Motor Shaft Power

Location in the menu:

- Standard application: **V2.3.8**

This monitoring value shows the actual shaft power of the motor (calculated value). The unit of measurement is kW or hp, depending on parameter kW/hp Selection (ID 1198) value.

The number of decimals in the value of this monitoring value varies depending on the size of the AC drive. In fieldbus control, ID 15592 can be mapped as Process Data Out to determine how many decimals are used. The last significant digit tells the amount of decimals.

6.31 (ID 74) Last Active Alarm Code

Location in the menu:

- INU application: **V2.6.11**
- AFE application: **V2.6.8**

This monitoring value shows the alarm code of latest activated alarm that is not reset.

6.32 (ID 75) Analog Input 5

Location in the menu:

- INU application: **V2.4.8**
- AFE application: **V2.4.8**

This monitoring value shows the value of the analog input signal as a percentage of the used range.

6.33 (ID 76) Analog Input 6

Location in the menu:

- INU application: **V2.4.9**
- AFE application: **V2.4.9**

This monitoring value shows the value of the analog input signal as a percentage of the used range.

6.34 (ID 77) Motor Regulator Status

Location in the menu:

- Standard application: **V2.6.13**

This monitoring value shows the bit-coded status of the motor limit controllers.

NOTICE

The values are visible as checkboxes on the graphical display. If a box is selected, the limit controller is active.

6.35 (ID 78) Ready Status

Location in the menu:

- INU application: **V2.6.2**
- AFE application: **V2.6.2**

This monitoring value shows the bit-coded data about the Ready criteria of the drive. This data is useful for monitoring when the drive is not in the Ready state.

NOTICE

The values are visible as checkboxes on the graphical display. If a box is selected, the value is active.

6.36 (ID 79) Output Power

Location in the menu:

- Standard application: **V2.1.8** and **V2.3.14**

This monitoring value shows the output power in kW.

6.37 (ID 81) SlotA AO 1

Location in the menu:

- INU application: **V2.4.10**
- AFE application: **V2.4.10**
- BCU application: **V2.3.6**

This monitoring value shows the value of the analog output as a percentage of the used range.

6.38 (ID 89) Application Status Word 1

Location in the menu:

- INU application: **V2.6.3**
- AFE application: **V2.6.3**
- BCU application: **V2.4.2**

This monitoring value shows the bit-coded statuses of the application.

N O T I C E

The values are visible as checkboxes on the graphical display. If a box is selected, the value is active.

6.39 (ID 90) Application Status Word 2

Location in the menu:

- INU application: **V2.6.4**
- BCU application: **V2.4.3**

This monitoring value shows the bit-coded statuses of the application.

N O T I C E

The values are visible as checkboxes on the graphical display. If a box is selected, the value is active.

6.40 (ID 94) Last Active Alarm ID

Location in the menu:

- INU application: **V2.6.12**
- AFE application: **V2.6.9**
- BCU application: **V2.1.8**

This monitoring value shows the alarm ID of latest activated alarm that is not reset.

6.41 (ID 95) Last Active Fault ID

Location in the menu:

- INU application: **V2.6.10**
- AFE application: **V2.6.7**
- BCU application: **V2.1.7** and **V2.2.6**

This monitoring value shows the fault ID of latest activated fault that is not reset.

6.42 (ID 229) FB Data IN 9

Location in the menu:

- INU application: **V2.8.8.9**
- AFE application: **V2.8.7.9**
- BCU application: **V2.5.6.9**

This monitoring value shows the raw value of the process data in a 32-bit signed format.

6.43 (ID 230) FB Data IN 10

Location in the menu:

- INU application: **V2.8.8.10**
- AFE application: **V2.8.7.10**
- BCU application: **V2.5.6.10**

This monitoring value shows the raw value of the process data in a 32-bit signed format.

6.44 (ID 231) FB Data IN 11

Location in the menu:

- INU application: **V2.8.8.11**
- AFE application: **V2.8.7.11**
- BCU application: **V2.5.6.11**

This monitoring value shows the raw value of the process data in a 32-bit signed format.

6.45 (ID 232) FB Data IN 12

Location in the menu:

- INU application: **V2.8.8.12**
- AFE application: **V2.8.7.12**
- BCU application: **V2.5.6.12**

This monitoring value shows the raw value of the process data in a 32-bit signed format.

6.46 (ID 233) FB Data IN 13

Location in the menu:

- INU application: **V2.8.8.13**
- AFE application: **V2.8.7.13**
- BCU application: **V2.5.6.13**

This monitoring value shows the raw value of the process data in a 32-bit signed format.

6.47 (ID 234) FB Data IN 14

Location in the menu:

- INU application: **V2.8.8.14**
- AFE application: **V2.8.7.14**
- BCU application: **V2.5.6.14**

This monitoring value shows the raw value of the process data in a 32-bit signed format.

6.48 (ID 235) FB Data IN 15

Location in the menu:

- INU application: **V2.8.8.15**
- AFE application: **V2.8.7.15**
- BCU application: **V2.5.6.15**

This monitoring value shows the raw value of the process data in a 32-bit signed format.

6.49 (ID 236) FB Data IN 16

Location in the menu:

- INU application: **V2.8.8.16**
- AFE application: **V2.8.7.16**
- BCU application: **V2.5.6.16**

This monitoring value shows the raw value of the process data in a 32-bit signed format.

6.50 (ID 861) Fieldbus General Control Word

Location in the menu:

- INU application: **V2.8.5**
- AFE application: **V2.8.5**
- BCU application: **V2.5.4**

This monitoring value shows the fieldbus general control word value.

The value is shown in hexadecimal format.

6.51 (ID 862) Fieldbus General Status Word

Location in the menu:

- INU application: **V2.8.6**
- AFE application: **V2.8.6**
- BCU application: **V2.5.5**

This monitoring value shows the fieldbus general status word value.
The value is shown in hexadecimal format.

6.52 (ID 864) FB Status Word

Location in the menu:

- INU application: **V2.8.2**
- AFE application: **V2.8.2**
- BCU application: **V2.5.2**

This monitoring value shows the status of the fieldbus status word that the application uses in bypass mode. Depending on the fieldbus type or profile, the data can be modified before it is sent to the fieldbus.

Bit	Value = 0 (FALSE)	Value = 1 (TRUE)
Bit 0	Not ready to operate	Ready to operate
Bit 1	Not running	Running
Bit 2	Running in the Forward direction	Running in the Reverse direction
Bit 3	No fault	Fault is active
Bit 4	No alarm	Alarm is active
Bit 5	Requested speed not reached	Running at requested speed
Bit 6	Actual speed of the drive not zero	Actual speed of the drive is zero
Bit 7	Motor not magnetized (flux not ready)	Motor magnetized (flux ready)
Bit 8	No action	Reserved
Bit 9	Reserved	Reserved
Bit 10	Reserved	Reserved
Bit 11	Reserved	Reserved
Bit 12	Reserved	Reserved
Bit 13	Reserved	Reserved
Bit 14	Reserved	Reserved
Bit 15	Reserved	Reserved

6.53 (ID 865) FB Speed Actual

Location in the menu:

- INU application: **V2.8.4**
- AFE application: **V2.8.4**
- BCU application: **V2.5.3**

This monitoring value shows the actual speed of the drive as a percentage of minimum frequency and maximum frequency. The value 0% indicates the minimum frequency and the value 100% indicates the maximum frequency. This monitoring value is continuously updated depending on the momentary min and max frequencies and the output frequency.

6.54 (ID 874) FB Control Word

Location in the menu:

- INU application: **V2.8.1**
- AFE application: **V2.8.1**
- BCU application: **V2.5.1**

This monitoring value shows the status of the fieldbus control word that the application uses in bypass mode. Depending on the fieldbus type or profile, the data that is received from the fieldbus can be modified before it is sent to the application.

Bit	Value = 0 (FALSE)	Value = 1 (TRUE)
Bit 0	Stop request from Fieldbus	Start request from Fieldbus
Bit 1	Forward direction request	Reverse direction request
Bit 2	No action	Reset active faults and alarms (on rising edge 0=>1)
Bit 3	No action	Force stop mode to Coasting
Bit 4	No action	Force stop mode to Ramping
Bit 5	No action (normal deceleration ramp time)	Force drive to use fast deceleration ramp time (1/3 of normal deceleration time)
Bit 6	No action	Freeze drive frequency reference
Bit 7	No action	Force Fieldbus frequency reference to zero
Bit 8	No action	Force drive control place to Fieldbus control
Bit 9	No action	Force drive reference source to Fieldbus reference
Bit 10	No action	Jogging Reference 1 activation **NOTICE** This will start the drive.
Bit 11	No action	Jogging Reference 2 activation **NOTICE** This will start the drive.
Bit 12	No action	Activate Quick Stop function **NOTICE** This will stop the drive according to setting in parameter menu M3.9.5.
Bit 13	Reserved	Reserved
Bit 14	Reserved	Reserved
Bit 15	Reserved	Reserved

6.55 (ID 875) FB Speed Reference

Location in the menu:

- INU application: **V2.8.3**
- AFE application: **V2.8.3**

This monitoring value shows the fieldbus frequency reference as a percentage of minimum frequency to maximum frequency.

The speed reference information is scaled between the minimum and the maximum frequency at the moment when the application received it. You can change the minimum and the maximum frequencies after the application received the reference without an effect on the reference.

6.56 (ID 877) FB Data IN 2

Location in the menu:

- INU application: **V2.8.8.2**
- AFE application: **V2.8.7.2**
- BCU application: **V2.5.6.2**

This monitoring value shows the raw value of the process data in a 32-bit signed format.

6.57 (ID 878) FB Data IN 3

Location in the menu:

- INU application: **V2.8.8.3**
- AFE application: **V2.8.7.3**
- BCU application: **V2.5.6.3**

This monitoring value shows the raw value of the process data in a 32-bit signed format.

6.58 (ID 879) FB Data IN 4

Location in the menu:

- INU application: **V2.8.8.4**
- AFE application: **V2.8.7.4**
- BCU application: **V2.5.6.4**

This monitoring value shows the raw value of the process data in a 32-bit signed format.

6.59 (ID 880) FB Data IN 5

Location in the menu:

- INU application: **V2.8.8.5**
- AFE application: **V2.8.7.5**
- BCU application: **V2.5.6.5**

This monitoring value shows the raw value of the process data in a 32-bit signed format.

6.60 (ID 881) FB Data IN 6

Location in the menu:

- INU application: **V2.8.8.6**
- AFE application: **V2.8.7.6**
- BCU application: **V2.5.6.6**

This monitoring value shows the raw value of the process data in a 32-bit signed format.

6.61 (ID 882) FB Data IN 7

Location in the menu:

- INU application: **V2.8.8.7**
- AFE application: **V2.8.7.7**
- BCU application: **V2.5.6.7**

This monitoring value shows the raw value of the process data in a 32-bit signed format.

6.62 (ID 883) FB Data IN 8

Location in the menu:

- INU application: **V2.8.8.8**
- AFE application: **V2.8.7.8**
- BCU application: **V2.5.6.8**

This monitoring value shows the raw value of the process data in a 32-bit signed format.

6.63 (ID 1101) Maintenance Counter 1

Location in the menu:

- AFE application: **V2.7.1**

This monitoring value shows the status of the maintenance counter. The status of the maintenance counter is shown as revolutions multiplied by 1000, or in hours. For the configuration and activation of this counter, see 7.239 (ID 1104) Counter 1 Mode.

6.64 (ID 1172) Fault Word 1

Location in the menu:

- Standard application: **V2.6.15**

This monitoring value shows the bit-coded status of the Fault Word 1.

6.65 (ID 1173) Fault Word 2

Location in the menu:

- Standard application: **V2.6.16**

This monitoring value shows the bit-coded status of the Fault Word 2.

6.66 (ID 1495) Frequency Reference Source

Location in the menu:

- Standard application: **V2.6.8**

This monitoring value shows the momentary frequency reference source.

6.67 (ID 3007) Encoder HW Fallback Count

Location in the menu:

- Standard application: **V2.10.1**

This monitoring value shows the encoder HW fallback count.

6.68 (ID 3008) Encoder SW Fallback Count

Location in the menu:

- Standard application: **V2.10.2**

This monitoring value shows the encoder SW fallback count.

6.69 (ID 3050) Encoder Status Word

Location in the menu:

- Standard application: **V2.10.3.1**

This monitoring value shows the bit-coded status of the encoder channel A.

6.70 (ID 3051) Encoder Glitch Count

Location in the menu:

- Standard application: **V2.10.3.2**

This monitoring value shows the number of glitches detected by the input encoder in channel A. The glitches are usually caused by electromagnetic interference

6.71 (ID 3052) Encoder Error Flags

Location in the menu:

- Standard application: **V2.10.3.3**

This monitoring value shows the error type in the encoder channel A.

6.72 (ID 3053) Frequency Error

Location in the menu:

- Standard application: **V2.10.3.4**

This monitoring value shows the difference between the motor model frequency and the frequency of the encoder in channel A.

6.73 (ID 3054) Encoder Direction

Location in the menu:

- Standard application: **V2.10.3.5**

This monitoring value shows the hysteresis filtered rotation direction state of the encoder in channel A.

6.74 (ID 3055) Encoder Electrical Frequency

Location in the menu:

- Standard application: **V2.10.3.6**

This monitoring value shows the electrical frequency of the encoder in channel A.

6.75 (ID 3056) Encoder Mechanical Frequency

Location in the menu:

- Standard application: **V2.10.3.7**

This monitoring value shows the mechanical frequency of the encoder in channel A.

6.76 (ID 3057) Encoder Electrical Angle

Location in the menu:

- Standard application: **V2.10.3.8**

This monitoring value shows the electrical angle of the encoder in channel A.

6.77 (ID 3058) Encoder Mechanical Angle

Location in the menu:

- Standard application: **V2.10.3.9**

This monitoring value shows the mechanical angle of the encoder in channel A.

6.78 (ID 3059) Revolutions

Location in the menu:

- Standard application: **V2.10.3.10**

This monitoring value shows the mechanical revolutions count of the encoder in channel A.

6.79 (ID 3060) Encoder Update Position

Location in the menu:

- Standard application: **V2.10.3.11**

This monitoring value shows the position counter at the last pulse of the encoder in channel A.

6.80 (ID 3061) Encoder Index Position

Location in the menu:

- Standard application: **V2.10.3.12**

This monitoring value shows the position counter at the last index pulse of the encoder in channel A.

6.81 (ID 3062) Encoder Marker Position

Location in the menu:

- Standard application: **V2.10.3.13**

This monitoring value shows the position of the encoder in channel A at the last marker pulse.

6.82 (ID 3063) Encoder Alternate Marker Position

Location in the menu:

- Standard application: **V2.10.3.14**

This monitoring value shows the position of the encoder in channel A at the last alternate marker pulse.

6.83 (ID 3066) Encoder Fault Detection Status Word

Location in the menu:

- Standard application: **V2.10.3.15**

This monitoring value shows the bit-coded fault detection status of the encoder channel A.

6.84 (ID 3067) Encoder HW Error Count

Location in the menu:

- Standard application: **V2.10.3.16**

This monitoring value shows the HW error count in the encoder channel A.

6.85 (ID 3068) Encoder SW Error Count

Location in the menu:

- Standard application: **V2.10.3.17**

This monitoring value shows the SW error count in the encoder channel A.

6.86 (ID 3069) Encoder SW Error Peak

Location in the menu:

- Standard application: **V2.10.3.18**

This monitoring value shows the encoder SW error threshold detection peak within 1 s (Hz) in the encoder channel A.

6.87 (ID 3070) Encoder Status Word

Location in the menu:

- Standard application: **V2.10.4.1**

This monitoring value shows the bit-coded status of the encoder channel B.

6.88 (ID 3071) Encoder Glitch Count

Location in the menu:

- Standard application: **V2.10.4.2**

This monitoring value shows the number of glitches detected by the input encoder in channel B. The glitches are usually caused by electromagnetic interference

6.89 (ID 3072) Encoder Error Flags

Location in the menu:

- Standard application: **V2.10.4.3**

This monitoring value shows the error type in the encoder channel B.

6.90 (ID 3073) Frequency Error

Location in the menu:

- Standard application: **V2.10.4.4**

This monitoring value shows the difference between the motor model frequency and the frequency of the encoder in channel B.

6.91 (ID 3074) Encoder Direction

Location in the menu:

- Standard application: **V2.10.4.5**

This monitoring value shows the hysteresis filtered rotation direction state of the encoder in channel B.

6.92 (ID 3075) Encoder Electrical Frequency

Location in the menu:

- Standard application: **V2.10.4.6**

This monitoring value shows the electrical frequency of the encoder in channel B.

6.93 (ID 3076) Encoder Mechanical Frequency

Location in the menu:

- Standard application: **V2.10.4.7**

This monitoring value shows the mechanical frequency of the encoder in channel B.

6.94 (ID 3077) Encoder Electrical Angle

Location in the menu:

- Standard application: **V2.10.4.8**

This monitoring value shows the electrical angle of the encoder in channel B.

6.95 (ID 3078) Encoder Mechanical Angle

Location in the menu:

- Standard application: **V2.10.4.9**

This monitoring value shows the mechanical angle of the encoder in channel B.

6.96 (ID 3079) Revolutions

Location in the menu:

- Standard application: **V2.10.4.10**

This monitoring value shows the mechanical revolutions count of the encoder in channel B.

6.97 (ID 3080) Encoder Update Position

Location in the menu:

- Standard application: **V2.10.4.11**

This monitoring value shows the position counter at the last pulse of the encoder in channel B.

6.98 (ID 3081) Encoder Index Position

Location in the menu:

- Standard application: **V2.10.4.12**

This monitoring value shows the position counter at the last index pulse of the encoder in channel B.

6.99 (ID 3082) Encoder Marker Position

Location in the menu:

- Standard application: **V2.10.4.13**

This monitoring value shows the position of the encoder in channel B at the last marker pulse.

6.100 (ID 3083) Encoder Alternate Marker Position

Location in the menu:

- Standard application: **V2.10.4.14**

This monitoring value shows the position of the encoder in channel B at the last alternate marker pulse.

6.101 (ID 3510) Precharge State

Location in the menu:

- INU application: **V2.13.1**
- AFE application: **V2.1.9**, **V2.3.5**, **V2.10.1**, and **V3.3.6**

The monitoring value shows the status of the DC-link precharge.

See 9.1 Pre-charge State Diagram.

6.102 (ID 3511) Precharge Inhibit

Location in the menu:

- INU application: **V2.13.2**
- AFE application: **V2.10.2** and **V3.3.7**

The monitoring value shows, if a DC-link voltage lockout prevents the precharge operation.

6.103 (ID 3513) Precharge Status Word

Location in the menu:

- AFE application: **V2.10.4**

This monitoring value shows the status of the precharge.

6.104 (ID 3514) Precharge Status Word Fault

Location in the menu:

- INU application: **V2.12.5.5**
- AFE application: **V2.10.5.5**

This monitoring value shows the precharge status word fault.

6.105 (ID 3520) Power On State

Location in the menu:

- INU application: **V2.12.5.1**
- AFE application: **V2.10.5.1**

This monitoring value shows the state of the Power on state machine.

See 9.2 Power On State Diagram.

6.106 (ID 3521) Power On State Fault

Location in the menu:

- INU application: **V2.12.5.3**
- AFE application: **V2.10.5.3**

This monitoring value shows the fault state of the Power on state machine.

6.107 (ID 3568) Precharge Error Flags

Location in the menu:

- INU application: **V2.13.3**
- AFE application: **V2.10.3**

This monitoring value shows all the active precharge error types.

6.108 (ID 3569) LCL Status Word

Location in the menu:

- AFE application: **V2.10.6.6**

This monitoring value shows the LCL status word.

6.109 (ID 3570) MCB Status Word

Location in the menu:

- INU application: **V2.12.6.2**
- AFE application: **V2.10.6.2**

This monitoring value shows the MCB status word.

6.110 (ID 3571) Leak Detection Status Word

Location in the menu:

- INU application: **V2.12.6.3**
- AFE application: **V2.10.6.3**

This monitoring value shows the Leak Detection status word.

6.111 (ID 3572) ENC HX Status Word

Location in the menu:

- INU application: **V2.12.6.5**
- AFE application: **V2.10.6.4**

This monitoring value shows the ENC HX status word.

6.112 (ID 3573) HEX Status Word

Location in the menu:

- INU application: **V2.12.6.4**
- AFE application: **V2.10.6.5**

This monitoring value shows the HEX Status Word.

6.113 (ID 3574) Power On Status Word

Location in the menu:

- INU application: **V2.12.5.2**
- AFE application: **V2.10.5.2**

This monitoring value shows the Power on status word.

6.114 (ID 3575) GSW UFES Status Word

Location in the menu:

- INU application: **V2.12.6.1**
- AFE application: **V2.10.6.1**

This monitoring value shows the GSW UFES status word.

6.115 (ID 3576) MCB Status Word Fault

Location in the menu:

- INU application: **V2.12.7.2**
- AFE application: **V2.10.7.2**

This monitoring value shows the MCB status word fault.

6.116 (ID 3577) Leak Detection Status Word Fault

Location in the menu:

- INU application: **V2.12.7.3**
- AFE application: **V2.10.7.3**

This monitoring value shows the Leak detection status word fault.

6.117 (ID 3578) ENC HX Status Word Fault

Location in the menu:

- INU application: **V2.12.7.4**
- AFE application: **V2.10.7.4**

This monitoring value shows the ENC HX status word fault.

6.118 (ID 3579) HEX Status Word Fault

Location in the menu:

- INU application: **V2.12.7.5**
- AFE application: **V2.10.7.5**

This monitoring value shows the HEX Status Word fault.

6.119 (ID 3580) Precharge Error Flags Fault

Location in the menu:

- INU application: **V2.12.5.6**
- AFE application: **V2.10.5.6**

This monitoring value shows the precharge error flags fault.

6.120 (ID 3581) LCL Status Word Fault

Location in the menu:

- AFE application: **V2.10.7.6**

This monitoring value shows the LCL status word fault.

6.121 (ID 3582) GSW UFES Status Word Fault

Location in the menu:

- INU application: **V2.12.7.1**
- AFE application: **V2.10.7.1**

This monitoring value shows the GSW UFES status word fault.

6.122 (ID 3583) Power On Status Word Fault

Location in the menu:

- INU application: **V2.13.4.2**
- AFE application: **V2.10.5.4**

This monitoring value shows the fault state of the Power on status word.

6.123 (ID 3584) DC Capacitor Status Word

Location in the menu:

- Standard application: **V2.12.6.6**

This monitoring value shows the DC capacitor status word.

6.124 (ID 3585) DC Capacitor Status Word Fault

Location in the menu:

- Standard application: **V2.12.7.6**

This monitoring value shows the DC capacitor status word fault.

6.125 (ID 3586) Enclosure Humidity and Temperature

Location in the menu:

- INU application: **V2.6.18**
- AFE application: **V2.6.14**

This monitoring value shows 16-bit word where each bit is the status of one digital input from humidity or temperature measurement.

6.126 (ID 4500) Motor Speed Filtered

Location in the menu:

- Standard application: **V2.6.14**

This monitoring value shows the motor speed in RPM.

6.127 (ID 4501) FB Speed Actual Signed

Location in the menu:

- Standard application: **V2.8.7**

This monitoring value shows the actual speed of the drive as a percentage of minimum frequency and maximum frequency. The value -100% indicates the minimum frequency and the value 100% indicates the maximum frequency. This monitoring value is continuously updated depending on the momentary min and max frequencies and the output frequency.

6.128 (ID 4502) Output Filter Status Word

Location in the menu:

- Standard application: **V2.6.19**

This monitoring value shows 16-bit word where each bit is the status of one digital input from a temperature or pressure measurement of an output filter.

6.129 (ID 4503) Motor Torque LP 16

Location in the menu:

- Standard application: **V2.6.20**

This monitoring value shows the calculated shaft torque with a 16 ms low-pass filter.

6.130 (ID 4504) Motor Torque Unfilt

Location in the menu:

- Standard application: **V2.6.21**

This monitoring value shows the calculated shaft torque unfiltered.

6.131 (ID 5510) Line Voltage

Location in the menu:

- AFE application: **V2.3.2.1**

This monitoring value shows the measured line voltage.

6.132 (ID 5511) Line Frequency

Location in the menu:

- AFE application: **V2.3.2.2**

This monitoring value shows the measured line frequency.

6.133 (ID 5512) Line PLL Locked

Location in the menu:

- AFE application: **V2.3.2.3**

This monitoring value shows if the line PLL is locked.

6.134 (ID 5513) AFE Active Current

Location in the menu:

- AFE application: **V2.1.7** and **V2.3.3.1**

This monitoring value shows the active current of the AFE. The value is an estimate from the line filter observer.

6.135 (ID 5514) AFE Reactive Current

Location in the menu:

- AFE application: **V2.1.8** and **V2.3.3.2**

This monitoring value shows the reactive current of the AFE. The value is an estimate from the line filter observer.

6.136 (ID 5515) Grid Active Current

Location in the menu:

- AFE application: **V2.1.5** and **V2.3.3.3**

This monitoring value shows the active current from the supply network. The value is an estimate from the line filter observer.

6.137 (ID 5516) Grid Reactive Current

Location in the menu:

- AFE application: **V2.1.6** and **V2.3.3.4**

This monitoring value shows the reactive current from the supply network. The value is an estimate from the line filter observer.

6.138 (ID 5517) Capacitor Active Current

Location in the menu:

- AFE application: **V2.3.3.5**

This monitoring value shows the active current of the shunt capacitor. The value is an estimate from the line filter observer.

6.139 (ID 5518) Capacitor Reactive Current

Location in the menu:

- AFE application: **V2.3.3.6**

This monitoring value shows the reactive current of the shunt capacitor. The value is an estimate from the line filter observer.

6.140 (ID 5519) Capacitor Active Voltage

Location in the menu:

- AFE application: **V2.3.3.7**

This monitoring value shows the active voltage of the shunt capacitor. The value is an estimate from the line filter observer.

6.141 (ID 5520) Capacitor Reactive Voltage

Location in the menu:

- AFE application: **V2.3.3.8**

This monitoring value shows the reactive voltage of the shunt capacitor. The value is an estimate from the line filter observer.

6.142 (ID 5521) Grid Active Voltage

Location in the menu:

- AFE application: **V2.3.3.9**

This monitoring value shows the measured direct voltage of the supply network when the grid voltage is available. When the measurement is not available, the monitoring value shows an estimate of the voltage.

6.143 (ID 5522) Grid Reactive Voltage

Location in the menu:

- AFE application: **V2.3.3.10**

This monitoring value shows the measured quadrature voltage of the supply network when the grid voltage is available. When the measurement is not available, the monitoring value shows an estimate of the voltage.

6.144 (ID 5530) AFE Output Current

Location in the menu:

- AFE application: **V2.3.3.11**

This monitoring value shows the calculated AFE output current.

6.145 (ID 5640) Analog Input 7

Location in the menu:

- AFE application: **V2.4.15**

This monitoring value shows the value of the analog input signal as a percentage of the used range.

6.146 (ID 5641) Analog Input 8

Location in the menu:

- AFE application: **V2.4.16**

This monitoring value shows the value of the analog input signal as a percentage of the used range.

6.147 (ID 5642) Analog Input 9

Location in the menu:

- AFE application: **V2.4.17**

This monitoring value shows the value of the analog input signal as a percentage of the used range.

6.148 (ID 5643) Analog Input 10

Location in the menu:

- AFE application: **V2.4.18**

This monitoring value shows the value of the analog input signal as a percentage of the used range.

6.149 (ID 6043) MVS DIN Status Word

Location in the menu:

- INU application: **V2.6.17**
- AFE application: **V2.6.13**

This monitoring value shows 16-bit word where each bit is the status of one digital input.

7 Parameter descriptions

7.1 (ID 101) Minimum Frequency Reference

Location in the menu:

- INU application: **P3.3.1.1**

Use this parameter to set the minimum frequency reference.

It is possible to program the source of the frequency reference in all the control places, except the PC tool. If you use your PC, it always takes the frequency reference from the PC tool.

Remote Control Place (I/O A)

To set the source of the frequency reference for I/O A, use the parameter P3.3.1.5 .

Remote Control Place (I/O B)

To set the source of the frequency reference for I/O B, use the parameter P3.3.1.6.

Local Control Place (Keypad)

If you use the default value keypad for the parameter P3.3.1.7, the reference that you set for P3.3.1.8 Keypad Reference applies.

Remote Control Place (Fieldbus)

If you keep the default value fieldbus for the parameter P3.3.1.10, the frequency reference comes from fieldbus.

7.2 (ID 102) Maximum Frequency Reference

Location in the menu:

- INU application: **P3.3.1.2**

Use this parameter to set the maximum frequency reference.

7.3 (ID 103) Acceleration Time 1

Location in the menu:

- INU application: **P3.4.1.2**

Use this parameter to set the time that is necessary for the output frequency to increase from zero frequency to maximum frequency.

7.4 (ID 104) Deceleration Time 1

Location in the menu:

- INU application: **P3.4.1.3**

Use this parameter to set the time that is necessary for the output frequency to decrease from maximum frequency to zero frequency.

7.5 (ID 105) Preset Frequency 1

Location in the menu:

- INU application: **P3.3.3.2**

Use this parameter to set the preset frequency reference when the preset frequencies function is used. Select the preset frequencies with the digital input signals.

7.6 (ID 106) Preset Frequency 2

Location in the menu:

- INU application: **P3.3.3.3**

Use this parameter to set the preset frequency reference when the preset frequencies function is used. Select the preset frequencies with the digital input signals.

7.7 (ID 107) Current Limit

Location in the menu:

- INU application: **P3.1.3.1**
- AFE application: **P3.2.2.3**

Use this parameter to set the maximum motor current from the AC drive.

When the current limit is active, the drive output frequency decreases.

N O T I C E

The Motor Current Limit is not an overcurrent trip limit.

7.8 (ID 108) U/F Ratio

Location in the menu:

- INU application: **P3.1.4.1**

Use this parameter to set the type of the U/f curve between zero frequency and the field weakening point.

Selection number	Selection name	Description
0	Linear	The voltage of the motor changes linearly as a function of the output frequency. The voltage changes from the value of P3.1.4.6 (Zero Frequency Voltage) to the value of P3.1.4.3 (Voltage at Field Weakening Point) at a frequency set in P3.1.4.2 (Field Weakening Point Frequency). Use this default setting if a different setting is not necessary.
1	Squared	The voltage of the motor changes from the value of P3.1.4.6 (Zero Frequency Voltage) to the value of P3.1.4.2 (Field Weakening Point Frequency) at a squared curve. The motor operates undermagnetized below the field weakening point and produces less torque. You can use the squared U/f ratio in applications where the torque demand is in relation to the square of the speed, for example in centrifugal fans and pumps.
2	Programmable	It is possible to program the U/f curve with 3 different points: the zero frequency voltage (P1), the midpoint voltage/ frequency (P2), and the field weakening point (P3). You can use the programmable U/f curve at low frequencies if it is necessary to have more torque. You can find the optimal settings automatically with an identification run (P3.1.2.8.1).

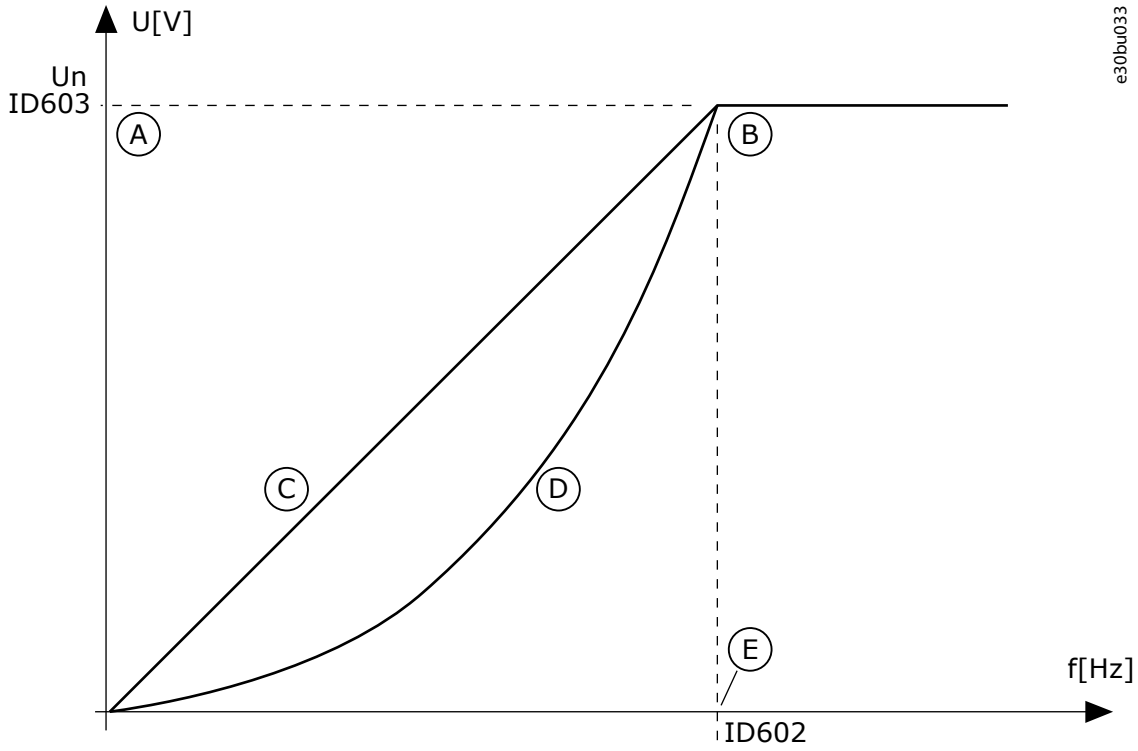


Illustration 11: Linear and squared change of the motor voltage

A	Default: Nominal voltage of the motor	D	Squared
B	Field weakening point	E	Default: Nominal frequency of the motor
C	Linear		

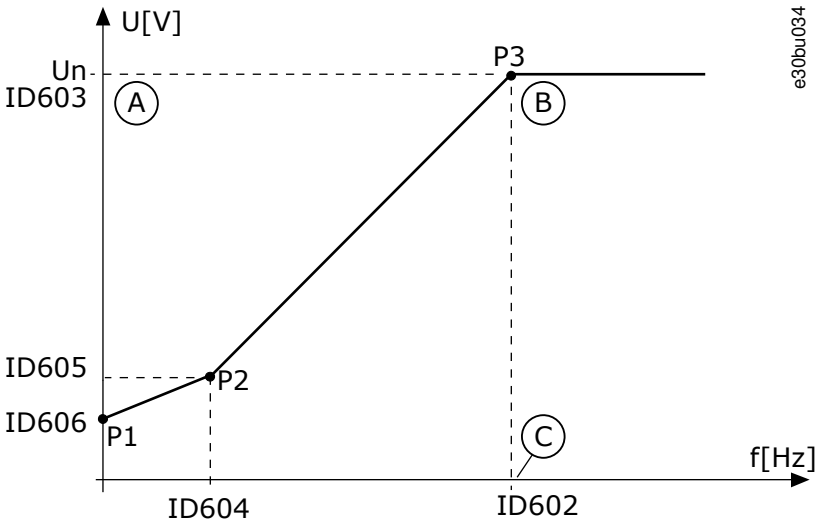


Illustration 12: The programmable U/f curve

A	Default: Nominal voltage of the motor	C	Default: Nominal frequency of the motor
B	Field weakening point		

When the parameter Motor Type has the value PM motor (Permanent Magnet Motor), this parameter is automatically set to the value Linear.

When the parameter Motor Type has the value Induction Motor, and when this parameter is changed, these parameters are set to their default values:

- P3.1.4.2 Field Weakening Point Frequency
- P3.1.4.3 Voltage at Field Weakening Point
- P3.1.4.4 U/f Midpoint Frequency
- P3.1.4.5 U/f Midpoint Voltage
- P3.1.4.6 Zero Frequency Voltage

7.9 (ID 109) Automatic Torque Boost

Location in the menu:

- INU application: **P3.1.4.9**

Use this parameter with a process that has a high starting torque because of friction.

The voltage to the motor changes in relation to the necessary torque. It makes the motor give more torque at the start and when the motor operates at low frequencies.

The torque boost affects the linear U/f curve. For the best result, do the identification run and activate the programmable U/f curve.

7.10 (ID 110) Motor Nominal Voltage

Location in the menu:

- INU application: **P3.1.1.1**

Find the value U_n on the nameplate of the motor. Find out whether the motor connection is Delta or Star.

7.11 (ID 111) Motor Nominal Frequency

Location in the menu:

- INU application: **P3.1.1.2**

Find the value f_n on the nameplate of the motor.

When this parameter changes, parameters *P3.1.4.2Field Weakening Point Frequency* and *P3.1.4.3Voltage at Field Weakening Point* start automatically.

7.12 (ID 112) Motor Nominal Speed

Location in the menu:

- INU application: **P3.1.1.3**

Find the value n_n on the nameplate of the motor.

7.13 (ID 113) Motor Nominal Current

Location in the menu:

- INU application: **P3.1.1.4**

Find the value I_n on the nameplate of the motor.

7.14 (ID 114) Keypad Stop Button

Location in the menu:

- INU application: **P3.2.3**
- AFE application: **P3.4.3**
- BCU application: **P3.3.3**

Use this parameter to enable the keypad stop button. When this function is enabled, a press of keypad stop button always stops the drive (regardless of the control place). When this function is disabled, a press of keypad stop button stops the drive in local control only.

Selection number	Selection name	Description
0	Yes	The keypad stop button is always enabled.
1	No	Limited function of the keypad stop button.

7.15 (ID 116) Motor Nominal Power

Location in the menu:

- INU application: **P3.1.1.6**

Find the value P_n on the nameplate of the motor.

7.16 (ID 117) I/O Control Reference A Selection

Location in the menu:

- INU application: **P3.3.1.5**

Use this parameter to select the reference source when the control place is I/O A. The application set with parameter 1.2 gives the default value.

7.17 (ID 118) PID Gain

Location in the menu:

- INU application: **P3.12.1.1**

Use this parameter to adjust the gain of the PID controller. If this parameter is set to 100%, a change of 10% in the error value causes the controller output to change by 10%.

7.18 (ID 119) PID Integration Time

Location in the menu:

- INU application: **P3.12.1.2**

Use this parameter to adjust the integration time of the PID controller. If this parameter is set to 1.00 s, a change of 10% in the error value causes the controller output to change by 10.00%/s.

7.19 (ID 120) Motor Cos Phi

Location in the menu:

- INU application: **P3.1.1.5**

Find the value on the nameplate of the motor.

7.20 (ID 121) Keypad Control Reference Selection

Location in the menu:

- INU application: **P3.3.1.7**

Use this parameter to select the reference source when the control place is keypad.

7.21 (ID 122) Fieldbus Control Reference Selection

Location in the menu:

- INU application: **P3.3.1.10**

Use this parameter to select the reference source when the control place is Fieldbus.

The selection of the application with parameter *P1.2Application* gives the default value.

7.22 (ID 123) Keypad Direction

Location in the menu:

- INU application: **P3.3.1.9**

Use this parameter to set the rotation direction of the motor when the control place is keypad.

7.23 (ID 126) Preset Frequency 3

Location in the menu:

- INU application: **P3.3.3.4**

Use this parameter to set the preset frequency reference when the preset frequencies function is used. Select the preset frequencies with the digital input signals.

7.24 (ID 127) Preset Frequency 4

Location in the menu:

- INU application: **P3.3.3.5**

Use this parameter to set the preset frequency reference when the preset frequencies function is used. Select the preset frequencies with the digital input signals.

7.25 (ID 128) Preset Frequency 5

Location in the menu:

- INU application: **P3.3.3.6**

Use this parameter to set the preset frequency reference when the preset frequencies function is used. Select the preset frequencies with the digital input signals.

7.26 (ID 129) Preset Frequency 6

Location in the menu:

- INU application: **P3.3.3.7**

Use this parameter to set the preset frequency reference when the preset frequencies function is used. Select the preset frequencies with the digital input signals.

7.27 (ID 130) Preset Frequency 7

Location in the menu:

- INU application: **P3.3.3.8**

Use this parameter to set the preset frequency reference when the preset frequencies function is used. Select the preset frequencies with the digital input signals.

7.28 (ID 131) I/O Control Reference B Selection

Location in the menu:

- INU application: **P3.3.1.6**

Use this parameter to select the reference source when the control place is I/O B. See P3.3.1.5 for more information. It is possible to force the I/O B control place to be active only with a digital input (P3.5.1.7).

7.29 (ID 132) PID Derivation Time

Location in the menu:

- INU application: **P3.12.1.3**

Use this parameter to adjust the derivation time of the PID controller. If this parameter is set to 1.00 s, a change of 10% in the error value during 1.00 s causes the controller output to change by 10.00%.

7.30 (ID 167) Keypad Setpoint 1

Location in the menu:

- INU application: **P3.12.2.1**

Use this parameter to set the setpoint value of the PID controller when the setpoint source is *Keypad SP*. The value of this parameter is given in the selected process unit.

7.31 (ID 168) Keypad Setpoint 2

Location in the menu:

- INU application: **P3.12.2.2**

Use this parameter to set the setpoint value of the PID controller when the setpoint source is *Keypad SP*. The value of this parameter is given in the selected process unit.

7.32 (ID 172) Remote Control Place

Location in the menu:

- INU application: **P3.2.1**
- AFE application: **P3.4.1**
- BCU application: **P3.3.1**

Use this parameter to select the remote control place (start/stop). Use this parameter to change back to remote control from VACON®Live, for example if the control panel is broken.

7.33 (ID 180) Preset Frequency 0

Location in the menu:

- INU application: **P3.3.3.1**

Use this parameter to set the preset frequency reference when the preset frequencies function is used. Select the preset frequencies with the digital input signals.

7.34 (ID 181) Remote to Local Function

Location in the menu:

- INU application: **P3.2.10**
- AFE application: **P3.4.7**

Use this parameter to set the selection of copy settings when you go from Remote to Local (keypad) control.

Selection number	Selection name	Description
0	Keep Run	
1	Keep Run & Reference	
2	Stop	

7.35 (ID 183) Preset Alarm Frequency

Location in the menu:

- INU application: **P3.9.1.1**
- AFE application: **P3.8.1.9**

Use this parameter to set the frequency of the drive when a fault is active and the response to the fault is set to *Alarm + Preset Frequency*.

7.36 (ID 184) Keypad Reference

Location in the menu:

- INU application: **P3.3.1.8**

Use this parameter to adjust the frequency reference on the keypad.

7.37 (ID 211) Local/Remote

Location in the menu:

- INU application: **P3.2.2**
- AFE application: **P3.4.2**
- BCU application: **P3.3.2**

Use this parameter to switch between the local and remote control places. Local control place is always keypad control. The remote control place can be I/O or Fieldbus, depending on the 'Remote Control Place' parameter value.

Start and stop commands must be given differently in each control place.

Remote Control Place (I/O A)

Use the parameters P3.5.1.1 (Control signal 1 A), P3.5.1.2 (Control signal 2 A) and P3.5.1.3 (Control signal 3 A) to select digital inputs. These digital inputs control the start, stop, and reverse commands. Then select a logic for these inputs with P3.2.6 I/O A Logic.

Remote Control Place (I/O B)

Use the parameters P3.5.1.4 (Control signal 1 B), P3.5.1.5 (Control signal 2 B) and P3.5.1.6 (Control signal 3 B) to select digital inputs. These digital inputs control the start, stop, and reverse commands. Then select a logic for these inputs with P3.2.7 I/O B Logic.

Local Control Place (Keypad)

The start and stop commands come from the keypad buttons. The direction of the rotation is set with parameter P3.3.1.9 Keypad direction.

Remote Control Place (Fieldbus)

Start, stop, and reverse commands come from the fieldbus.

7.38 (ID 213) Fault Reset Open

Location in the menu:

- AFE application: **P3.5.1.9**

Use this parameter to select the digital input signal that resets all active faults. Active faults are reset when the state of the digital input changes from closed to open (falling edge).

7.39 (ID 300) I/O A Start/Stop Logic

Location in the menu:

- INU application: **P3.2.6**
- AFE application: **P3.4.5**
- BCU application: **P3.3.6**

Use this parameter to control the start and stop of the drive with the digital signals. The selections can include the word 'edge' to help you prevent an accidental start.

An accidental start can occur, for example, in these conditions

- When you connect the power.
- When the power is connected again after a power cut.
- After you reset a fault.
- After Run Enable stops the drive.
- When you change the control place to I/O control.

Before you can start the motor, you must open the Start/Stop contact.
In all the examples of the next pages, the stop mode is coasting. CS = Control signal.

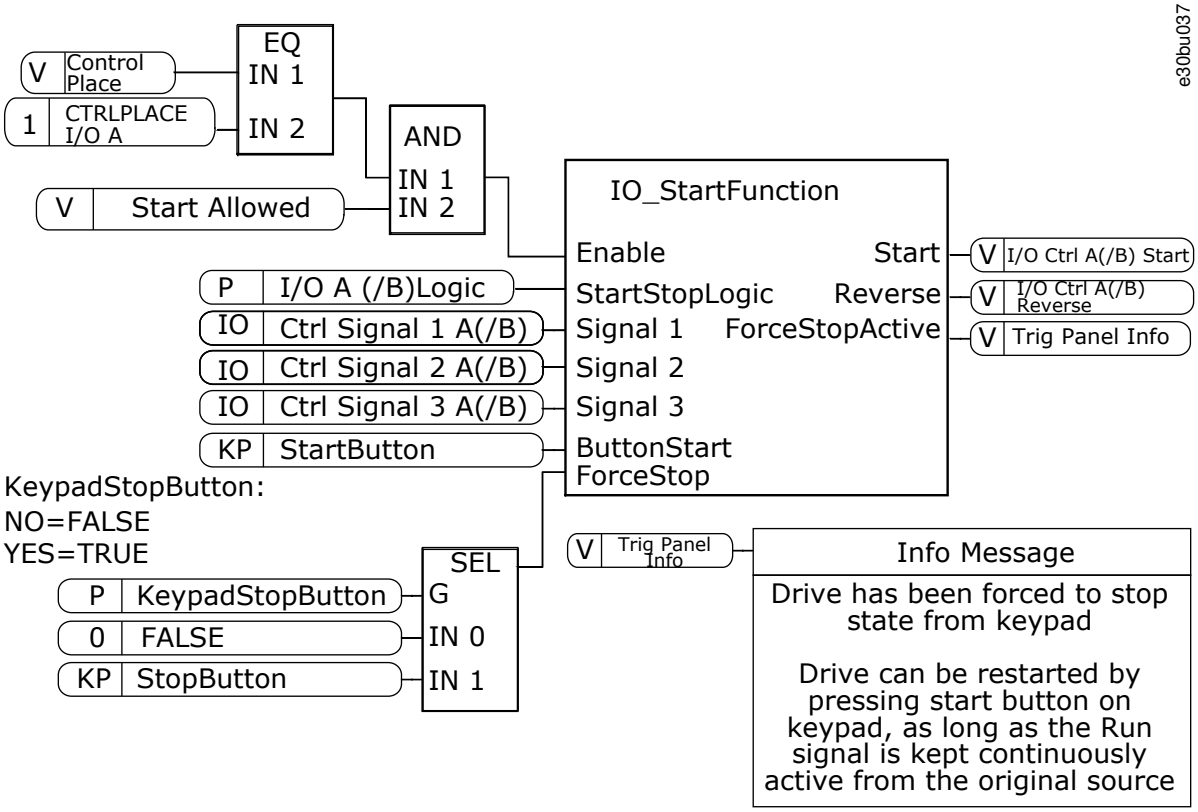


Illustration 13: The block diagram of the I/O A Start/stop logic

Selection = 0

Selection number	Selection name	Description
0	CS1 = Forward CS2 = Backward	The functions activate when the contacts are closed.

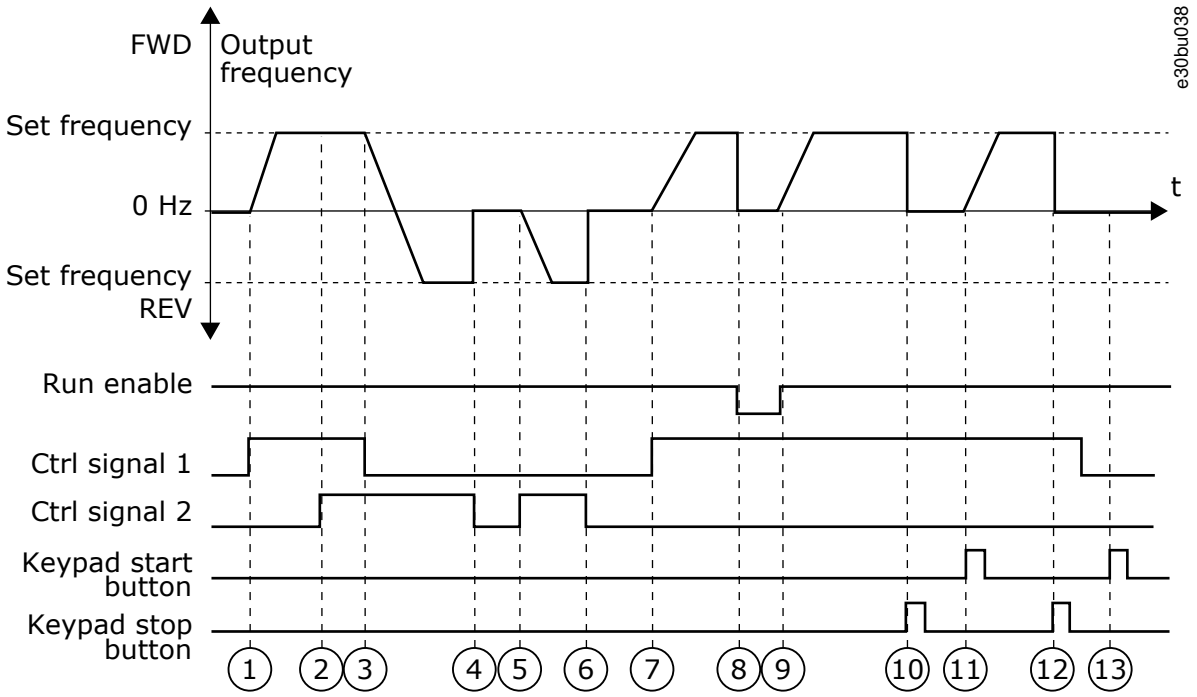


Illustration 14: I/O A Start/stop logic = 0

1	Control signal (CS) 1 activates and causes the output frequency to increase. The motor operates forward.	8	The Run enable signal is set to OPEN, which causes the frequency to go to 0. Configure the Run enable signal with parameter P2.5.1.10.
2	CS2 activates, but it does not have an effect on the output frequency, because the direction that is set first has the highest priority.	9	The Run enable signal is set to CLOSED, which causes the frequency to increase to the set frequency, because CS1 is still active.
3	CS1 becomes inactive and causes the direction to start to change (FWD to REV), because CS2 is still active.	10	The STOP button on the keypad is pushed, and the frequency that is fed to the motor goes to 0. (This signal only works if the value of P2.4.3 Keypad Stop Button is Yes.)
4	CS2 becomes inactive and the frequency that is fed to the motor goes to 0.	11	The drive starts because the START button on the keypad was pushed.
5	CS2 activates again and causes the motor to accelerate (REV) to the set frequency.	12	The STOP button on the keypad is pushed again to stop the drive.
6	CS2 becomes inactive and the frequency fed to the motor drops to 0.	13	The attempt to start the drive with the START button is not successful, because CS1 is inactive.
7	CS1 activates and the motor accelerates (FWD) to the set frequency.		

Selection = 1

Selection number	Selection name	Description
1	CS1 = Forward (edge) CS2 = Inverted stop CS3 = Backward (edge)	For a 3-wire control (pulse control)

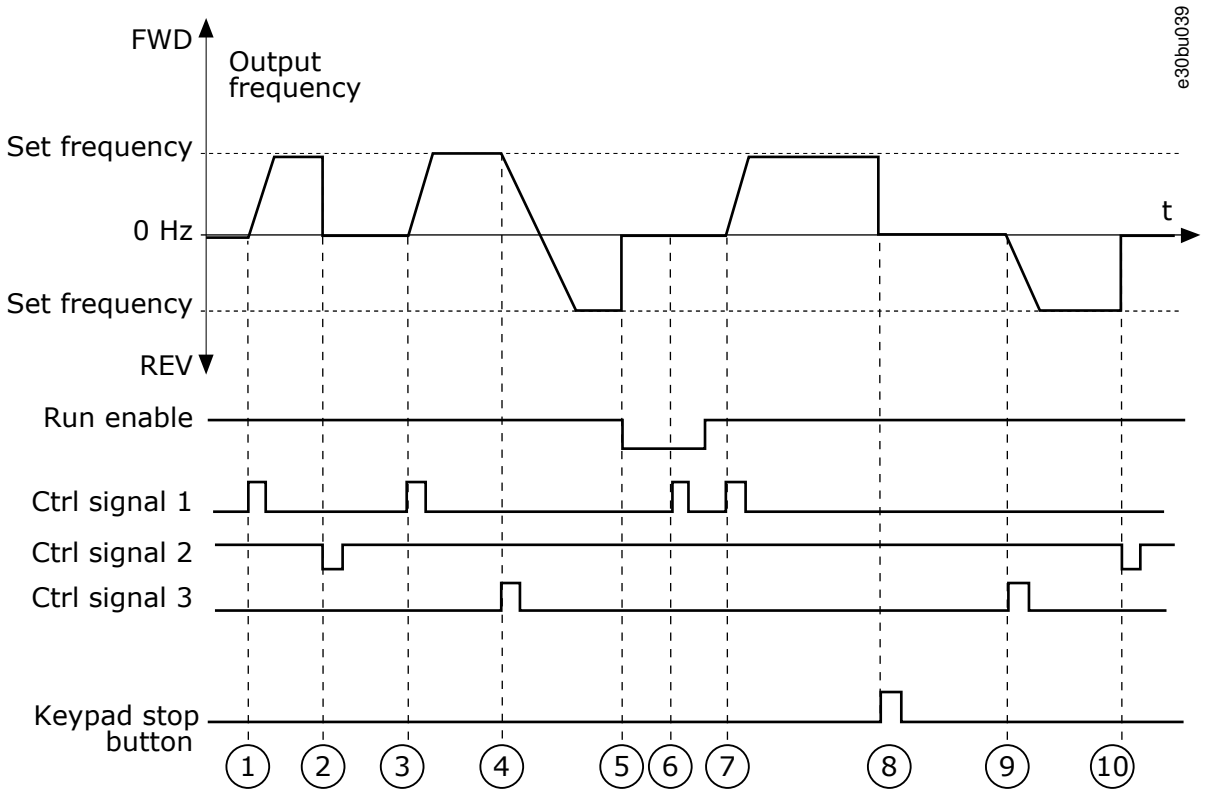


Illustration 15: I/O A Start/stop logic = 1

1	Control signal (CS) 1 activates and causes the output frequency to increase. The motor operates forward.	6	The start attempt with CS1 is not successful, because the Run enable signal is still OPEN.
2	CS2 becomes inactive and causes the frequency to go to 0.	7	CS1 activates and the motor accelerates (FWD) to the set frequency, because the Run enable signal was set to CLOSED.
3	CS1 activates and causes the output frequency to increase again. The motor operates forward.	8	The STOP button on the keypad is pushed, and the frequency that is fed to the motor goes to 0. (This signal only works if the value of P2.4.3 Keypad Stop Button is Yes.)
4	CS3 activates and causes the direction to start to change (FWD to REV).	9	CS3 activates and causes the motor to start and to operate in the reverse direction.
5	The Run enable signal is set to OPEN, which causes the frequency to go to 0. Configure the Run enable signal with parameter P2.5.1.10.	10	CS2 becomes inactive and causes the frequency to go to 0.

Selection = 2

Selection number	Selection name	Description
2	CS1 = Forward (edge) CS2 = Backward (edge)	Use this function to prevent an accidental start. Before you can start the motor again, you must open the start/stop contact.

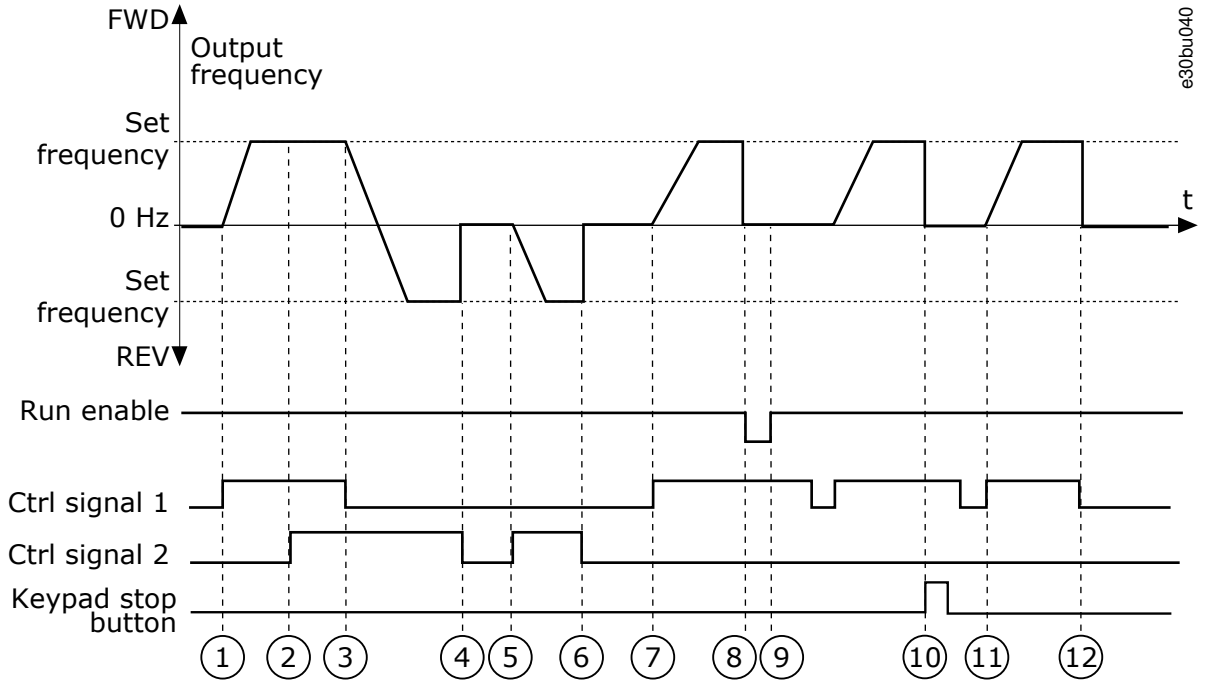


Illustration 16: I/O A Start/stop logic = 2

1	Control signal (CS) 1 activates and causes the output frequency to increase. The motor operates forward.	7	CS1 activates and the motor accelerates (FWD) to the set frequency.
2	CS2 activates, but it does not have an effect on the output frequency, because the direction that is set first has the highest priority.	8	The Run enable signal is set to OPEN, which causes the frequency to go to 0. Configure the Run enable signal with parameter P2.5.1.10.
3	CS1 becomes inactive and causes the direction to start to change (FWD to REV), because CS2 is still active.	9	The Run enable signal is set to CLOSED, which does not have an effect, because a rising edge is necessary for the start, even if CS1 is active.
4	CS2 becomes inactive and the frequency that is fed to the motor goes to 0.	10	The STOP button on the keypad is pushed and the frequency that is fed to the motor goes to 0. (This signal only works if the value of P2.4.3 Keypad Stop Button is Yes.)
5	CS2 activates again and causes the motor to accelerate (REV) to the set frequency.	11	CS1 is opened and closed again, which causes the motor to start.
6	CS2 becomes inactive and the frequency that is fed to the motor goes to 0.	12	CS1 becomes inactive and the frequency that is fed to the motor goes to 0.

Selection = 3

Selection number	Selection name	Description
3	CS1 = Start CS2 = Reverse	

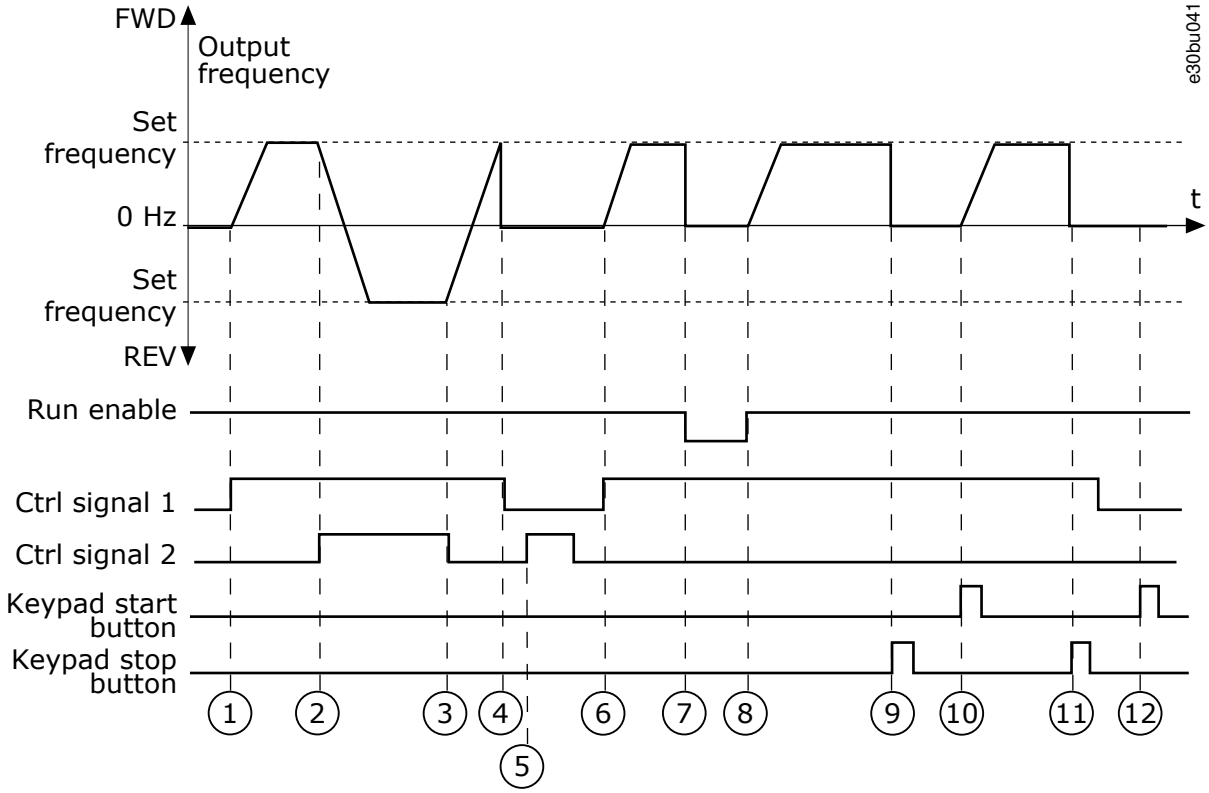


Illustration 17: I/O A Start/stop logic = 3

1	Control signal (CS) 1 activates and causes the output frequency to increase. The motor operates forward.
2	CS2 activates and causes the direction to start to change (FWD to REV).
3	CS2 becomes inactive, which causes the direction to start to change (REV to FWD), because CS1 is still active.
4	CS1 becomes inactive and the frequency goes to 0.
5	CS2 activates, but the motor does not start because CS1 is inactive.
6	CS1 activates and causes the output frequency to increase again. The motor operates forward because CS2 is inactive.
7	The Run enable signal is set to OPEN, which causes the frequency to go to 0. Configure the Run enable signal with parameter P2.5.1.10.
8	The Run enable signal is set to CLOSED, which causes the frequency to increase to the set frequency, because CS1 is still active.
9	The STOP button on the keypad is pushed and the frequency that is fed to the motor goes to 0. (This signal only works if the value of P2.4.3 Keypad Stop Button is Yes.)
10	The drive starts because the START button on the keypad was pushed.
11	The drive is stopped again with the STOP button on the keypad.
12	The attempt to start the drive with the START button is not successful, because CS1 is inactive.

Selection = 4

Selection number	Selection name	Description
4	CS1 = Start (edge) CS2 = Reverse	Use this function to prevent an accidental start. Before you can start the motor again, you must open the start/stop contact.

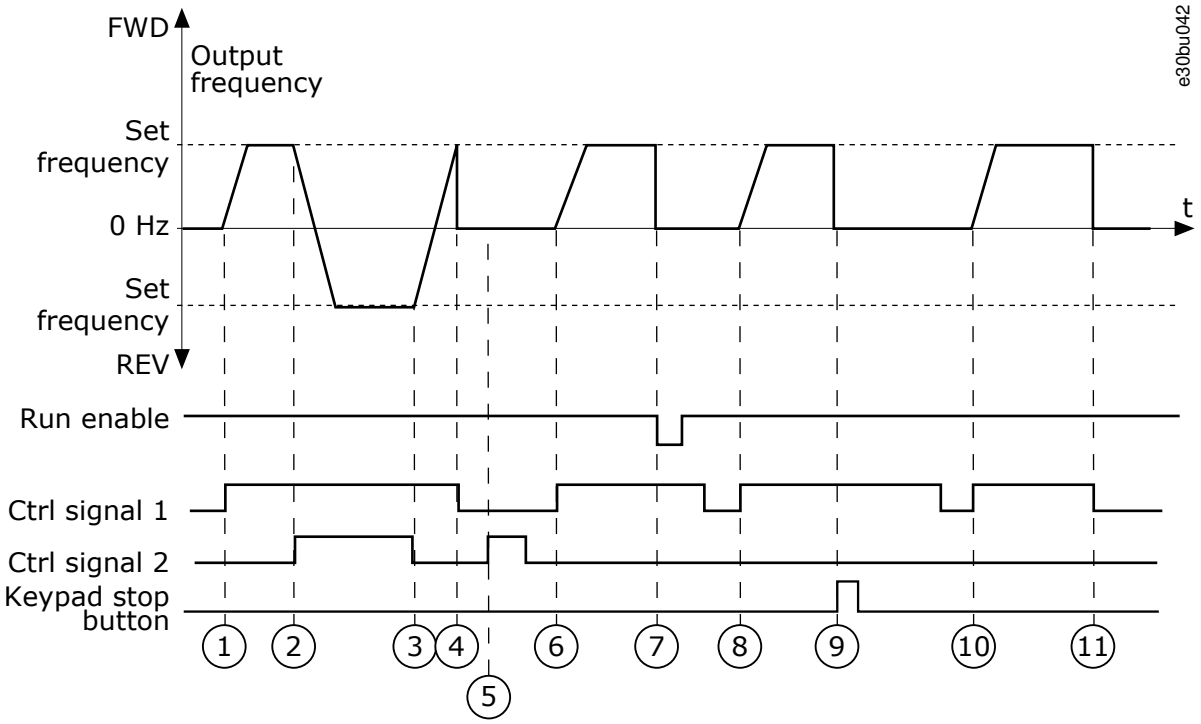


Illustration 18: I/O A Start/stop logic = 4

1	Control signal (CS) 1 activates and causes the output frequency to increase. The motor operates forward because CS2 is inactive.	7	The Run enable signal is set to OPEN, which causes the frequency to go to 0. Configure the Run enable signal with parameter P2.5.1.10.
2	CS2 activates, which causes the direction to start to change (FWD to REV).	8	Before the drive can start, you must open and close CS1 again.
3	CS2 becomes inactive, which causes the direction to start to change (REV to FWD), because CS1 is still active.	9	The STOP button on the keypad is pushed and the frequency that is fed to the motor goes to 0. (This signal only works if the value of P2.4.3 Keypad Stop Button is Yes.)
4	CS1 becomes inactive and the frequency goes to 0.	10	Before the drive can start, you must open and close CS1 again.
5	CS2 activates, but the motor does not start because CS1 is inactive.	11	CS1 becomes inactive and the frequency goes to 0.
6	CS1 activates and causes the output frequency to increase again. The motor operates forward, because CS2 is inactive.		

7.40 (ID 331) Motor Potentiometer Ramp Time

Location in the menu:

- INU application: **P3.3.4.3**

Use this parameter to set the rate of change in the motor potentiometer reference when it is increased or decreased.

The parameter value is entered as Hz/s.

The frequency reference of the Motor Potentiometer is available in all the control places. You can change the motor potentiometer reference only when the drive is in the run state.

N O T I C E

If you set the output frequency slower than the Motor Potentiometer Ramp Time, the normal acceleration and deceleration times give limits to it.

7.41 (ID 332) Setpoint Source 1 Selection

Location in the menu:

- INU application: **P3.12.2.5**

Use this parameter to select the source of the PID setpoint signal. The AIs and the ProcessDataIn are handled as percentages (0.00–100.00%) and scaled according to the setpoint minimum and maximum.

The ProcessDataIn signals use 2 decimals.

If temperature inputs are selected, the values of parameters P3.12.1.5 *Process Unit Minimum* and P3.12.1.6 *Process Unit Maximum* must be set to correspond to the scale of the temperature measurement board: *Process Unit Minimum* = -50 °C and *Process Unit Maximum* = 200 °C.

7.42 (ID 334) Feedback 1 Source Selection

Location in the menu:

- INU application: **P3.12.3.2**

Use this parameter to select the source of the PID feedback signal. The AIs and the ProcessDataIn are handled as percentages (0.00–100.00%) and scaled according to the feedback minimum and maximum.

The ProcessDataIn signals use 2 decimals.

If temperature inputs are selected, the values of parameters P3.12.1.5 *Process Unit Minimum* and P3.12.1.6 *Process Unit Maximum* must be set to correspond to the scale of the temperature measurement board: *Process Unit Minimum* = -50 °C and *Process Unit Maximum* = 200 °C.

7.43 (ID 336) Feedback 1 Minimum

Location in the menu:

- INU application: **P3.12.3.3**

Use this parameter to set the minimum value of the feedback signal.

7.44 (ID 337) Feedback 1 Maximum

Location in the menu:

- INU application: **P3.12.3.4**

Use this parameter to set the maximum value of the feedback signal.

7.45 (ID 340) Error Inversion

Location in the menu:

- INU application: **P3.12.1.8**

Use this parameter to invert the error value of the PID controller.

7.46 (ID 343) I/O B Reference Force

Location in the menu:

- INU application: **P3.5.1.8**

Use this parameter to select the digital input signal that switches the frequency reference source from I/O A to I/O B.

7.47 (ID 352) Brake Fault Delay

Location in the menu:

- INU application: **P3.14.6**

Use this parameter to set the brake fault delay time. If the correct brake feedback signal is not received during this delay, a fault shows. This delay is only used if the value of P3.14.1 is set to 2.

7.48 (ID 363) I/O B Start/Stop Logic

Location in the menu:

- INU application: **P3.2.7**

Use this parameter to control the start and stop of the drive with the digital signals. The selections can include the word 'edge' to help to prevent an accidental start. See P3.2.6 for more information.

7.49 (ID 367) Motor Potentiometer Reset

Location in the menu:

- INU application: **P3.3.4.4**

Use this parameter to set the logic for the resetting of the frequency reference of the motor potentiometer.

This parameter defines when the reference of the motor potentiometer is set to 0. There are 3 selections in the reset function: no reset, reset when the drive stops, or reset when the drive is powered down.

Selection number	Selection name	Description
0	No reset	The last motor potentiometer frequency reference is kept through the stop state and kept in memory when a power-down occurs.
1	Stop state	The motor potentiometer frequency reference is set to 0 when the drive goes to the stop state, or when the drive is powered down.
2	Powered down	The motor potentiometer frequency reference is set to 0 only when a power-down occurs.

7.50 (ID 377) AI1 Signal Selection

Location in the menu:

- INU application: **P3.5.2.1.1**
- AFE application: **P3.5.2.1.1**
- BCU application: **P3.4.2.1.1**

Use this parameter to connect the AI signal to the analog input of your selection.

This parameter is programmable. See 3.6 Default Functions of Programmable Inputs.

7.51 (ID 378) AI1 Signal Filter Time

Location in the menu:

- INU application: **P3.5.2.1.2**
- AFE application: **P3.5.2.1.2**
- BCU application: **P3.4.2.1.2**

Use this parameter to filter out disturbances in the analog input signal. To activate this parameter, enter a value greater than 0.

N O T I C E

A long filter time makes the regulation response slow.

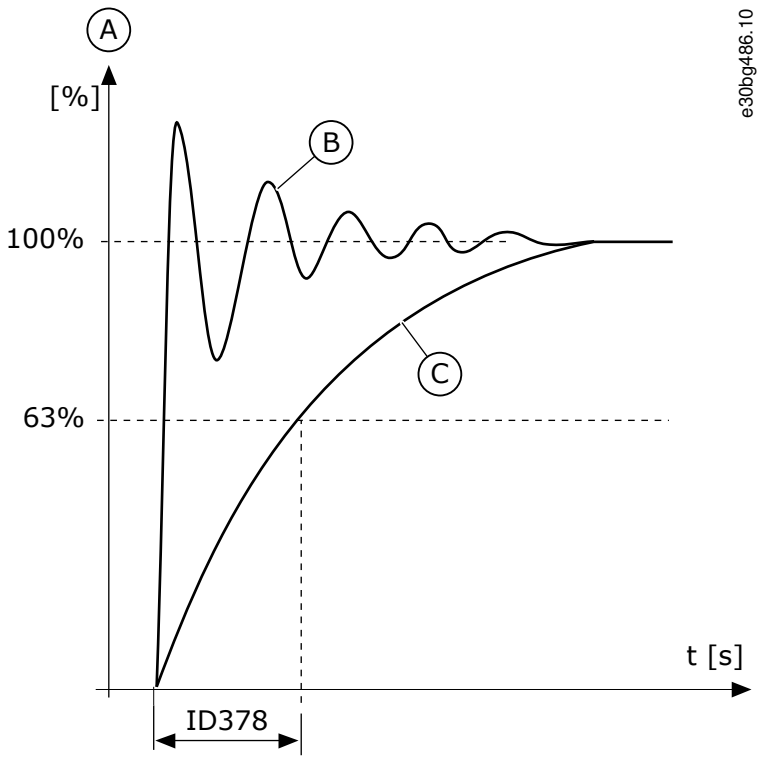


Illustration 19: The AI1 signal filtering

A	Analog input signal	C	Filtered signal
B	Unfiltered signal		

7.52 (ID 379) AI1 Signal Range

Location in the menu:

- INU application: **P3.5.2.1.3**
- AFE application: **P3.5.2.1.3**
- BCU application: **P3.4.2.1.3**

Use this parameter to change the range of the analog signal. The value of this parameter is bypassed if the custom scaling parameters are used.

Use the DIP switches on the control board to set the type of the analog input signal (current or voltage). For more information, see the Installation manual. It is also possible to use the analog input signal as frequency reference. The selection of the value 0 or 1 change the scaling of the analog input signal.

Selection number	Selection name	Description
0	0...10 V / 0...20 mA	The range of the analog input signal is 0...10 V or 0...20 mA (the DIP switch settings on the control board tell which one). The input signal is 0...100%.
1	2...10 V / 4...20 mA	The range of the analog input signal is 2...10 V or 4...20 mA (the DIP switch settings on the control board tell which one). The input signal is 20...100%.

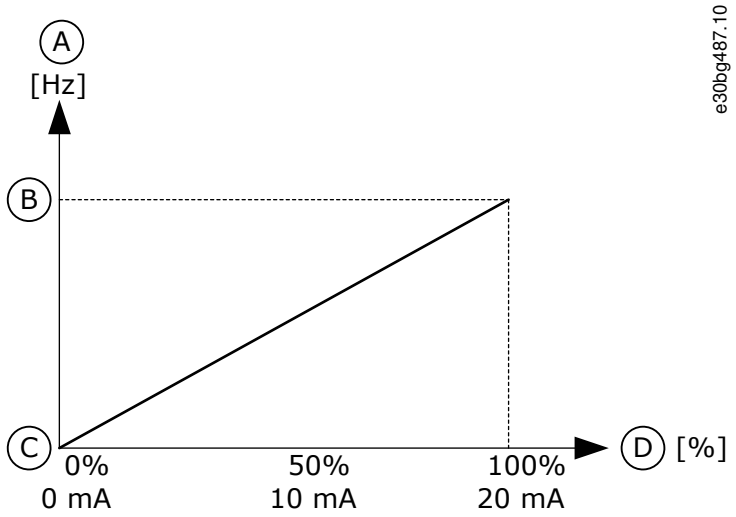


Illustration 20: The analog input signal range, selection 0

A	Frequency reference	C	Min freq reference
B	Max freq reference	D	Analog input signal

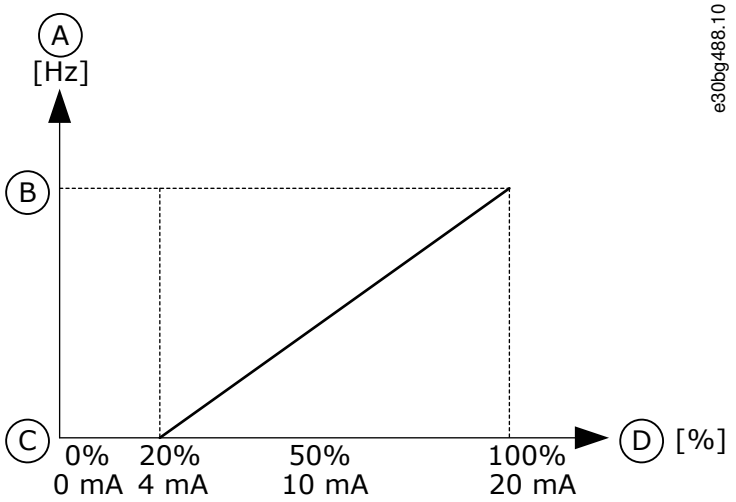


Illustration 21: The analog input signal range, selection 1

A	Frequency reference	C	Min freq reference
B	Max freq reference	D	Analog input signal

7.53 (ID 380) AI1 Custom. MIN

Location in the menu:

- INU application: **P3.5.2.1.4**
- AFE application: **P3.5.2.1.4**
- BCU application: **P3.4.2.1.4**

Use this parameter to adjust the range of the analog input signal between -160% and 160%.

7.54 (ID 381) AI1 Custom. MAX

Location in the menu:

- INU application: **P3.5.2.1.5**
- AFE application: **P3.5.2.1.5**
- BCU application: **P3.4.2.1.5**

Use this parameter to adjust the range of the analog input signal between -160% and 160%.

For example, you can use the analog input signal as frequency reference, and set the parameters ID 380 and ID 381 between 40 and 80%. In these conditions, the frequency reference changes between the Minimum frequency reference and the Maximum frequency reference, and the analog input signal changes between 8 and 16 mA.

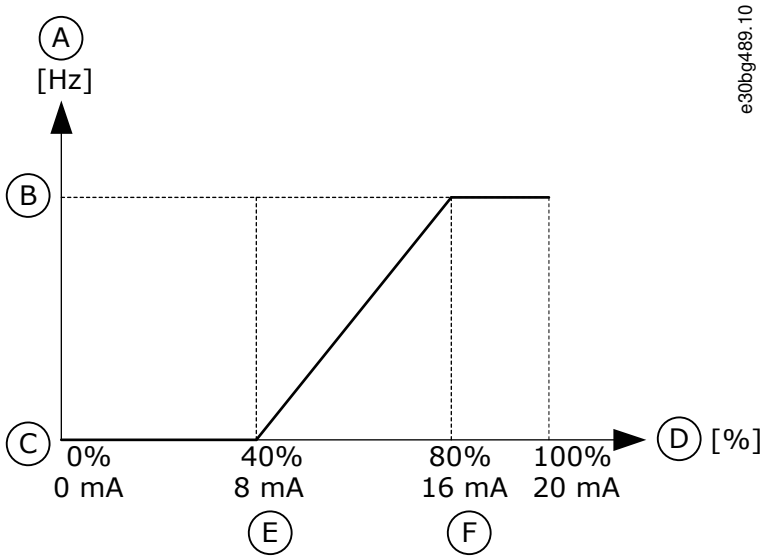


Illustration 22: AI1 signal custom. min/max

A	Frequency reference	D	Analog input signal
B	Max freq reference	E	AI custom min
C	Min freq reference	F	AI custom max

7.55 (ID 384) Joystick Dead Zone

Location in the menu:

- INU application: **P3.3.5.2**

Use this parameter to set the joystick dead zone. To ignore small values of the reference around the midpoint, set this value to be bigger than 0%. When the analog input signal is 50% ± the value of this parameter, the joystick reference is set to 0%.

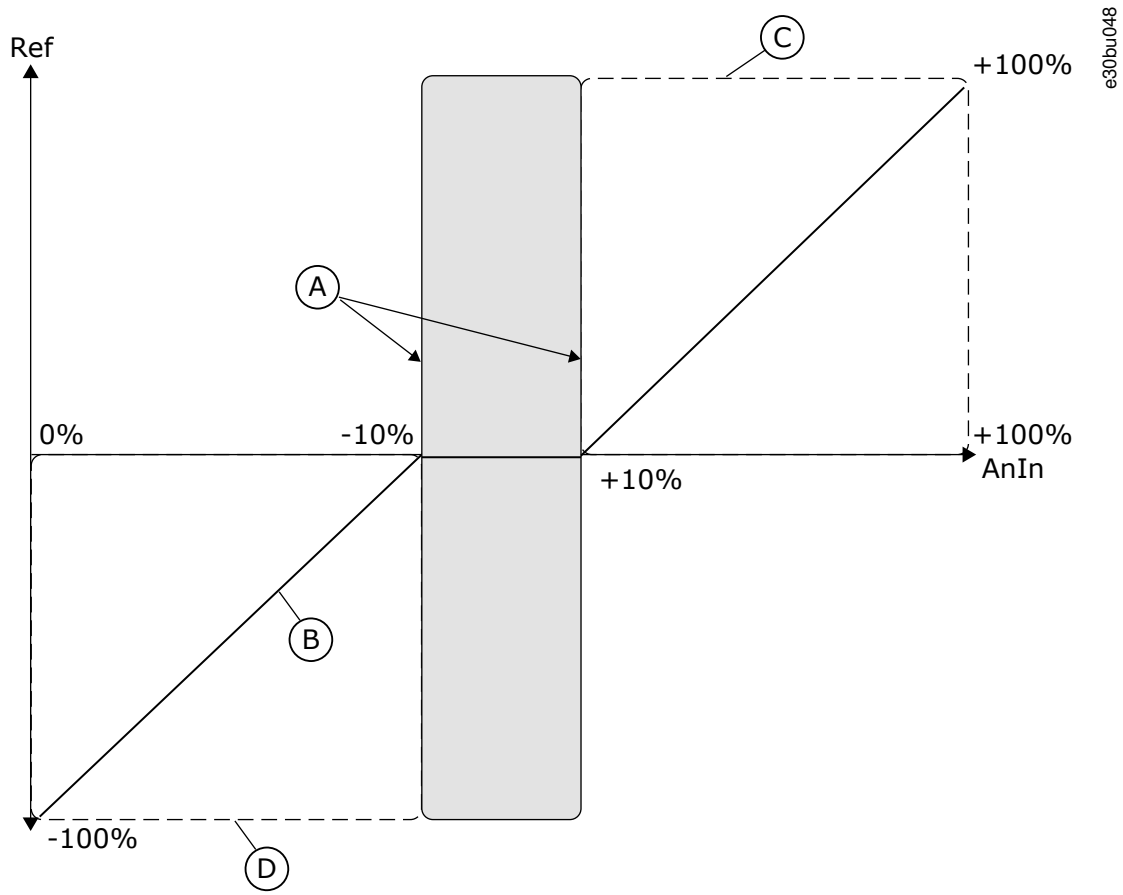


Illustration 23: The Joystick Function

A	AI joystick dead zone = 10%	C	Maximum Frequency
B	Reference	D	- Maximum Frequency

7.56 (ID 386) Joystick Sleep Delay

Location in the menu:

- INU application: **P3.3.5.3**

Use this parameter to set the joystick sleep delay. If the joystick reference stays in the set sleep zone for longer than the sleep delay, the drive stops and the sleep mode is activated.

N O T I C E

The Joystick sleep function is disabled when the value of this parameter is set to 0.

7.57 (ID 387) AI1 Signal Inversion

Location in the menu:

- INU application: **P3.5.2.1.6**
- AFE application: **P3.5.2.1.6**
- BCU application: **P3.4.2.1.6**

Use this parameter to invert the analog input signal. When the analog input signal is inverted, the curve of the signal becomes the opposite.

It is possible to use the analog input signal as frequency reference. The selection of the value 0 or 1 change scaling of the analog input signal.

Selection number	Selection name	Description
0	Normal	No inversion. The value 0% of the analog input signal agrees to the Minimum Frequency Reference. The value 100% of the analog input signal agrees to the Maximum Frequency Reference.
1	Inverted	Signal inversion. The value 0% of the analog input signal agrees to the Maximum Frequency Reference. The value 100% of the analog input signal agrees to the Minimum Frequency Reference.

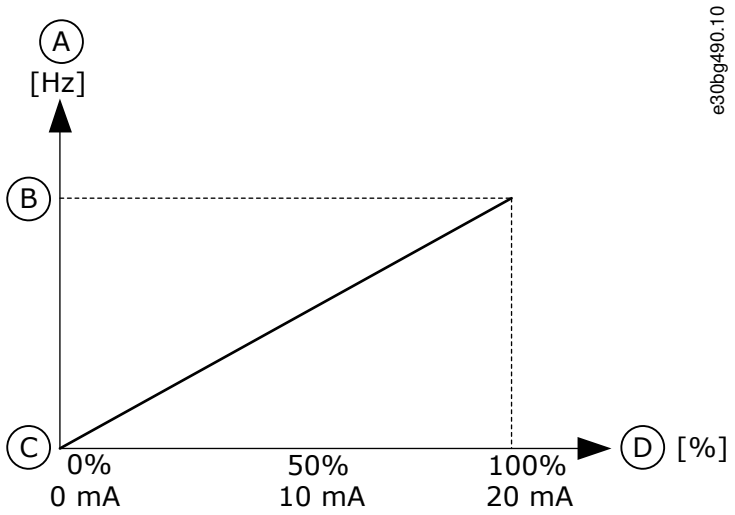


Illustration 24: AI1 signal inversion, selection 0

A	Frequency reference	C	Min freq reference
B	Max freq reference	D	Analog input signal

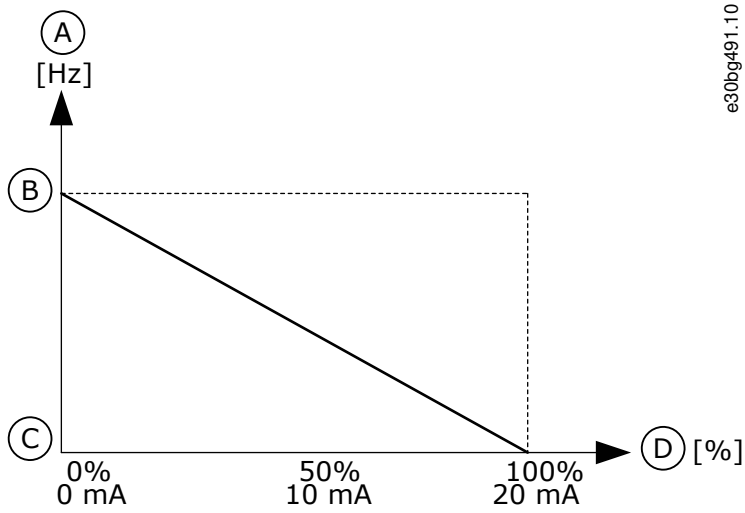


Illustration 25: AI1 signal inversion, selection 1

A	Frequency reference	C	Min freq reference
B	Max freq reference	D	Analog input signal

7.58 (ID 403) Control Signal 1 A

Location in the menu:

- INU application: **P3.5.1.1**
- AFE application: **P3.5.1.1**
- BCU application: **P3.4.1.1**

Use this parameter to select the digital input signal (Control Signal 1) that starts and stops the drive when the control place is I/O A (FWD).

7.59 (ID 404) Control Signal 2 A

Location in the menu:

- INU application: **P3.5.1.2**
- AFE application: **P3.5.1.2**
- BCU application: **P3.4.1.2**

Use this parameter to select the digital input signal (Control Signal 2) that starts and stops the drive when the control place is I/O A (REV).

7.60 (ID 405) External Fault Close

Location in the menu:

- INU application: **P3.5.1.11**
- AFE application: **P3.5.1.6**
- BCU application: **P3.4.1.4**

Use this parameter to select the digital input signal that activates an external fault.

7.61 (ID 406) External Fault Open

Location in the menu:

- INU application: **P3.5.1.12**
- AFE application: **P3.5.1.7**
- BCU application: **P3.4.1.5**

Use this parameter to select the digital input signal that activates an external fault.

7.62 (ID 407) Run Enable

Location in the menu:

- INU application: **P3.5.1.15**
- AFE application: **P3.5.1.10**
- BCU application: **P3.4.1.7**

Use this parameter to select the digital input signal that sets the drive to Ready state. When the contact is OPEN, the start of the motor is disabled. When the contact is CLOSED, the start of the motor is enabled.

The state of the drive remains in 'Not Ready' if the state of this signal is 'opened'. If the Run Enable signal is used for stopping the drive, the drive will always coast to stop regardless of the selection in parameter ID 506 *Stop Function*.

7.63 (ID 408) Ramp 2 Selection

Location in the menu:

- INU application: **P3.4.2.4** and **P3.5.1.18**

Use this parameter to select the digital input signal that selects the ramp time to be used.

Selection number	Selection name	Description
0	OPEN	Ramp 1 Shape, Acceleration Time 1, and Deceleration Time 1
1	CLOSED	Ramp 2 Shape, Acceleration Time 2, and Deceleration Time 2

7.64 (ID 410) Keypad Control Force

Location in the menu:

- INU application: **P3.5.1.10**
- AFE application: **P3.5.1.5**

Use this parameter to select the digital input signal that switches the control place and the frequency reference source to Keypad (from any control place).

7.65 (ID 411) Fieldbus Control Force

Location in the menu:

- INU application: **P3.5.1.9**
- AFE application: **P3.5.1.4**

Use this parameter to select the digital input signal that switches the control place and the frequency reference source to Fieldbus (from I/O A, I/O B or Local control).

7.66 (ID 414) Fault Reset Close

Location in the menu:

- INU application: **P3.5.1.13**
- AFE application: **P3.5.1.8**
- BCU application: **P3.4.1.6**

Use this parameter to select the digital input signal that resets all active faults. Active faults are reset when the state of the digital input changes from open to closed (rising edge).

7.67 (ID 415) Acceleration/Deceleration Prohibit

Location in the menu:

- INU application: **P3.5.1.19**

Use this parameter to select the digital input signal that prevents the acceleration and the deceleration of the drive. No acceleration or deceleration is possible until the contact is open.

7.68 (ID 417) Motor Potentiometer Down

Location in the menu:

- INU application: **P3.3.4.2** and **P3.5.1.24**

Use this parameter to decrease the output frequency with a digital input signal. With a motor potentiometer, it is possible to increase and decrease the output frequency. When a digital input is connected to parameter Motor Potentiometer DOWN, and the digital input signal is active, the output frequency falls. The motor potentiometer reference DECREASES until the contact is opened.

3 different parameters affect how the output frequency rises or falls when Motor Potentiometer UP or DOWN is active. These parameters are Motor Potentiometer Ramp Time (P3.3.4.3), Acceleration Time (P3.4.1.2), and Deceleration Time (P3.4.1.3).

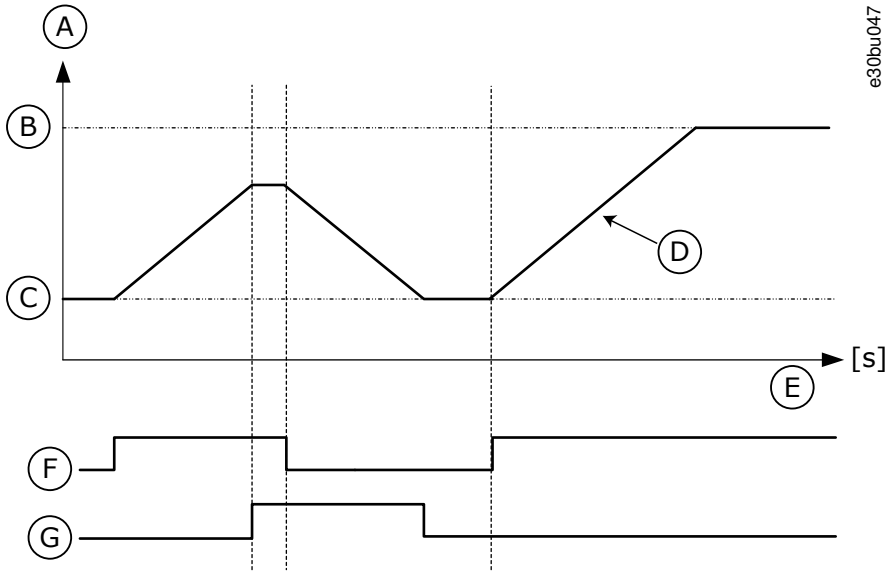


Illustration 26: The Motor Potentiometer Parameters

A	Frequency Reference	E	Time
B	Max Frequency	F	Motor potentiometer UP
C	Min Frequency	G	Motor potentiometer DOWN
D	Motor potentiometer ramp time		

7.69 (ID 418) Motor Potentiometer Up

Location in the menu:

- INU application: **P3.3.4.1** and **P3.5.1.23**

Use this parameter to increase the output frequency with a digital input signal. With a motor potentiometer, it is possible to increase and decrease the output frequency. When a digital input is connected to parameter Motor Potentiometer UP, and the digital input signal is active, the output frequency rises. The motor potentiometer reference INCREASES until the contact is opened.

7.70 (ID 419) Preset Frequency Selection 1

Location in the menu:

- INU application: **P3.3.3.9** and **P3.5.1.20**

Use this parameter to select the digital input signal that is used as a selector for the preset frequencies. This parameter is a binary selector for Preset speeds (0–7). See parameters P3.3.3.1 to P3.3.3.8.

You can use the Preset frequencies function in processes where more than 1 fixed frequency reference is necessary. There are 8 preset frequency references available.

To apply Preset frequencies 1 to 7, connect a digital input to these functions with the instructions in 3.3 Programming of Digital Inputs.

7.71 (ID 420) Preset Frequency Selection 2

Location in the menu:

- INU application: **P3.3.3.10** and **P3.5.1.21**

Use this parameter to select the digital input signal that is used as a selector for the preset frequencies. This parameter is a binary selector for Preset speeds (0–7). See parameters P3.3.3.1 to P3.3.3.8.

You can use the Preset frequencies function in processes where more than 1 fixed frequency reference is necessary. There are 8 preset frequency references available.

To apply Preset frequencies 1 to 7, connect a digital input to these functions with the instructions in 3.3 Programming of Digital Inputs.

7.72 (ID 421) Preset Frequency Selection 3

Location in the menu:

- INU application: **P3.3.3.11** and **P3.5.1.22**

Use this parameter to select the digital input signal that is used as a selector for the preset frequencies. This parameter is a binary selector for Preset speeds (0–7). See parameters P3.3.3.1 to P3.3.3.8.

You can use the Preset frequencies function in processes where more than 1 fixed frequency reference is necessary. There are 8 preset frequency references available.

To apply Preset frequencies 1 to 7, connect a digital input to these functions with the instructions in 3.3 Programming of Digital Inputs.

7.73 (ID 423) Control Signal 1 B

Location in the menu:

- INU application: **P3.5.1.4**

Use this parameter to select the digital input signal (Control Signal 1) that starts and stops the drive when the control place is I/O B.

7.74 (ID 424) Control Signal 2 B

Location in the menu:

- INU application: **P3.5.1.5**

Use this parameter to select the digital input signal (Control Signal 2) that starts and stops the drive when the control place is I/O B.

7.75 (ID 425) I/O B Control Force

Location in the menu:

- INU application: **P3.5.1.7**

Use this parameter to select the digital input signal that switches the control place from I/O A to I/O B.

7.76 (ID 431) Setpoint Source 2 Selection

Location in the menu:

- INU application: **P3.12.2.8**

Use this parameter to select the source of the PID setpoint signal. The AIs and the ProcessDataIn are handled as percentages (0.00–100.00%) and scaled according to the setpoint minimum and maximum.

The ProcessDataIn signals use 2 decimals.

If temperature inputs are selected, the values of parameters P3.12.1.5 *Process Unit Minimum* and P3.12.1.6 *Process Unit Maximum* must be set to correspond to the scale of the temperature measurement board: *Process Unit Minimum* = -50 °C and *Process Unit Maximum* = 200 °C.

7.77 (ID 434) Control Signal 3 A

Location in the menu:

- INU application: **P3.5.1.3**
- AFE application: **P3.5.1.3**
- BCU application: **P3.4.1.3**

Use this parameter to select the digital input signal (Control Signal 3) that starts and stops the drive when the control place is I/O A.

7.78 (ID 435) Control Signal 3 B

Location in the menu:

- INU application: **P3.5.1.6**

Use this parameter to select the digital input signal (Control Signal 3) that starts and stops the drive when the control place is I/O B.

7.79 (ID 451) Joystick Signal Selection

Location in the menu:

- INU application: **P3.3.5.1**

Use this parameter to set the analog input signal that controls the Joystick function. Use the Joystick function to control the frequency reference of the drive or the torque reference.

Use the joystick parameters when you control the frequency reference or the torque reference of the motor with a joystick. To control the motor with a joystick, connect the joystick signal to an analogue input and set the joystick parameters.

7.80 (ID 490) Maintenance Counter 1 Reset

Location in the menu:

- AFE application: **P3.5.1.13** and **P3.11.5**

Use this parameter to select the digital input that resets the value of the Maintenance Counter.

7.81 (ID 496) Parameter Set 1/2 Selection

Location in the menu:

- INU application: **P3.5.1.31**
- AFE application: **P3.5.1.14**

Use this parameter to set the digital input that selects the parameter set to be used. This function is enabled if any other slot than 'DigIN Slot0' is selected to this parameter. The parameter set selection is allowed only when the drive is stopped.

- Contact Open = Parameter Set 1 is loaded as the active set
- Contact Closed = Parameter Set 2 is loaded as the active set

Parameter values are stored to Set 1 and Set 2 by parameters *Save to Set 1* and *Save to Set 2*. These parameters can be used either from keypad or VACONÆ Live PC tool.

7.82 (ID 500) Ramp 1 Shape

Location in the menu:

- INU application: **P3.4.1.1**

Use this parameter to make the start and the end of the acceleration and deceleration ramps smoother.

With the parameters Ramp 1 Shape and Ramp 2 Shape, it is possible to make smoother the start and the end of the acceleration and deceleration ramps. The value is set to 0.0% gives a linear ramp shape. The acceleration and deceleration act immediately to the changes in the reference signal.

The value set between 1.0% and 100.0% gives an S-shaped acceleration or deceleration ramp. Use this function to reduce mechanical erosion of the parts and current spikes when the reference changes. The acceleration time can be modified with parameters P3.4.1.2 (Acceleration Time 1) and P3.4.1.3 (Deceleration Time 1).

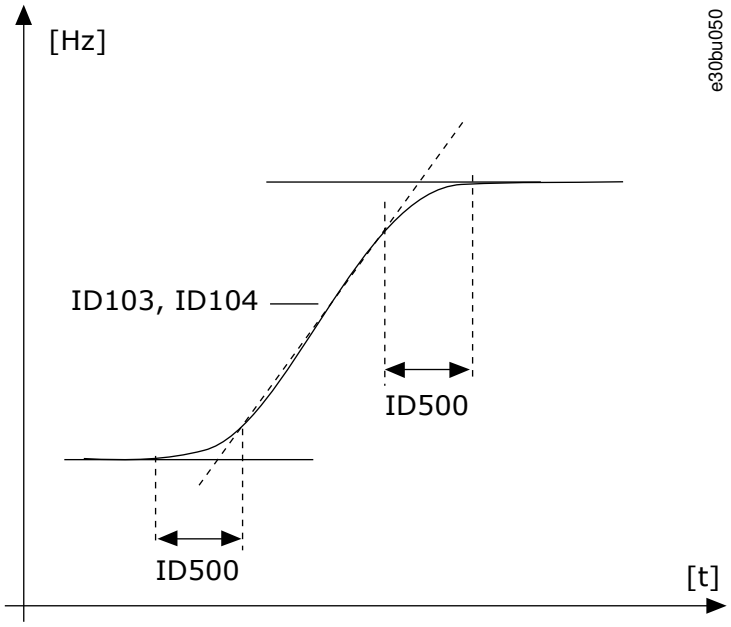


Illustration 27: The Acceleration/Deceleration Curve (S-shaped)

7.83 (ID 501) Ramp 2 Shape

Location in the menu:

- INU application: **P3.4.2.1**

Use this parameter to make the start and the end of the acceleration and deceleration ramps smoother.

With the parameters Ramp 1 Shape and Ramp 2 Shape, it is possible to make smoother the start and the end of the acceleration and deceleration ramps. The value set to 0.0% gives a linear ramp shape. The acceleration and deceleration act immediately to the changes in the reference signal.

The value set between 1.0% and 100.0% gives an S-shaped acceleration or deceleration ramp. Use this function to reduce mechanical erosion of the parts and current spikes when the reference changes. The acceleration time can be modified with parameters P3.4.2.2 (Acceleration Time 2) and P3.4.2.3 (Deceleration Time 2).

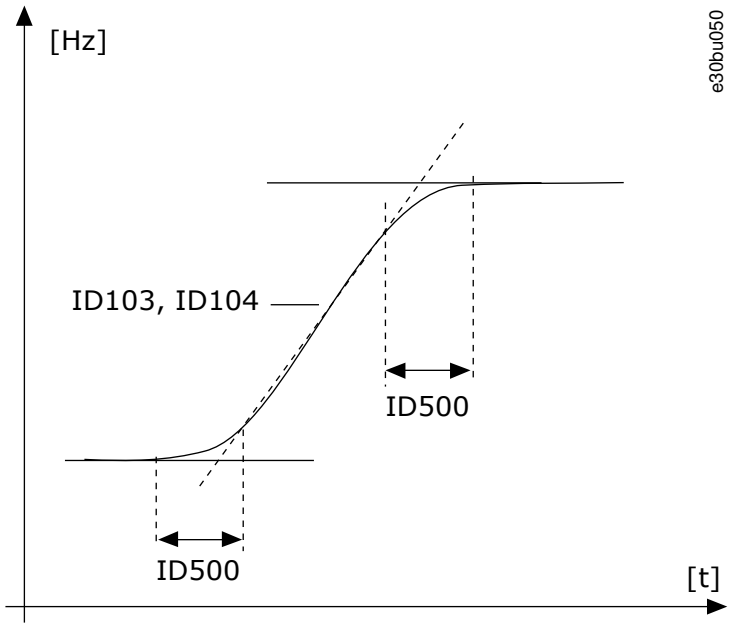


Illustration 28: The Acceleration/Deceleration Curve (S-shaped)

7.84 (ID 502) Acceleration Time 2

Location in the menu:

- INU application: **P3.4.2.2**

Use this parameter to set the time that is necessary for the output frequency to increase from zero frequency to maximum frequency.

7.85 (ID 503) Deceleration Time 2

Location in the menu:

- INU application: **P3.4.2.3**

Use this parameter to set the time that is necessary for the output frequency to decrease from maximum frequency to zero frequency.

7.86 (ID 505) Start Function

Location in the menu:

- INU application: **P3.2.4**

Use this parameter to select the type of the start function.

Selection number	Selection name	Description
0	Ramping	The drive accelerates from 0 frequency to frequency reference.
1	Flying start	The drive detects the actual speed of the motor and accelerates from that speed to frequency reference.

7.87 (ID 506) Stop Function

Location in the menu:

- INU application: **P3.2.5**
- AFE application: **P3.4.4**
- BCU application: **P3.3.5**

Use this parameter to select the type of the stop function.

Selection number	Selection name	Description
0	Coasting	The motor stops on its inertia. When the stop command is given, the control by the drive stops and the current from the drive goes to 0.
1	Ramp	After the stop command, the speed of the motor is decreased to zero speed according to the deceleration parameters.

N O T I C E

Ramp stop cannot be guaranteed in all situations. If ramp stop is selected and the net voltage changes over 20%, the voltage estimation fails. In such case, ramp stop is not possible.

7.88 (ID 507) DC Brake Current

Location in the menu:

- INU application: **P3.4.4.1**

Use this parameter to set the current that is fed into the motor during DC braking. If the value of this parameter is set to 0, the DC brake function is disabled.

7.89 (ID 508) DC Braking Time at Stop

Location in the menu:

- INU application: **P3.4.4.2**

Use this parameter to set the braking is ON or OFF and to give the braking time when the motor stops. If the value of this parameter is set to 0, the DC brake function is disabled.

7.90 (ID 509) Prohibit Frequency Range 1 Low Limit

Location in the menu:

- INU application: **P3.7.1**

Use this parameter to prevent the drive operating on the prohibited frequencies.

In some processes, it can be necessary to avoid some frequencies because they make problems of mechanical resonance. With the Prohibit frequencies function, it is possible to prevent the usage of these frequencies. When the input frequency reference increases, the internal frequency reference stays at the low limit, until the input frequency reference is above the high limit.

With this parameter, it is possible to set limits for the "skip frequency" region.

7.91 (ID 510) Prohibit Frequency Range 1 High Limit

Location in the menu:

- INU application: **P3.7.2**

Use this parameter to prevent the drive operating on the prohibited frequencies. In some processes, it can be necessary to avoid some frequencies because they cause mechanical resonance.

With this parameter, it is possible to set limits for the "skip frequency" region.

7.92 (ID 511) Prohibit Frequency Range 2 Low Limit

Location in the menu:

- INU application: **P3.7.3**

Use this parameter to prevent the drive operating on the prohibited frequencies. In some processes, it can be necessary to avoid some frequencies because they cause mechanical resonance.

With this parameter, it is possible to set limits for the "skip frequency" region.

7.93 (ID 512) Prohibit Frequency Range 2 High Limit

Location in the menu:

- INU application: **P3.7.4**

Use this parameter to prevent the drive operating on the prohibited frequencies. In some processes, it can be necessary to avoid some frequencies because they cause mechanical resonance.

With this parameter, it is possible to set limits for the "skip frequency" region.

7.94 (ID 513) Prohibit Frequency Range 3 Low Limit

Location in the menu:

- INU application: **P3.7.5**

Use this parameter to prevent the drive operating on the prohibited frequencies. In some processes, it can be necessary to avoid some frequencies because they cause mechanical resonance.

With this parameter, it is possible to set limits for the "skip frequency" region.

7.95 (ID 514) Prohibit Frequency Range 3 High Limit

Location in the menu:

- INU application: **P3.7.6**

Use this parameter to prevent the drive operating on the prohibited frequencies. In some processes, it can be necessary to avoid some frequencies because they cause mechanical resonance.

With this parameter, it is possible to set limits for the "skip frequency" region.

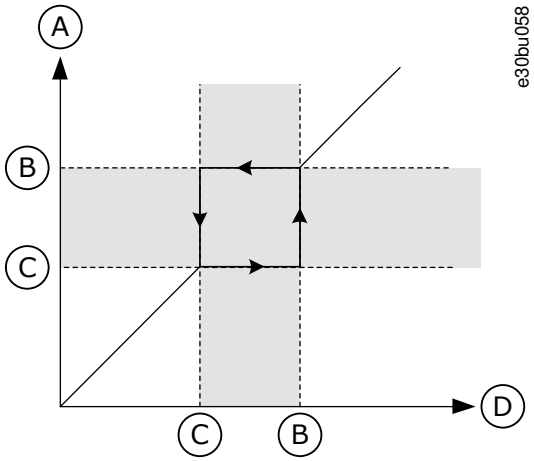


Illustration 29: The prohibited frequencies

A	Actual Reference	C	Low Limit
B	High Limit	D	Requested Reference

7.96 (ID 515) Frequency to Start DC Braking at Ramp Stop

Location in the menu:

- INU application: **P3.4.4.3**

Use this parameter to set the output frequency at which the DC-braking starts.
See 7.95 (ID 514) Prohibit Frequency Range 3 High Limit.

7.97 (ID 516) Start Magnetizing Time

Location in the menu:

- INU application: **P3.4.3.2**

Use this parameter to set the time during which the DC current is fed to the motor before the acceleration starts.

7.98 (ID 517) Start Magnetizing Current

Location in the menu:

- INU application: **P3.4.3.1**

Use this parameter to set the DC current that is fed into the motor at the start. If the value of this parameter is set to 0, the Start Magnetizing function is disabled.

7.99 (ID 518) Ramp Time Factor

Location in the menu:

- INU application: **P3.7.7**

Use this parameter to set the multiplier of the selected ramp times when the output frequency of the drive is between the prohibited frequency limits. The Ramp Time Factor sets the acceleration and the deceleration time when the output frequency is in a prohibited frequency range. The value of the Ramp Time Factor is multiplied by the value of P3.4.1.2 (Acceleration Time 1) or P3.4.1.3 (Deceleration Time 1). For example, the value 0.1 makes the acceleration/deceleration time ten times shorter.

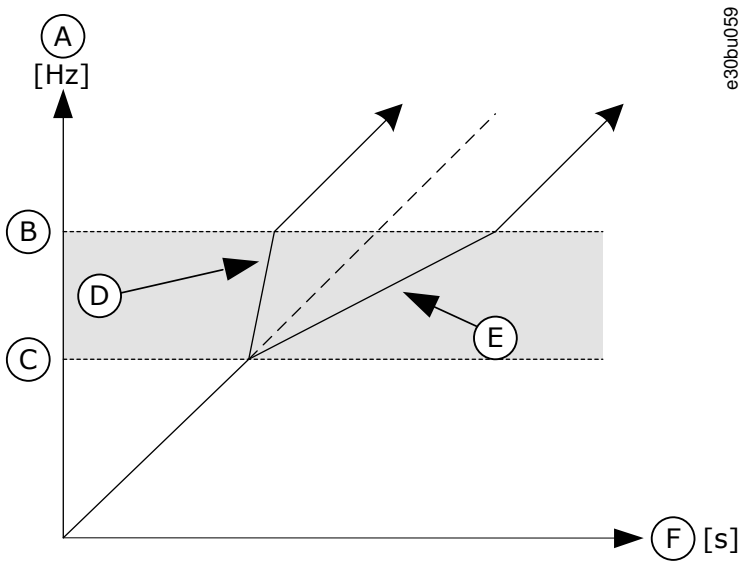


Illustration 30: The Parameter Ramp Time Factor

A	Output Frequency	D	Ramp Time Factor = 0.3
B	High Limit	E	Ramp Time Factor = 2.5
C	Low Limit	F	Time

7.100 (ID 519) Flux Braking Current

Location in the menu:

- INU application: **P3.4.5.2**

Use this parameter to set the current level for the flux braking.

7.101 (ID 520) Flux Braking

Location in the menu:

- INU application: **P3.4.5.1**

Use this parameter to enable Flux Braking. You can use flux braking as an alternative to DC-braking. Flux braking increases the braking capacity in conditions where extra brake resistors are not necessary.

When braking is necessary, the system decreases the frequency and increases the flux in the motor. It increases the capacity of the motor to brake. The motor speed is controlled during braking.

NOTICE

Use the braking only intermittently. Flux braking converts energy into heat and can damage the motor.

7.102 (ID 524) Start Delay

Location in the menu:

- INU application: **P3.2.9**

Use this parameter to set the delay between the start command and the actual start of the drive.

7.103 (ID 530) Jogging Reference 1 Activation

Location in the menu:

- INU application: **P3.3.6.2** and **P3.5.1.28**

Use this parameter to set the digital input signals for the Jogging function activation. This parameter gives the digital input signal that is used to set the frequency reference for Jogging function and make the drive start. It is possible to use this digital input signal only when Enable DI Jogging is active.

NOTICE

If both Enable DI Jogging and this digital input are activated, the drive starts.

NOTICE

If the 2 activation signals are active at the same time, the drive stops.

7.104 (ID 531) Jogging Reference 2 Activation

Location in the menu:

- INU application: **P3.3.6.3** and **P3.5.1.29**

Use this parameter to set the digital input signals for the Jogging function activation. This parameter gives the digital input signal that is used to set the frequency reference for Jogging function and make the drive start. It is possible to use this digital input signal only when Enable DI Jogging is active.

NOTICE

If both Enable DI Jogging and this digital input are activated, the drive starts.

NOTICE

If the 2 activation signals are active at the same time, the drive stops.

7.105 (ID 532) Enable DI Jogging

Location in the menu:

- INU application: **P3.3.6.1** and **P3.5.1.27**

Use this parameter to enable the jogging commands from digital inputs. This parameter gives the digital input signal that is used to enable jogging commands from digital inputs. This signal does not affect the jogging commands that come from Fieldbus.

Use the Jogging function to override the normal control momentarily. Use this function, for example, to control the process slowly to a special status or position during maintenance. There is no need to change the control place or other parameters.

Only when the drive is in stop state, it is possible to activate the Jogging function. It is possible use 2 bi-directional frequency references. Activate the Jogging function from the fieldbus or by digital input signals. The Jogging function has a ramp time that is used always when jogging is active.

The Jogging function starts the drive at the set reference. A new start command is not necessary. The control place does not affect it.

The Jogging function can be activated from the fieldbus in bypass mode with Control Word bits 10 and 11.

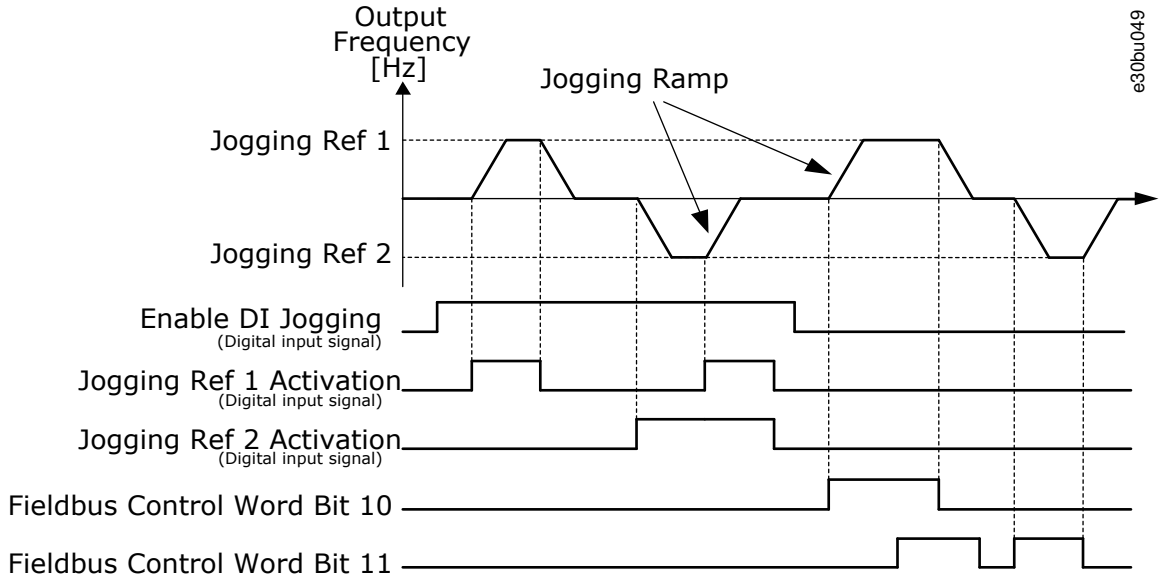


Illustration 31: The Jogging Parameters

7.106 (ID 534) I/f Start

Location in the menu:

- INU application: **P3.1.4.12.1**

Use this parameter to enable the I/f start function.

When the I/f start function is activated, the drive starts to operate in the current control mode. A constant current is led to the motor until the output frequency increases above the level that is set in P3.1.4.12.2. When the output frequency increases above I/f Start Frequency level, the operation mode changes back to the normal U/f control mode.

With a PM motor, use the I/f Start function to start the motor with constant current control. A high power motor gives the best effect. With a high power motor, the resistance is low and it is not easy to change the U/f curve.

The I/f Start function can also give a sufficient torque for the motor at start up.

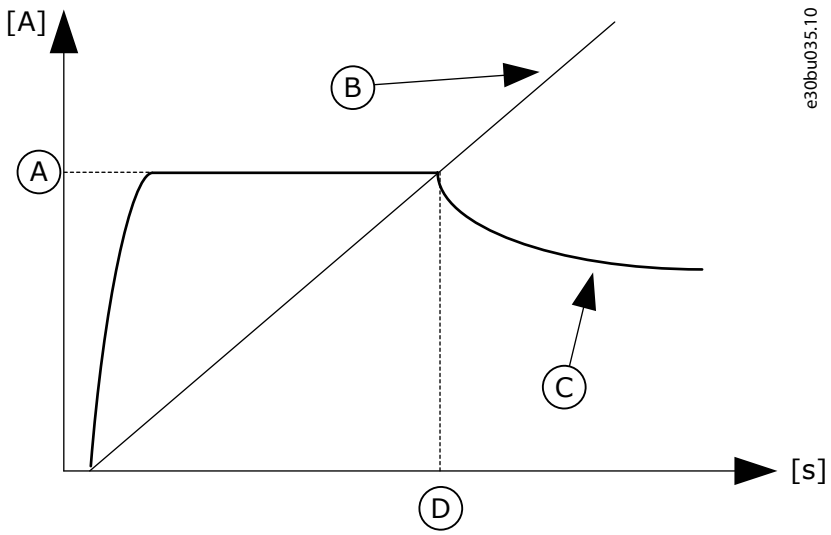


Illustration 32: The I/f Start Parameters

A	I/f Start Current	C	Motor Current
B	Output Frequency	D	I/f Start Frequency

7.107 (ID 535) I/f Start Frequency

Location in the menu:

- INU application: **P3.1.4.12.2**

Use this parameter to set the output frequency limit below which the set I/f start current is fed to motor.

When the output frequency of the drive is below the limit of this parameter, I/f start function activates. When the output frequency is more than the limit, the drive operation mode changes back to the normal U/f control mode.

7.108 (ID 536) I/f Start Current

Location in the menu:

- INU application: **P3.1.4.12.3**

Use this parameter to set the current that is used when the I/f start function is enabled.

7.109 (ID 600) Control Mode

Location in the menu:

- INU application: **P3.1.2.1**
- AFE application: **P3.2.1**

Use this parameter to set the AC drive control mode.

Selection number	Selection name	Description
0	Frequency control	The frequency reference of the drive is set to the output frequency without slip compensation. The motor load specifies the actual speed of the motor.
1	Speed control	The frequency reference of the drive is set to the motor speed reference. The motor load does not affect the motor speed. There is slip compensation.
2	Torque control	The motor torque is controlled. The motor produces torque in the set speed limits to achieve torque reference.

7.110 (ID 601) Switching Frequency

Location in the menu:

- INU application: **P3.1.2.6.1**
- AFE application: **P3.2.7.1**

Use this parameter to set the switching frequency of the AC drive.

If you increase the switching frequency, the capacity of the AC drive reduces. To reduce capacitive currents in the motor cable, when the cable is long, we recommend that you use a low switching frequency. To reduce the motor noise, use a high switching frequency.

7.111 (ID 602) Field Weakening Point Frequency

Location in the menu:

- INU application: **P3.1.4.2**

Use this parameter to set the output frequency at which the output voltage reaches the field weakening point voltage.

7.112 (ID 603) Voltage at Field Weakening Point

Location in the menu:

- INU application: **P3.1.4.3**

Use this parameter to set the voltage at the field weakening point as a percentage of the motor nominal voltage.

Above the frequency at the field weakening point, the output voltage stays at the set maximum value. Below the frequency at the field weakening point, the U/f curve parameters control the output voltage. See the U/f parameters P3.1.4.1, P3.1.4.4 and P3.1.4.5.

When setting the parameters P3.1.1.1 (Motor nominal voltage) and P3.1.1.2 (Motor nominal frequency), the parameters P3.1.4.2 and P3.1.4.3 automatically receive related values. To have different values for P3.1.4.2 and P3.1.4.3, change these parameters only after setting the parameters P3.1.1.1 and P3.1.1.2.

7.113 (ID 604) U/f Midpoint Frequency

Location in the menu:

- INU application: **P3.1.4.4**

Use this parameter to set the middle point frequency of the U/f curve.

N O T I C E

This parameter gives the middle point frequency of the curve if the value of P3.1.4.1 is programmable.

7.114 (ID 605) U/f Midpoint Voltage

Location in the menu:

- INU application: **P3.1.4.5**

Use this parameter to set the middle point voltage of the U/f curve.

N O T I C E

This parameter gives the middle point voltage of the curve if the value of P3.1.4.1 is programmable.

7.115 (ID 606) Zero Frequency Voltage

Location in the menu:

- INU application: **P3.1.4.6**

Use this parameter to set the zero frequency voltage of the U/f curve. The default value for the parameter is different for each unit size.

7.116 (ID 607) Overvoltage Control

Location in the menu:

- INU application: **P3.1.2.5.1**

Use this parameter to set the overvoltage controller out of operation.

The function is necessary when

- the supply voltage changes, for example, between -15% and +10%, and
- the process you control does not have the tolerance for the changes that the undervoltage controller and the overvoltage controller make to the output frequency of the drive.

The overvoltage controller increases the output frequency of the drive

- to keep the DC-link voltage in the permitted limits, and
- to make sure that the drive does not trip because of an overvoltage fault.

N O T I C E

The drive can trip when the overvoltage and undervoltage controllers are disabled.

7.117 (ID 608) Undervoltage Control

Location in the menu:

- INU application: **P3.1.2.5.2**

Use this parameter to set the undervoltage controller out of operation.

The function is necessary when

- the supply voltage changes, for example, between -15% and +10%, and
- the process you control does not have the tolerance for the changes that the undervoltage controller and the overvoltage controller make to the output frequency of the drive.

The undervoltage controller decreases the output frequency of the drive

- to get energy from the motor to keep the DC-link voltage at a minimum level when the voltage is near the lowest permitted limit, and
- to make sure that the drive does not trip because of an undervoltage fault.

N O T I C E

The drive can trip when the overvoltage and undervoltage controllers are disabled.

7.118 (ID 609) Torque Limit

Location in the menu:

- INU application: **P3.1.3.6**

Use this parameter to set the general maximum torque limit control between 0.0–300.0%. The torque limit applies to both directions. 100% equals to motor nominal torque.

7.119 (ID 612) Magnetizing Current

Location in the menu:

- INU application: **P3.1.2.7.1**

Use this parameter to set the magnetizing current of the motor.

The magnetizing current (no-load current) of the motor identifies the values of the U/f parameters when they are given before the identification run. If the value is set to 0, the magnetizing current is calculated internally.

7.120 (ID 613) Speed Control KP

Location in the menu:

- INU application: **P3.1.2.4.1**

Use this parameter to set the gain for the speed controller as a percentage per Hz.

When the gain value is 100%, the nominal torque reference is produced at the speed controller output for a frequency error of 1 Hz.

7.121 (ID 614) Speed Control I-Time

Location in the menu:

- INU application: **P3.1.2.4.2**

Use this parameter to set the integral time constant for the speed controller.

$$\text{Speed Control Output}(k) = \text{SPC OUT}(k-1) + \text{SPC Kp} \times [\text{Speed Error}(k) - \text{Speed Error}(k-1)] + \text{Ki} \times \text{Speed Error}(k)$$

where

$$\text{Ki} = \frac{\text{SPC Kp} \times \text{Ts}}{\text{SPC Ti}}$$

.

7.122 (ID 617) Current Control KP

Location in the menu:

- INU application: **P3.1.2.3.1**
- AFE application: **P3.2.2.1**

Use this parameter to adjust the P-gain of the current controller.

This controller is active only in closed loop control mode. The controller generates the voltage vector reference to the modulator..

7.123 (ID 619) Slip Adjust

Location in the menu:

- INU application: **P3.1.2.7.5**

Use this parameter to adjust the voltage of the motor when the motor is loaded.

The motor nameplate speed is used to calculate the nominal slip. This value is used to adjust the voltage of the motor when loaded. The nameplate speed is sometimes a little inaccurate and this parameter can therefore be used to trim the slip. Reducing the slip adjust value increases the motor voltage when the motor is loaded. Value 100% corresponds to nominal slip at nominal load.

7.124 (ID 620) Load Drooping

Location in the menu:

- INU application: **P3.1.2.4.6**

Use this parameter to enable the Load Drooping function. The Load drooping function enables a speed drop as a function of load. You can use this function when a balanced load is necessary for mechanically connected motors. This is called static drooping. You can also use the function when a dynamic drooping is necessary because the load changes. In static drooping, the Load Drooping Time is set to 0, so that the drooping cannot decay. In dynamic drooping, the Load Drooping Time is set. The load is momentarily drooped with energy from the system inertia. This decreases the current torque spikes when the load changes suddenly.

If the motor has a nominal frequency of 50 Hz, the motor is loaded with the nominal load (100% of the torque), and Load Drooping is set to 10%, the output frequency is let to decrease 5 Hz from the frequency reference.

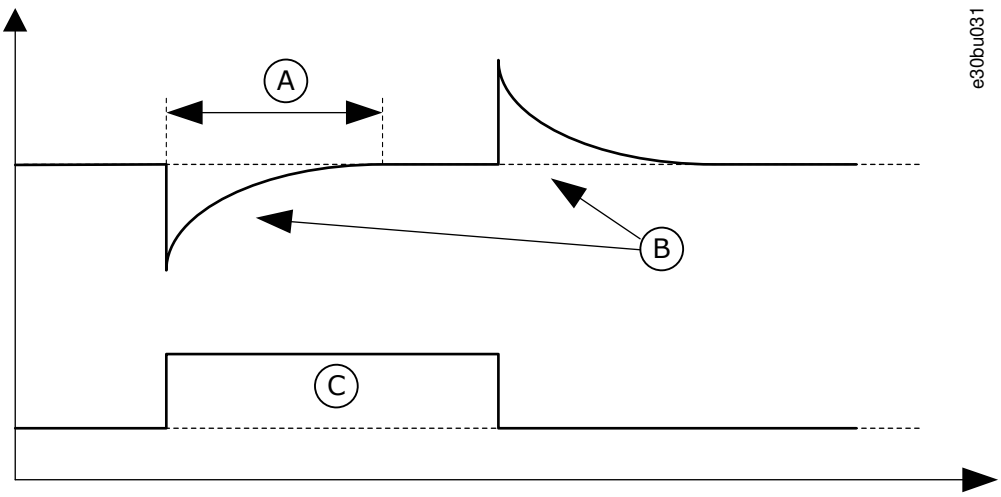


Illustration 33: The Load drooping function

A	Load Drooping Time (ID 656)	C	Torque
B	Output Frequency		

7.125 (ID 626) Acceleration Compensation TC

Location in the menu:

- INU application: **P3.1.2.4.3**

Use this parameter to set the inertia compensation to make the speed response during acceleration and deceleration more accurate.

The time is defined as acceleration time to nominal speed with nominal torque. This feature is used when the inertia of the system is known to achieve the best speed accuracy at alternating references.

$$\text{Acceleration Compensation TC} = J \times \frac{2\pi \times f_{nom}}{T_{nom}} = J \times \frac{(2\pi \times f_{nom})^2}{P_{nom}}$$

, where:

- J = System inertia (kg×m^2)
- f_{nom} = Motor nominal frequency (Hz)
- T_{nom} = Motor nominal torque
- P_{nom} = Motor nominal power (kW)

7.126 (ID 631) Identification

Location in the menu:

- INU application: **P3.1.2.8.1**

Use this parameter to find the parameter values that are optimal for the operation of the drive.

The identification run calculates or measures the motor parameters that are necessary for a good control of the motor and speed. The identification run helps you to adjust the motor-specific and the drive-specific parameters. It is a tool for the commissioning and the servicing of the drive.

N O T I C E

Before you do the identification run, you have to set the motor nameplate parameters.

Selection number	Selection name	Description
0	No action	No identification requested.
1	Identification at standstill	The drive operates without speed when you do the identification run for the motor parameters. The motor receives current and voltage, but the frequency is zero. The U/f ratio and start magnetization parameters are identified.
2	Identification with rotation	The drive operates with speed when you do the identification run for the motor parameters. The U/f ratio, the magnetization current and start magnetization parameters are identified. To get accurate results, do this identification run with no load on the motor shaft.

To activate the Identification function, set the parameter *ID 631* and give a start command. You have to give the start command in 20 s. If there is no start command in that time, the identification run does not start. The parameter *ID 631* is reset to the default value and an identification alarm shows.

To stop the identification run before it is completed, give a stop command. This resets the parameter to the default value. If the identification run is not completed, an identification alarm shows.

N O T I C E

To start the drive after the identification, a new start command is necessary.

7.127 (ID 636) Open Loop Torque Control Minimum Frequency

Location in the menu:

- INU application: **P3.3.2.14.1**

Use this parameter to set the output frequency limit below which the drive operates in the frequency control mode.

7.128 (ID 639) Open Loop Torque Control P Gain

Location in the menu:

- INU application: **P3.3.2.14.2**

Use this parameter to set the P gain for the torque controller in the open loop control mode.

The P Gain value 1.0 causes a 1 Hz change in the output frequency when the torque error is 1% of the motor nominal torque.

7.129 (ID 640) Open Loop Torque Control I Gain

Location in the menu:

- INU application: **P3.3.2.14.3**

Use this parameter to set the I gain for the torque controller in the open loop control mode.

The I Gain value 1.0 causes the integration to reach 1.0 Hz in 1 second when the torque error is 1% of the motor nominal torque.

7.130 (ID 641) Torque Reference Selection

Location in the menu:

- INU application: **P3.3.2.1**

Use this parameter to select the torque reference.

When the parameter P3.1.2.1 (Control Mode) is set to Torque control open loop, the motor torque is controlled. The motor speed changes to agree with the actual load on the motor shaft.

The torque reference is scaled between the values of P3.3.2.2. and P3.3.2.3. When using a fieldbus protocol where the torque reference can be given in Nm units, set ProcessDataIn1 as the value to this parameter.

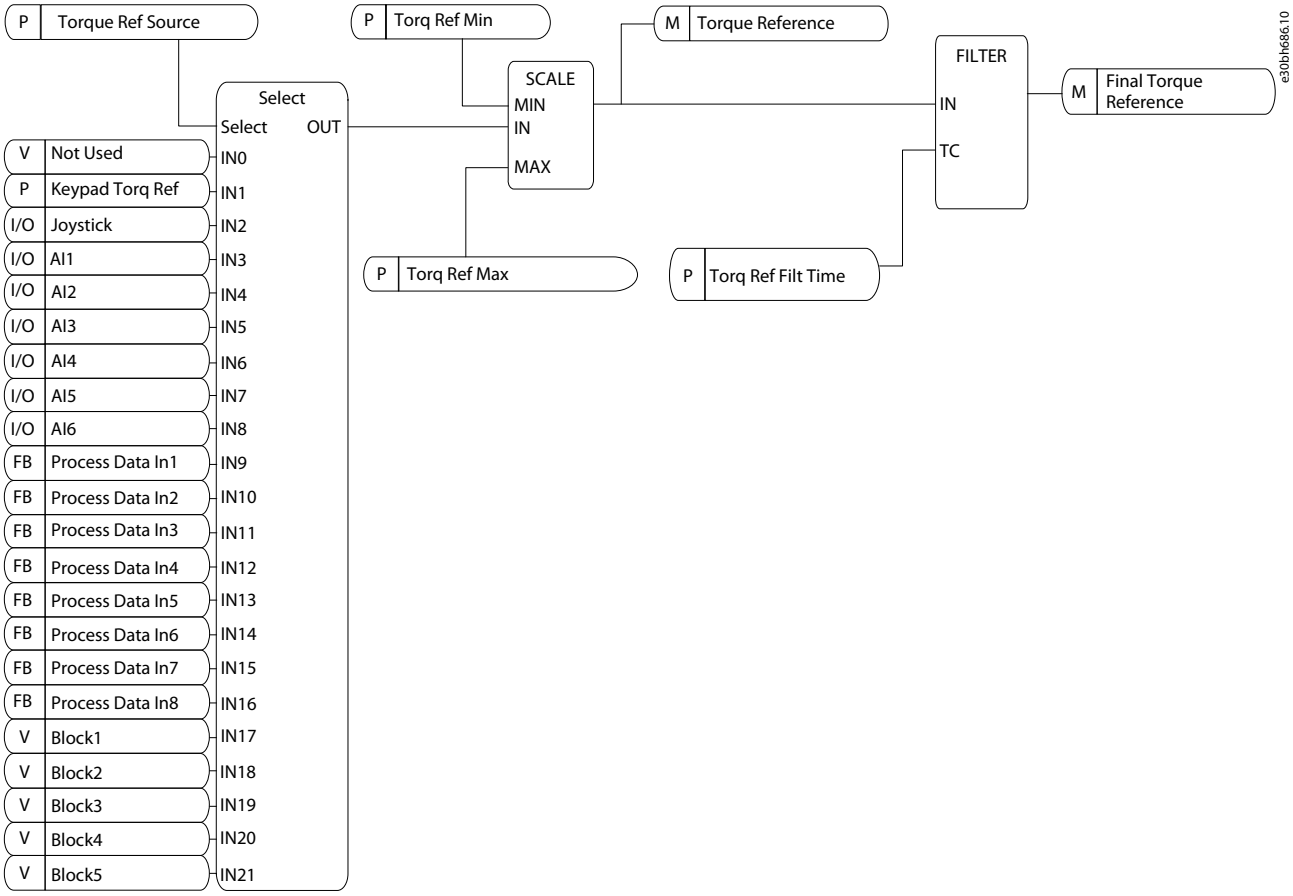


Illustration 34: The Torque Reference Chain Diagram

7.131 (ID 642) Torque Maximum Reference

Location in the menu:

- INU application: **P3.3.2.3**

Use this parameter to set the maximum torque reference of the positive and negative values.

These parameters define the scaling of selected torque reference signal. For instance, the analog input signal is scaled between the Torque Reference Minimum and the Torque Reference Maximum.

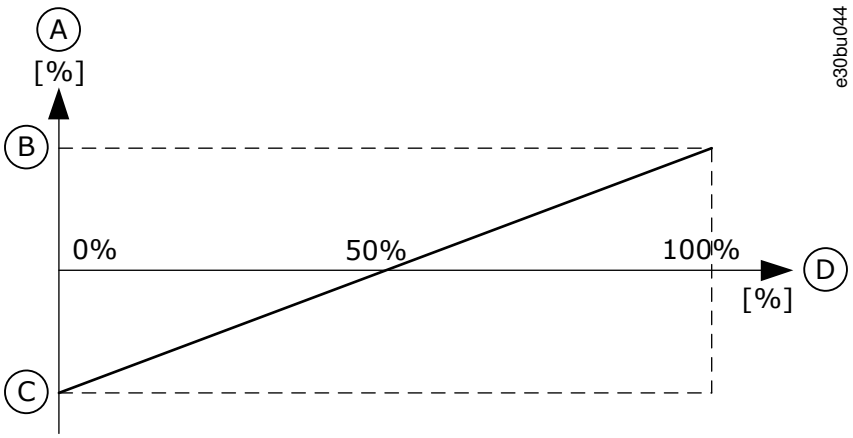


Illustration 35: Scaling of the Torque Reference Signal

A	Torque reference	C	Torque reference minimum
B	Torque reference maximum	D	Analog input signal

7.132 (ID 643) Torque Minimum Reference

Location in the menu:

- INU application: **P3.3.2.2**

Use this parameter to set the minimum torque reference. This parameter defines the minimum torque reference of the positive and negative values.

N O T I C E

This value is not applied when torque reference source is Joystick.

7.133 (ID 648) Modulator Type

Location in the menu:

- INU application: **P3.1.2.6.2**
- AFE application: **P3.2.7.5**

Use this parameter to set the modulator type:

- 1: SVM
- 2: DPWM1
- 3: DPWMIN
- 4: No 3rd harmonic

7.134 (ID 650) Motor Type

Location in the menu:

- INU application: **P3.1.2.2**

Use this parameter to set the type of motor in your process.

Selection number	Selection name	Description
0	Induction motor (IM)	Make this selection if you use an induction motor.

When you change the value of parameter P3.1.2.2 Motor Type, the values of parameters P3.1.4.2 Field Weakening Point Frequency and P3.1.4.3 Voltage at Field Weakening Point change automatically, as the table below shows. The 2 parameters have different values for each motor type.

Parameter	Induction motor (IM)
P3.1.4.2 (Field Weakening Point Frequency)	Motor nominal frequency
P3.1.4.3 (Voltage at Field Weakening Point)	100.0%

7.135 (ID 655) Maximum Modulation Index

Location in the menu:

- INU application: **P3.1.2.6.5**

This parameter can be used to control how the drive modulates the output voltage.

Reducing this value limits the maximum output voltage. If a sinusoidal filter is used set this parameter to 96%.

Higher DC link use increases current harmonics.

7.136 (ID 656) Load Drooping Time

Location in the menu:

- INU application: **P3.1.2.4.7**

Use this parameter to set the drooping time of the motor. Use load drooping to get a dynamic speed drooping when the load changes. This parameter gives the time during which the speed is restored 63% of the change.

7.137 (ID 657) Current Control Time

Location in the menu:

- INU application: **P3.1.2.3.2**
- AFE application: **P3.2.2.2**

Use this parameter to adjust the integrator time constant of the current controller. This value is presented in seconds.

7.138 (ID 659) Stator Voltage Adjust

Location in the menu:

- INU application: **P3.1.2.7.4**

Use this parameter to adjust the stator voltage in permanent magnet motors.

N O T I C E

The identification run sets a value for this parameter automatically. If possible, make the identification run. You can make the identification run with the parameter ID 631.

It is possible to use this parameter only when the parameter P3.1.2.2 Motor Type has the value PM motor. If you set induction motor as the motor type, the value is automatically set to 100%, and you cannot change the value.

When you change the value of P3.1.2.2 (Motor type) to PM Motor, the parameters P3.1.4.2 (Field Weakening Point Frequency) and P3.1.4.3 (Voltage at Field Weakening Point) increase automatically to be equal with output voltage of the drive. The set U/f ratio does not change. This is done to prevent the operation of the PM motor in the field weakening area. The nominal voltage of the PM motor is much lower than the full output voltage of the drive.

The nominal voltage of the PM motor agrees to the back-EMF voltage of the motor at nominal frequency. But in a different motor manufacturer, it can be equal to, for example, the stator voltage at nominal load.

Stator Voltage Adjust helps you to adjust the U/f curve of the drive near the back-EMF curve. It is not necessary to change the values of many U/f curve parameters.

The Stator Voltage Adjust parameter gives the output voltage of the drive in percentage of the nominal voltage of the motor at the nominal frequency of the motor. Adjust the U/f curve of the drive above the back-EMF curve of the motor. The motor current increases the more the U/f curve is different from the back-EMF curve.

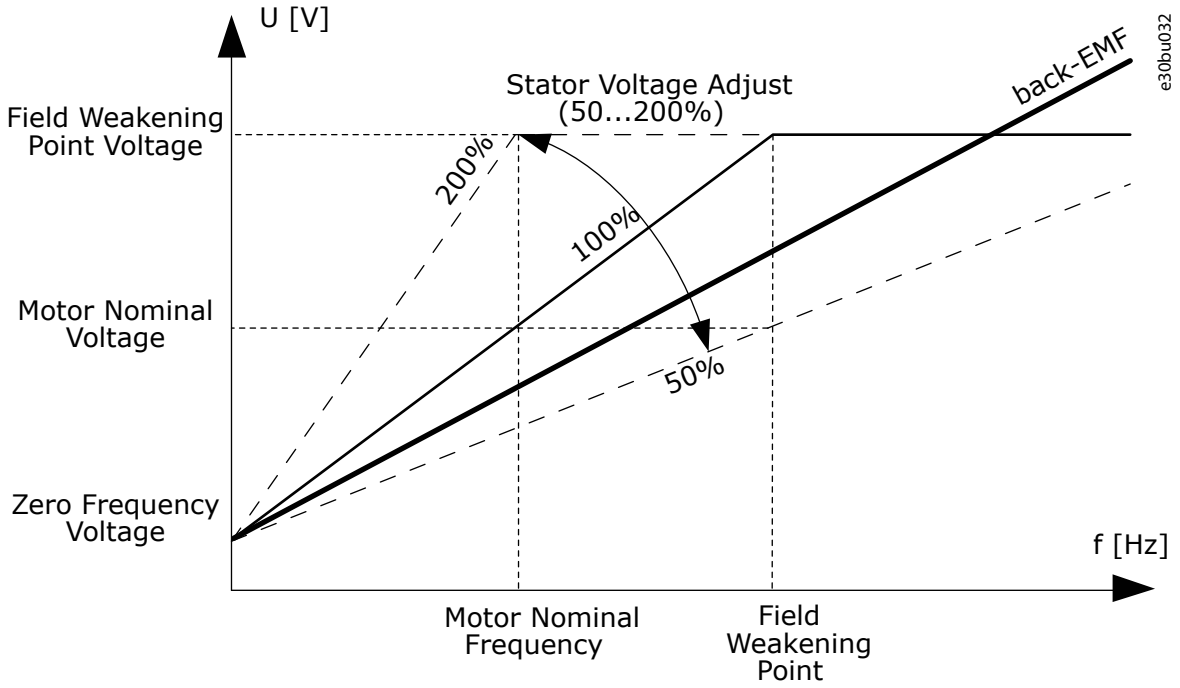


Illustration 36: The stator voltage adjustment

7.139 (ID 662) Stator Resistance Voltage Drop

Location in the menu:

- INU application: **P3.1.2.7.2**

Use this parameter to set the measured voltage drop at stator resistance between two phases with the nominal current of the motor (in star-connection equivalent circuit). The resistance is essential for an accurate motor control. Set this value to gain the optimum torque calculation for Open Loop low frequencies.

The value is given as a percentage of voltage drop at nominal current.

N O T I C E

The identification run sets a value for this parameter automatically. If possible, make the identification run. You can make the identification run with the parameter ID 631.

7.140 (ID 665) Torque Boost Generator Gain

Location in the menu:

- INU application: **P3.1.4.11**

Use this parameter to set the scaling factor for the generating side IR-compensation when the torque boost is used.

7.141 (ID 667) Torque Boost Motor Gain

Location in the menu:

- INU application: **P3.1.4.10**

Use this parameter to set the scaling factor for the motoring side IR-compensation when the torque boost is used.

7.142 (ID 672) Short Restart Delay

Location in the menu:

- INU application: **P3.2.12**

Use this parameter to set the time delay during which the drive cannot be restarted if flying start is used.

7.143 (ID 673) Stator Inductance Voltage Drop

Location in the menu:

- INU application: **P3.1.2.7.3**

Use this parameter to set the motor stator leakage inductance voltage drop between two phases (in star-connection equivalent circuit). The value is the transient inductance.

The value is given as a percentage of voltage drop at nominal current and nominal frequency.

N O T I C E

The identification run sets a value for this parameter automatically. If possible, make the identification run. You can make the identification run with the parameter ID 631.

7.144 (ID 675) Rs Voltage Drop

Location in the menu:

- INU application: **P3.1.2.8.4**

Use this parameter to set the Rs voltage drop value.

7.145 (ID 677) Magnetizing Current

Location in the menu:

- INU application: **P3.1.2.8.3**

Use this parameter to set the magnetizing current value.

7.146 (ID 678) Ls Voltage Drop

Location in the menu:

- INU application: **P3.1.2.8.5**

Use this parameter to set the Ls voltage drop value.

7.147 (ID 679) Forward Voltage Drop

Location in the menu:

- INU application: **P3.1.2.8.6**

Use this parameter to set the forward voltage drop value.

7.148 (ID 680) Identification Options

Location in the menu:

- INU application: **P3.1.2.8.2**

Use this parameter to select the identification options.

7.149 (ID 700) Analog Input Low Fault

Location in the menu:

- INU application: **P3.9.8.2**
- AFE application: **P3.8.4.2**
- BCU application: **P3.6.1.1**

Use this parameter to select the response of the drive to an 'AI Low' fault. If the analog input signal becomes less than 50% of the minimum signal for 500 ms, an AI Low fault occurs.

If AI Low Protection is enabled with parameter ID 767, this parameter gives a response for the fault code 50 (Fault ID 1050).

The AI low protection function monitors the signal level of the analog inputs 1-6. If the analog input signal becomes less than 50% of the minimum signal for 500 ms, an AI Low fault or alarm shows.

N O T I C E

You can use the value Alarm + previous frequency only when you use analog input 1 or analog input 2 as frequency reference.

Selection number	Selection name	Description
0	No Action	AI Low Protection is not used.
1	Alarm	
2	Alarm, preset frequency	The frequency reference is set as in P2.8.1.10 Preset Alarm Frequency.
3	Alarm, previous frequency	The last valid frequency is kept as frequency reference.
4	Fault	The drive stops as is set in P2.4.4 Stop Function.
5	Fault, coasting	The drive stops by coasting.

7.150 (ID 701) Response to External Fault

Location in the menu:

- INU application: **P3.9.1.2**
- AFE application: **P3.8.1.2**
- BCU application: **P3.6.1.2**

Use this parameter to select the response of the drive to an *External Fault*.

If a fault occurs, the drive can show a notification of it on the display of the drive. An external fault is activated with a digital input signal. The default digital input is DI3. You can also program the response data into a relay output.

7.151 (ID 702) Response to Output Phase Fault

Location in the menu:

- INU application: **P3.9.1.4**
- AFE application: **P3.8.1.4**
- BCU application: **P3.6.1.4**

Use this parameter to select the response of the drive to an 'Output Phase' fault. If the measurement of the motor current detects that there is no current in 1 motor phase, an output phase fault occurs. See ID 701.

7.152 (ID 703) Earth Fault

Location in the menu:

- INU application: **P3.9.1.8**
- AFE application: **P3.8.1.8**

Use this parameter to select the response of the drive to an *Earth Fault*.

If the measurement of the current detects that the sum of the motor phase currents is not 0, an earth fault occurs. See ID 701.

7.153 (ID 704) Motor Thermal Protection

Location in the menu:

- INU application: **P3.9.2.1**

Use this parameter to select the response of the drive to a 'Motor Overtemperature' fault. If the motor thermal protection function detects that the temperature of the motor is too high, a motor overtemperature fault occurs.

If possible, use a motor thermistor to protect the motor. Set the value of this parameter to 0.

The motor thermal protection prevents the motor from becoming too hot.

The AC drive can supply a current that is higher than the nominal current. The high current can be necessary to the load, and it must be used. In these conditions, there is a risk of a thermal overload. Low frequencies have a higher risk. At low frequencies, the cooling effect and the capacity of the motor decrease. If the motor has an external fan, the load reduction at low frequencies is small.

The motor thermal protection is based on calculations. The protection function uses the output current of the drive to know what is the load on the motor. If the control board is not energized, the calculations are reset.

To adjust the thermal protection of the motor, use the parameters from P3.9.2.1 to P3.9.2.5. You can monitor the thermal status of the motor on the display of the control panel.

N O T I C E

If you use long motor cables (maximum 100 m) with small drives (≤1.5 kW), the motor current that the drive measures can be much higher than the actual motor current. It is because there are capacitive currents in the motor cable.

N O T I C E

OVERHEATING BECAUSE OF BLOCKED AIRFLOW

If the airflow to the motor is blocked, the function does not protect the motor, and the motor can become too hot. This can damage the motor.

- Make sure that the airflow to the motor is not blocked.

7.154 (ID 705) Ambient Temperature

Location in the menu:

- INU application: **P3.9.2.2**

Use this parameter to set the ambient temperature where the motor is installed. The temperature value is given in Celsius or Fahrenheit degrees.

7.155 (ID 706) Zero Speed Cooling Factor

Location in the menu:

- INU application: **P3.9.2.3**

Use this parameter to set the cooling factor at 0 speed in relation to the point where the motor operates at nominal speed without external cooling.

The default value is set for conditions where there is no external fan. When using an external fan, the value can be set higher than without the fan, for example at 90%.

When changing the parameter P3.1.1.4 *Motor Nominal Current*, this parameter is automatically set to its default value.

Changing this parameter does not affect the maximum output current of the drive. Only parameter *P3.1.3.1Motor Current Limit* can change the maximum output current.

The corner frequency for the thermal protection is 70% of the value of the parameter *Motor Nominal Frequency* (*ID 111*).

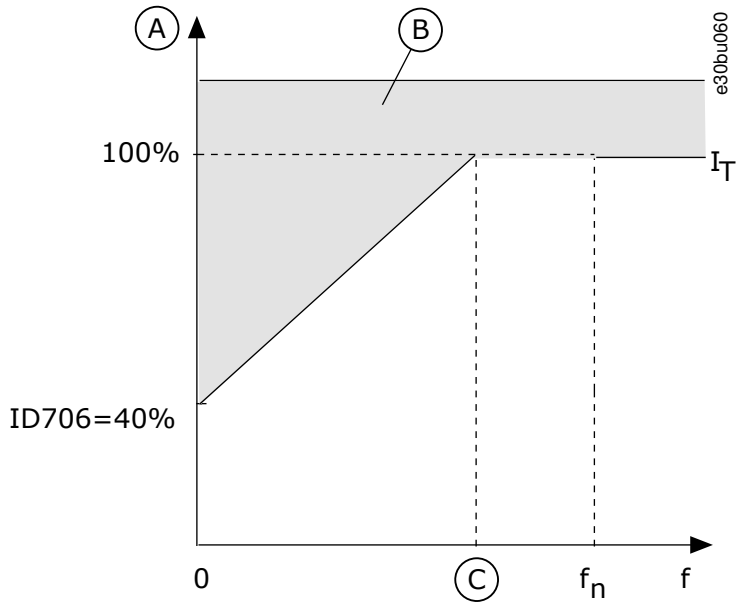


Illustration 37: The motor thermal current IT curve

A	$P_{Cooling}$	C	Corner frequency
B	Overload area		

7.156 (ID 707) Motor Thermal Time Constant

Location in the menu:

- INU application: **P3.9.2.4**

Use this parameter to set the motor thermal time constant.

The time constant is the time within which the calculated thermal stage has reached 63% of its final value. The final thermal stage equals to running the motor continuously with nominal load at nominal speed. The length of the time constant is in relation with the dimension of the motor. The bigger the motor, the longer the time constant.

In different motors, the motor thermal time constant is different. It also changes between different motor manufacturers. The default value of the parameter changes from dimension to dimension.

The t6-time is the time in seconds that the motor can safely operate at 6 times the rated current. It is possible that the motor manufacturer gives the data with the motor. Use this information to set the time constant parameter. Usually, the motor thermal time constant in minutes is 2*t6. When the drive is in the *STOP* state, the time constant is internally increased to 3 times the set parameter value, because the cooling operates based on convection.

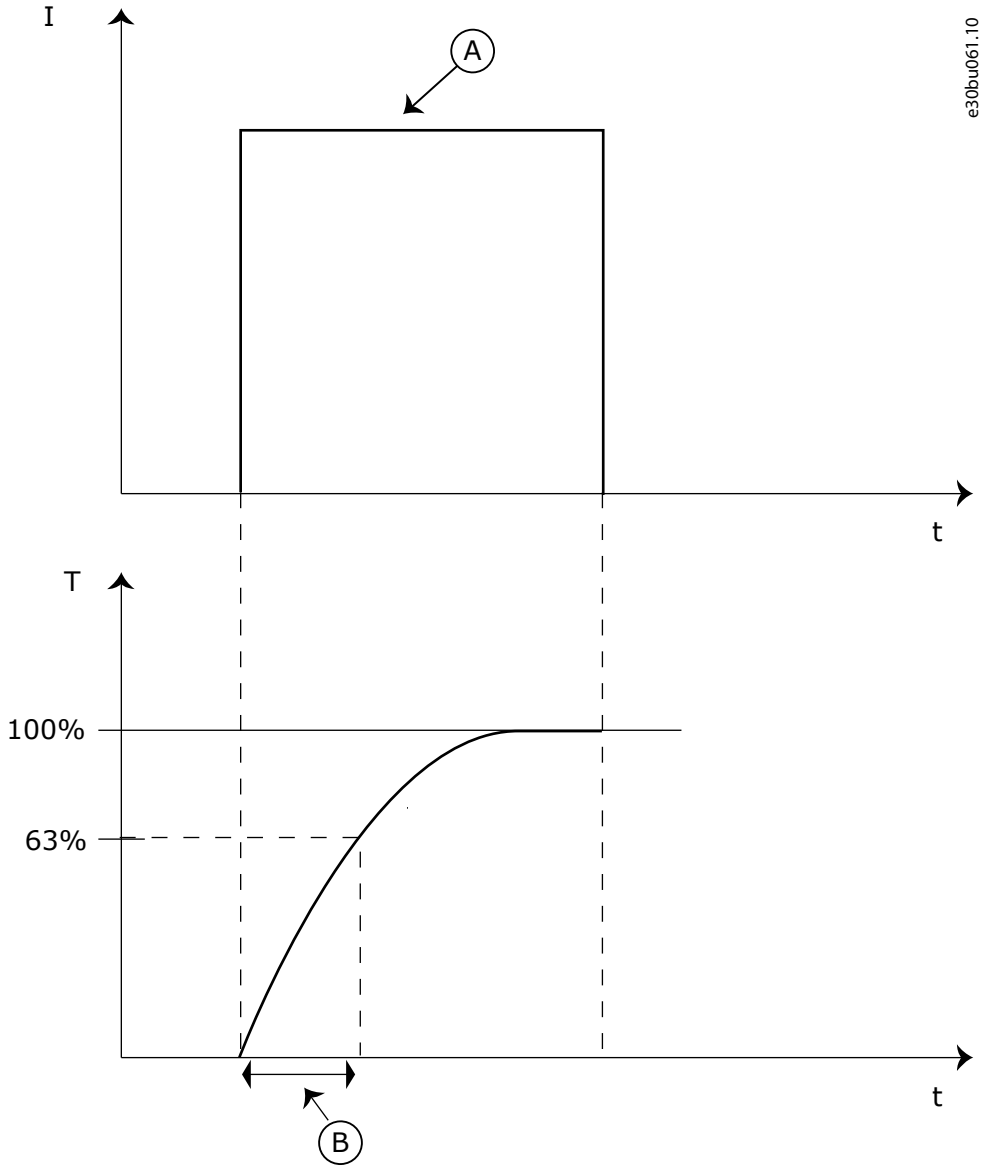


Illustration 38: The motor thermal time constant

A	Current
B	T = Motor thermal time constant

7.157 (ID 708) Motor Thermal Loadability

Location in the menu:

- INU application: **P3.9.2.5**

Use this parameter to set the thermal loadability of the motor. For example, if the value is set to 130%, the motor goes to the nominal temperature with 130% of the motor nominal current.

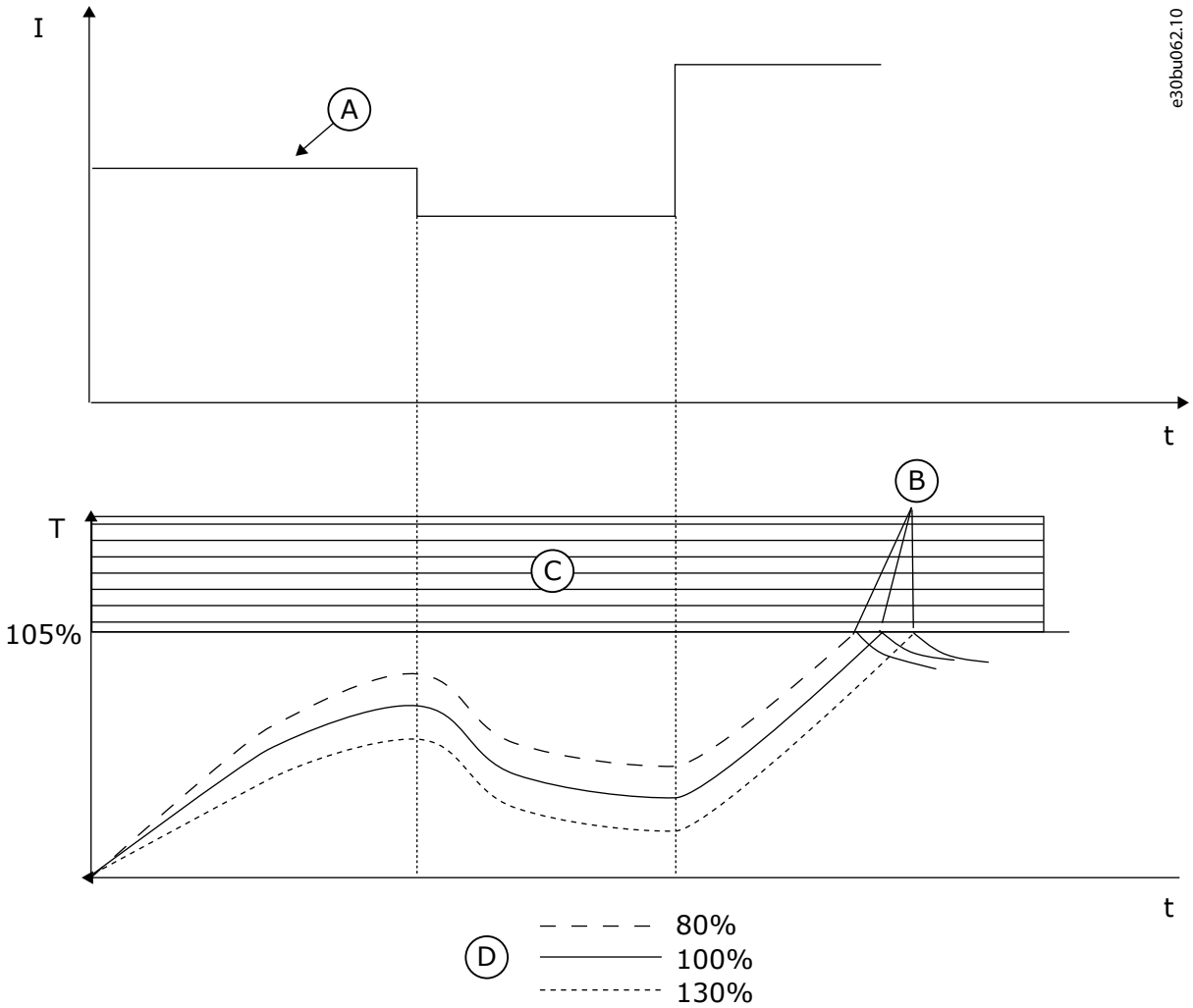


Illustration 39: The Calculation of the Motor Temperature

A	Current	C	Trip area
B	Fault/Alarm	D	Loadability

7.158 (ID 709) Motor Stall Fault

Location in the menu:

- INU application: **P3.9.3.1**

Use this parameter to select the response of the drive to a 'Motor Stall' fault. If the stall protection detects that the shaft of the motor is stalled, a motor stall fault occurs.

The motor stall protection function gives protection to the motor against short overloads. An overload can be caused, for example, by a stalled shaft. It is possible to set the reaction time of the stall protection shorter than that of the motor thermal protection.

The stall status of the motor is specified with parameters P3.9.3.2 Stall Current and P3.9.3.4 Stall Frequency Limit. If the current is higher than the limit, and the output frequency is lower than the limit, the motor is in a stall status.

The stall protection is a type of overcurrent protection.

N O T I C E

If you use long motor cables (max. 100 m) with small drives (≤1.5 kW), the motor current that the drive measures can be much higher than the actual motor current. It is because there are capacitive currents in the motor cable.

7.159 (ID 710) Stall Current

Location in the menu:

- INU application: **P3.9.3.2**

Use this parameter to set the limit above which the current of the motor must stay for a stall stage to occur.

You can set the value of this parameter between 0.0 and 2*I_L. For a stall status to occur, the current must be higher than this limit. If parameter P3.1.3.1 *Motor Current Limit* changes, this parameter is automatically calculated to 90% of the current limit.

The value of the Stall Current must be below the motor current limit.

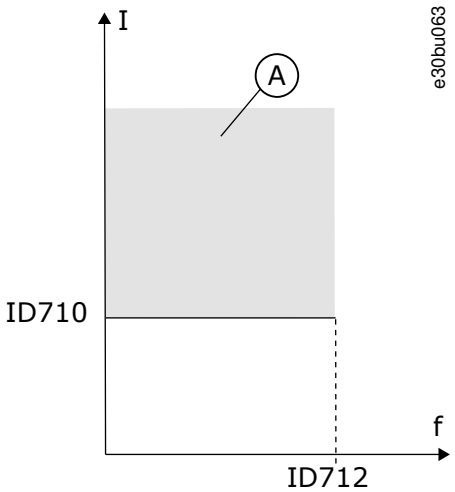


Illustration 40: The stall characteristics settings

A	Stall area

7.160 (ID 711) Stall Time Limit

Location in the menu:

- INU application: **P3.9.3.3**

Use this parameter to set the maximum time for a stall stage.

This parameter is the maximum time for the stall stage to be active before a motor stall fault occurs. The value of this parameter can be set between 1.0 s and 120.0 s. An internal counter counts the stall time. If the stall time counter value goes above this limit, the protection causes the drive to trip.

7.161 (ID 712) Stall Frequency Limit

Location in the menu:

- INU application: **P3.9.3.4**

Use this parameter to set the limit below which the output frequency of the drive must stay for a stall stage to occur.

For a stall state to occur, the output frequency must be below this limit for a certain time.

7.162 (ID 713) Underload Fault

Location in the menu:

- INU application: **P3.9.4.1**

Use this parameter to select the response of the drive to an 'Underload' fault. If the underload protection function detects that there is not a sufficient load on the motor, an underload fault occurs.

The motor underload protection makes sure that there is a load on the motor when the drive operates. If the motor loses the load, a problem can occur in the process. For example, a belt can break or a pump become dry.

You can adjust the motor underload protection with parameters P3.9.4.2 (Underload Protection: Field Weakening Area Load) and P3.9.4.3 (Underload Protection: Zero Frequency Load). The underload curve is a squared curve between the zero frequency and the field weakening point. The protection is not active below 5 Hz. The underload time counter does not operate below 5 Hz.

The values of the underload protection parameters are set in percentage of the nominal torque of the motor. To find the scaling ratio for the internal torque value, use the data in the name plate data of the motor, the motor nominal current and the nominal current of the drive IH. If you use another current than the nominal motor current, the precision of the calculation decreases.

N O T I C E

If you use long motor cables (max. 100 m) with small drives (≤1.5 kW), the motor current that the drive measures can be much higher than the actual motor current. It is because there are capacitive currents in the motor cable.

7.163 (ID 714) Underload Protection: Field Weakening Area Load

Location in the menu:

- INU application: **P3.9.4.2**

Use this parameter to set the minimum torque that the motor needs when the output frequency of the drive is higher than the frequency of the weakening point. You can set the value of this parameter between 10.0% and 150.0% x T_{nMotor}. This value is the limit for the minimum torque when the output frequency is above the field weakening point.

Changing parameter ID 113 *Motor Nominal Current* restores this parameter automatically to its default value. See 7.162 (ID 713) Underload Fault.

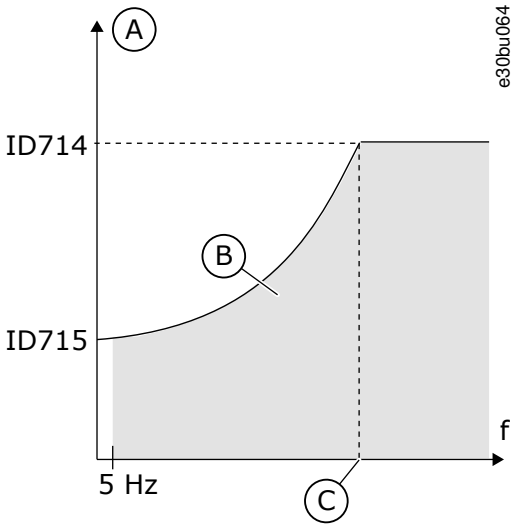


Illustration 41: Setting of the minimum load

A	Torque	C	Field weakening point
B	Underload area		

7.164 (ID 715) Underload Protection: Zero Frequency Load

Location in the menu:

- INU application: **P3.9.4.3**

Use this parameter to set the minimum torque that the motor needs when the output frequency of the drive is 0.

Changing the value of parameter P3.1.1.4 *Motor nominal current* restores this parameter automatically to the default value.

7.165 (ID 716) Underload Protection: Time Limit

Location in the menu:

- INU application: **P3.9.4.4**

Use this parameter to set the maximum time for an underload state. It is the maximum time for the underload state to be active before an underload fault occurs.

You can set the time limit between 2.0 s and 600.0 s.

An internal counter counts the underload time. If the value of the counter goes above this limit, the protection causes the drive to trip. The drive trips as is set in parameter P3.9.4.1 *Underload Fault*. If the drive stops, the underload counter goes back to 0.

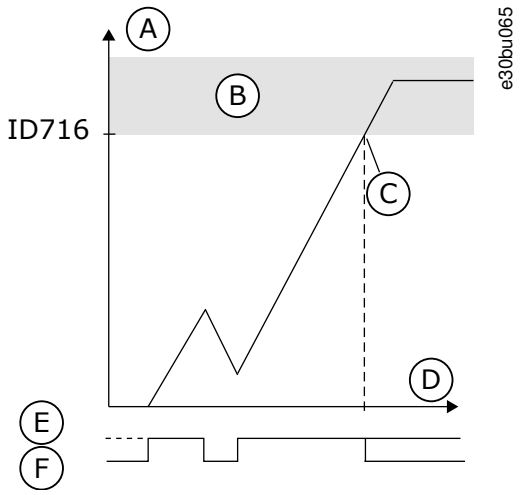


Illustration 42: The Underload time counter function

A	Underload time counter	D	Time
B	Trip area	E	Underload
C	Trip/warning *ID 713*	F	No underload

7.166 (ID 717) Wait Time

Location in the menu:

- INU application: **P3.10.3**
- AFE application: **P3.9.3**
- BCU application: **P3.7.3**

Use this parameter to set the wait time before the first automatic reset of a fault is done.

7.167 (ID 718) Trial Time

Location in the menu:

- INU application: **P3.10.4**
- AFE application: **P3.9.4**
- BCU application: **P3.7.4**

Use this parameter to set the trial time for the automatic reset function. During the trial time, the automatic reset function tries to reset the faults that occur.

The time count starts from the first automatic reset. The next fault starts the trial time count again.

If the number of reset tries is exceeded within this time or the fault remains, a permanent fault is generated.

7.168 (ID 719) Restart Function

Location in the menu:

- INU application: **P3.10.2**
- AFE application: **P3.9.2**
- BCU application: **P3.7.2**

Use this parameter to select the start mode for the Automatic reset function.

7.169 (ID 720) Autoreset: Undervoltage

Location in the menu:

- INU application: **P3.10.6**
- AFE application: **P3.9.6**
- BCU application: **P3.7.6**

Use this parameter to enable the automatic reset after an undervoltage fault.

7.170 (ID 721) Autoreset: Overvoltage

Location in the menu:

- INU application: **P3.10.7**
- AFE application: **P3.9.7**
- BCU application: **P3.7.7**

Use this parameter to enable the automatic reset after an overvoltage fault.

7.171 (ID 722) Autoreset: Overcurrent

Location in the menu:

- INU application: **P3.10.8**
- AFE application: **P3.9.8**
- BCU application: **P3.7.8**

Use this parameter to enable the automatic reset after an overcurrent fault.

7.172 (ID 723) Autoreset: AI Low

Location in the menu:

- INU application: **P3.10.9**
- AFE application: **P3.9.9**
- BCU application: **P3.7.9**

Use this parameter to enable the automatic reset after a fault caused by low AI signal.

7.173 (ID 724) Autoreset: Unit Overtemperature

Location in the menu:

- INU application: **P3.10.10**
- AFE application: **P3.9.10**
- BCU application: **P3.7.10**

Use this parameter to enable the automatic reset after a fault caused by unit overtemperature.

7.174 (ID 725) Autoreset: Motor Overtemperature

Location in the menu:

- INU application: **P3.10.11**
- AFE application: **P3.9.11**

Use this parameter to enable the automatic reset after a fault caused by motor overtemperature.

7.175 (ID 726) Autoreset: External Fault

Location in the menu:

- INU application: **P3.10.12**
- AFE application: **P3.9.12**
- BCU application: **P3.7.11**

Use this parameter to enable the automatic reset after an external fault.

7.176 (ID 727) Undervoltage Fault

Location in the menu:

- INU application: **P3.9.1.3**
- AFE application: **P3.8.1.3**
- BCU application: **P3.6.1.3**

Use this parameter to select if undervoltage faults are saved to the fault history or not.

7.177 (ID 731) Automatic Reset

Location in the menu:

- INU application: **P3.10.1**
- AFE application: **P3.9.1**
- BCU application: **P3.7.1**

Use this parameter to enable the Automatic reset function. To select the faults that are reset automatically, enter the value 0 or 1 to parameters ID 720–726 and ID 738.

N O T I C E

The automatic reset function is available only for some fault types.

7.178 (ID 732) Thermistor Fault

Location in the menu:

- INU application: **P3.9.1.7**
- AFE application: **P3.8.1.7**
- BCU application: **P3.6.1.7**

Use this parameter to select the response of the drive to a 'Thermistor' fault. If the thermistor detects too high temperature, a thermistor fault occurs. See ID 701.

7.179 (ID 733) Response to Fieldbus Communication Fault

Location in the menu:

- INU application: **P3.9.1.5**
- AFE application: **P3.8.1.5**
- BCU application: **P3.6.1.5**

Use this parameter to select the response of the drive to a fieldbus communication fault. If the data connection between the master and the fieldbus board is defective, a fieldbus fault occurs.

7.180 (ID 734) Slot Communication Fault

Location in the menu:

- INU application: **P3.9.1.6**
- AFE application: **P3.8.1.6**
- BCU application: **P3.6.1.6**

Use this parameter to select the response of the drive to a 'Slot Communication' fault. If the drive detects a defective option board, a slot communication fault occurs. See ID 701.

7.181 (ID 738) Autoreset: Underload Fault

Location in the menu:

- INU application: **P3.10.13**
- AFE application: **P3.9.13**

Use this parameter to enable the automatic reset after an underload fault.

7.182 (ID 739) Temperature Signal 1

Location in the menu:

- INU application: **P3.9.6.1**
- AFE application: **P2.8.2.1**

Use this parameter to select the temperature input signals that are supervised.
The maximum value is taken from the set signals and used for alarm and fault triggering.

N O T I C E

Only the 6 first temperature inputs are supported (the boards from slot A to slot E).

7.183 (ID 740) Fault Limit Response 1

Location in the menu:

- INU application: **P3.9.6.4**
- AFE application: **P2.8.2.4**

Use this parameter to select the response of the drive to 'Temperature' fault.

7.184 (ID 741) Alarm Limit 1

Location in the menu:

- INU application: **P3.9.6.2**
- AFE application: **P2.8.2.2**

Use this parameter to set the temperature alarm limit.
Only the inputs that are set with parameter ID 739 are compared.

7.185 (ID 742) Fault Limit 1

Location in the menu:

- INU application: **P3.9.6.3**
- AFE application: **P2.8.2.3**

Use this parameter to set the temperature fault limit.
Only the inputs that are set with parameter ID 739 are compared.

7.186 (ID 744) Response to Quick Stop Fault

Location in the menu:

- INU application: **P3.9.5.4**

Use this parameter to select the response of the drive to a 'Quick Stop' fault. If the quick stop command is given from DI or Fieldbus, a quick stop fault occurs.
With the quick stop function, it is possible stop the drive in an unusual procedure from I/O or Fieldbus in unusual conditions. When the quick stop function is active, it is possible make the drive decelerate and stop. It is possible to program an alarm or fault to put a mark in the fault history that there was a request for a quick stop.

⚠ C A U T I O N ⚠

Do not use the quick stop function as an emergency stop. An emergency stop must stop the power supply to the motor. The quick stop function does not do this.

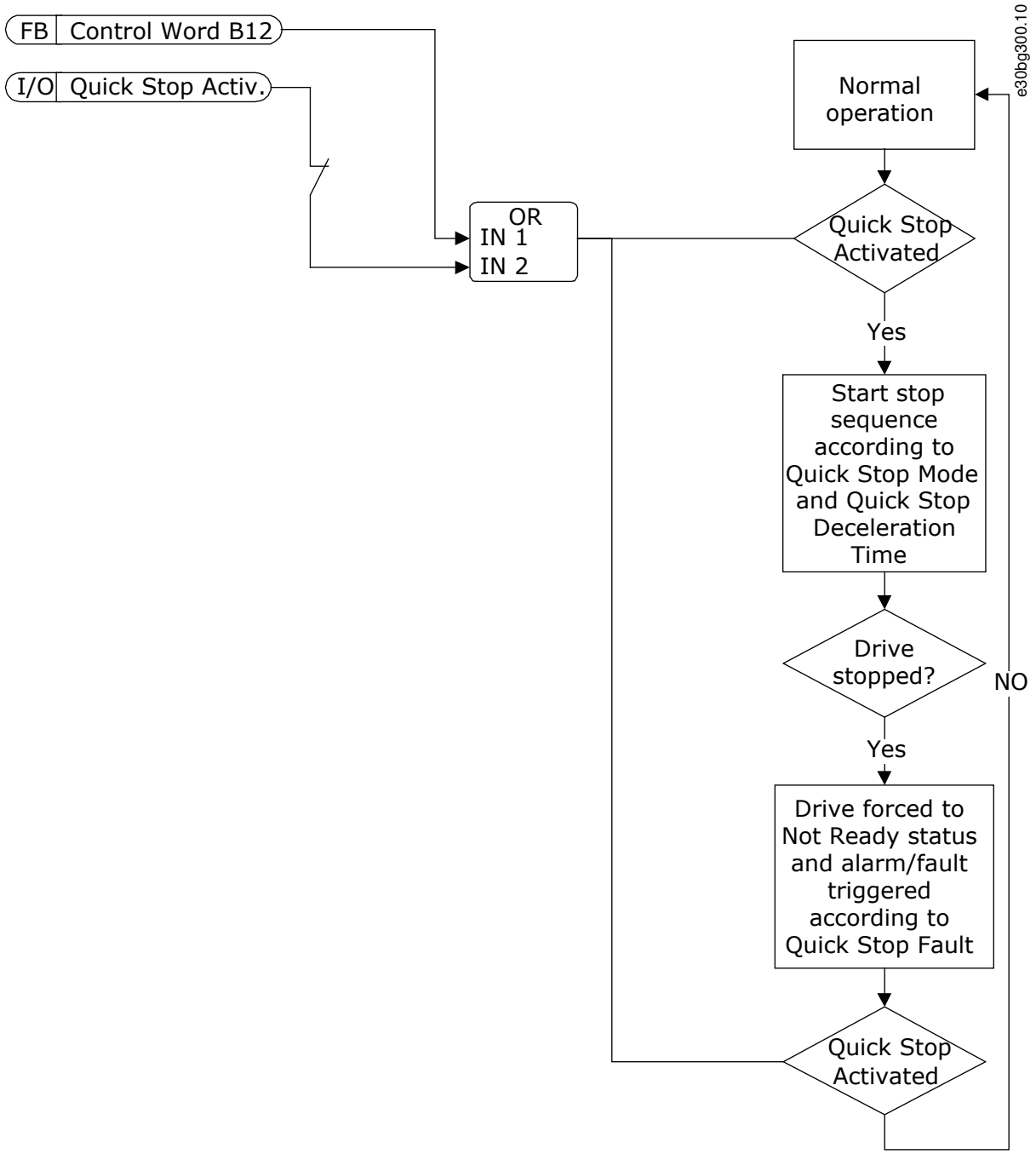


Illustration 43: The Quick Stop Logic

7.187 (ID 750) Response to Fieldbus Redundant Control Switchover

Location in the menu:

- INU application: **P3.9.1.13**
- AFE application: **P3.8.1.15**

Use this parameter to select the response of the AC drive to a "Fieldbus redundant control switchover" indication.

7.188 (ID 751) Fieldbus Communication Fault Force Delay

Location in the menu:

- INU application: **P3.9.1.14**
- AFE application: **P3.8.1.16**

Use this parameter to set a delay for temporarily forcing the fault response for a fieldbus communication fault from "No Action", "Alarm", or "Alarm + Preset Fault Frequency" to fault. When a timeout occurs, the drive responds as selected with parameter ID 733 (7.179 (ID 733) Response to Fieldbus Communication Fault) and keeps running. After the delay time set by this parameter, the drive goes to a fault state and stops running.

If this parameter is set to 0.00 s, the fault response stays as it is set with parameter ID 733 and the drive runs indefinitely. If the fault response is "Fault (Stop according to stop function)" or "Fault (Stop by coasting)", this delay has no effect.

7.189 (ID 752) Fieldbus Communication Fault Clear Delay

Location in the menu:

- INU application: **P3.9.1.15**
- AFE application: **P3.8.1.17**

Use this parameter to set a delay for accepting new fieldbus start commands, fieldbus reverse commands, and fieldbus refence commands after a fieldbus communication fault has been cleared. The delay does not start after clearing a fieldbus communication fault, but after the connection has been re-established.

7.190 (ID 759) Number of Trials

Location in the menu:

- INU application: **P3.10.5**
- AFE application: **P3.9.5**
- BCU application: **P3.7.5**

Use this parameter to set the total number of autoreset trials. If the number of trials during the trial time is more than the value of this parameter, a permanent fault shows. If not, the fault goes out of view after the trial time is completed. The fault type does not have an effect on the maximum number of trials.

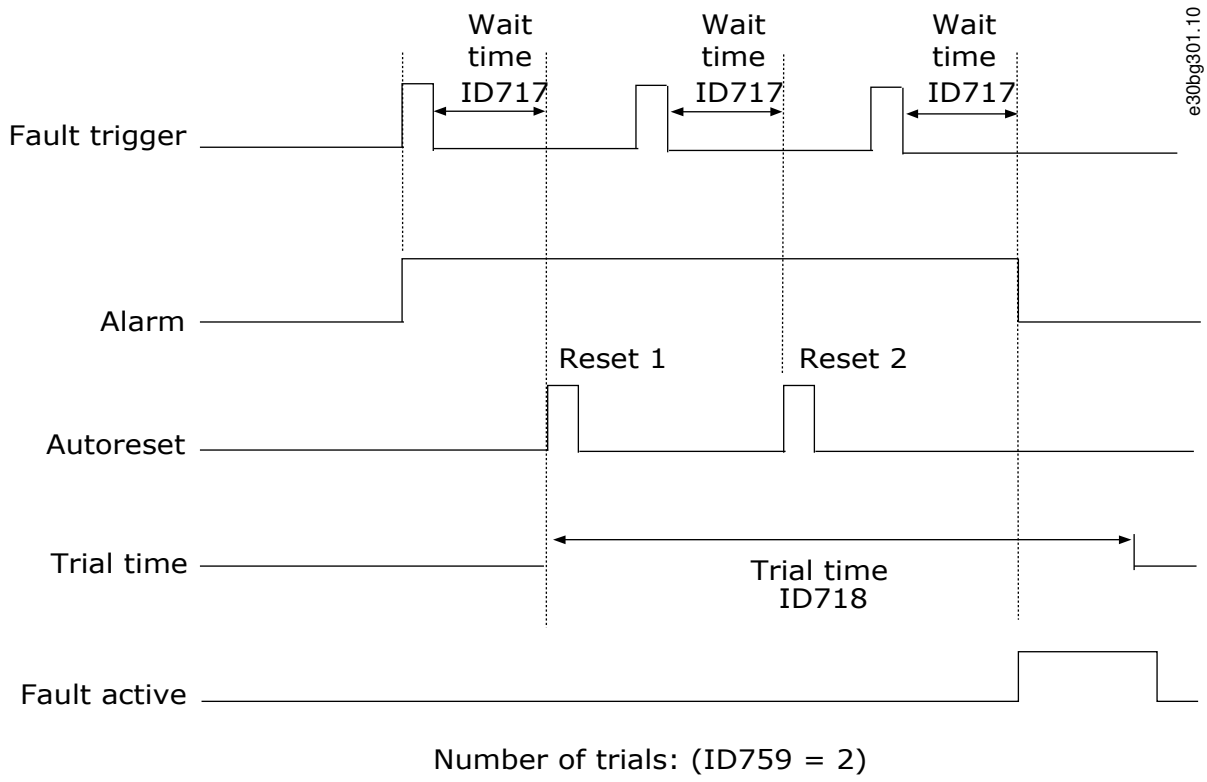


Illustration 44: The Automatic reset function

7.191 (ID 763) Temperature Signal 2

Location in the menu:

- INU application: **P3.9.7.1**
- AFE application: **P2.8.3.1**

Use this parameter to select the temperature input signals that are supervised.
The maximum value is taken from the set signals and used for alarm and fault triggering.

NOTICE

Only the 6 first temperature inputs are supported (the boards from slot A to slot E).

7.192 (ID 764) Alarm Limit 2

Location in the menu:

- INU application: **P3.9.7.2**
- AFE application: **P2.8.3.2**

Use this parameter to set the temperature alarm limit.
Only the inputs that are set with parameter ID 763 are compared.

7.193 (ID 765) Fault Limit 2

Location in the menu:

- INU application: **P3.9.7.3**
- AFE application: **P2.8.3.3**

Use this parameter to set the temperature fault limit.
Only the inputs that are set with parameter ID 763 are compared.

7.194 (ID 766) Fault Limit Response 2

Location in the menu:

- INU application: **P3.9.7.4**
- AFE application: **P2.8.3.4**

Use this parameter to select the response of the drive to 'Temperature' fault.

NOTICE

Temperature input settings are only available if an OPTB8 or OPTBH option board is installed.

7.195 (ID 767) Analog Input Low Protection

Location in the menu:

- INU application: **P3.9.8.1**
- AFE application: **P3.8.4.1**

Use this parameter to select when the AI Low supervision is enabled. For example, the AI Low supervision can be enabled only when the drive is in run state.
Use the AI Low Protection to find failures in the analog input signals. This function gives protection only to the analog inputs that are used as frequency reference, torque reference, or in the PID/ExtPID controllers.
You can have the protection on when the drive is in the RUN status, or in the RUN and STOP statuses.

Selection number	Selection name	Description
0	Protection disabled	
1	Protection enabled in RUN status	The protection is enabled only when the drive is in the RUN status.
2	Protection enabled in RUN and STOP status	The protection is enabled in the 2 statuses, RUN and STOP.

7.196 (ID 775) Response to Safe Torque Off (STO) Fault

Location in the menu:

- INU application: **P3.9.1.9**

Use this parameter to select the response of the drive to a 'STO Fault'.

This parameter defines drive operation when Safe Torque Off (STO) function is activated (for example, emergency stop button has been pressed or some other STO operation has been activated). See P3.9.1.2.

7.197 (ID 780) Overspeed Fault Response

Location in the menu:

- INU application: **P3.9.11.4**

Use this parameter to select the response of the drive to the *Over Speed Fault* (fault ID 1084).

7.198 (ID 852) FB DataOut 1 Selection

Location in the menu:

- INU application: **P3.6.1**
- AFE application: **P3.6.1**
- BCU application: **P3.5.1**

Use this parameter to select the data that is sent to the fieldbus with the ID number of the parameter or monitor value.

The data is scaled to an unsigned 16-bit format according to the format on the control panel. For example, value 25.5 on the display equals 255.

7.199 (ID 853) FB DataOut 2 Selection

Location in the menu:

- INU application: **P3.6.2**
- AFE application: **P3.6.2**
- BCU application: **P3.5.2**

Use this parameter to select the data that is sent to the fieldbus with the ID number of the parameter or monitor value.

The data is scaled to an unsigned 16-bit format according to the format on the control panel. For example, value 25.5 on the display equals 255.

7.200 (ID 854) FB DataOut 3 Selection

Location in the menu:

- INU application: **P3.6.3**
- AFE application: **P3.6.3**
- BCU application: **P3.5.3**

Use this parameter to select the data that is sent to the fieldbus with the ID number of the parameter or monitor value.

The data is scaled to an unsigned 16-bit format according to the format on the control panel. For example, value 25.5 on the display equals 255.

7.201 (ID 855) FB DataOut 4 Selection

Location in the menu:

- INU application: **P3.6.4**
- AFE application: **P3.6.4**
- BCU application: **P3.5.4**

Use this parameter to select the data that is sent to the fieldbus with the ID number of the parameter or monitor value.

The data is scaled to an unsigned 16-bit format according to the format on the control panel. For example, value 25.5 on the display equals 255.

7.202 (ID 856) FB DataOut 5 Selection

Location in the menu:

- INU application: **P3.6.5**
- AFE application: **P3.6.5**
- BCU application: **P3.5.5**

Use this parameter to select the data that is sent to the fieldbus with the ID number of the parameter or monitor value.

The data is scaled to an unsigned 16-bit format according to the format on the control panel. For example, value 25.5 on the display equals 255.

7.203 (ID 857) FB DataOut 6 Selection

Location in the menu:

- INU application: **P3.6.6**
- AFE application: **P3.6.6**
- BCU application: **P3.5.6**

Use this parameter to select the data that is sent to the fieldbus with the ID number of the parameter or monitor value.

The data is scaled to an unsigned 16-bit format according to the format on the control panel. For example, value 25.5 on the display equals 255.

7.204 (ID 858) FB DataOut 7 Selection

Location in the menu:

- INU application: **P3.6.7**
- AFE application: **P3.6.7**
- BCU application: **P3.5.7**

Use this parameter to select the data that is sent to the fieldbus with the ID number of the parameter or monitor value.

The data is scaled to an unsigned 16-bit format according to the format on the control panel. For example, value 25.5 on the display equals 255.

7.205 (ID 859) FB DataOut 8 Selection

Location in the menu:

- INU application: **P3.6.8**
- AFE application: **P3.6.8**
- BCU application: **P3.5.8**

Use this parameter to select the data that is sent to the fieldbus with the ID number of the parameter or monitor value.

The data is scaled to an unsigned 16-bit format according to the format on the control panel. For example, value 25.5 on the display equals 255.

7.206 (ID 889) Fieldbus Start Logic

Location in the menu:

- INU application: **P3.2.8**
- AFE application: **P3.4.6**
- BCU application: **P3.3.7**

Use this parameter to set the fieldbus start logic. The selections can include the word 'edge' to help you prevent an accidental start.

Selection number	Selection name	Description
0	A rising edge is necessary	
1	State	

7.207 (ID 890) FB DataOut 9 Selection

Location in the menu:

- INU application: **P3.6.9**
- AFE application: **P3.6.9**
- BCU application: **P3.5.9**

Use this parameter to select the fieldbus controlled data with the ID number of the parameter.

7.208 (ID 891) FB DataOut 10 Selection

Location in the menu:

- INU application: **P3.6.10**
- AFE application: **P3.6.10**
- BCU application: **P3.5.10**

Use this parameter to select the fieldbus controlled data with the ID number of the parameter.

7.209 (ID 892) FB DataOut 11 Selection

Location in the menu:

- INU application: **P3.6.11**
- AFE application: **P3.6.11**
- BCU application: **P3.5.11**

Use this parameter to select the fieldbus controlled data with the ID number of the parameter.

7.210 (ID 893) FB DataOut 12 Selection

Location in the menu:

- INU application: **P3.6.12**
- AFE application: **P3.6.12**
- BCU application: **P3.5.12**

Use this parameter to select the fieldbus controlled data with the ID number of the parameter.

7.211 (ID 894) FB DataOut 13 Selection

Location in the menu:

- INU application: **P3.6.13**
- AFE application: **P3.6.13**
- BCU application: **P3.5.13**

Use this parameter to select the fieldbus controlled data with the ID number of the parameter.

7.212 (ID 895) FB DataOut 14 Selection

Location in the menu:

- INU application: **P3.6.14**
- AFE application: **P3.6.14**
- BCU application: **P3.5.14**

Use this parameter to select the fieldbus controlled data with the ID number of the parameter.

7.213 (ID 896) FB DataOut 15 Selection

Location in the menu:

- INU application: **P3.6.15**
- AFE application: **P3.6.15**
- BCU application: **P3.5.15**

Use this parameter to select the fieldbus controlled data with the ID number of the parameter.

7.214 (ID 897) FB DataOut 16 Selection

Location in the menu:

- INU application: **P3.6.16**
- AFE application: **P3.6.16**
- BCU application: **P3.5.16**

Use this parameter to select the fieldbus controlled data with the ID number of the parameter.

7.215 (ID 1016) SP1 Sleep Frequency

Location in the menu:

- INU application: **P3.12.4.1**

Use this parameter to set the limit below which the output frequency of the drive must stay for a set time before the drive goes to the sleep state.

The value of this parameter is used when the signal of the PID controller setpoint is taken from the setpoint source 1.

Criteria for going to sleep mode

- Output frequency remains below sleep frequency for longer than defined sleep delay time.
- PID feedback signal remains above defined wake-up level.

Criteria for waking from sleep

- PID feedback signal falls below defined wake-up level.

N O T I C E

An incorrectly set wake-up level might not allow the drive to go into sleep mode.

7.216 (ID 1017) SP1 Sleep Delay

Location in the menu:

- INU application: **P3.12.4.2**

Use this parameter to set the minimum duration that the output frequency of the drive must stay below the set limit before the drive goes to the sleep state. The value of this parameter is used when the signal of the PID controller setpoint is taken from the setpoint source 1.

7.217 (ID 1018) SP1 Wake-Up Level

Location in the menu:

- INU application: **P3.12.4.3**

Use this parameter to set the level at which the drive wakes up from the sleep state. When the PID feedback value goes below the level that is set with this parameter, drive wakes up from the sleep state. The operation of this parameter is selected with wake-up mode parameter.

7.218 (ID 1033) Process Unit Minimum

Location in the menu:

- INU application: **P3.12.1.5**

Use this parameter to set the minimum value of the PID feedback signal. For example, an analog signal of 4...20 mA corresponds to the pressure of 0...10 bar. The value in process units at a 0% feedback or setpoint. This scaling is done for monitoring purposes only. The PID controller still uses the percentage internally for feedbacks and setpoints.

7.219 (ID 1034) Process Unit Maximum

Location in the menu:

- INU application: **P3.12.1.6**

Use this parameter to set the maximum value of the PID feedback signal. For example, an analog signal of 4...20 mA corresponds to the pressure of 0...10 bar. The value in process units at a 0% feedback or setpoint. This scaling is done for monitoring purposes only. The PID controller still uses the percentage internally for feedbacks and setpoints.

7.220 (ID 1035) Process Unit Decimals

Location in the menu:

- INU application: **P3.12.1.7**

Use this parameter to set the number of decimals for the process unit values. For example, an analog signal of 4...20 mA corresponds to the pressure of 0...10 bar. The value in process units at a 0% feedback or setpoint. This scaling is done for monitoring purposes only. The PID controller still uses the percentage internally for feedbacks and setpoints.

7.221 (ID 1036) Process Unit Selection

Location in the menu:

- INU application: **P3.12.1.4**

Use this parameter to select the unit for the feedback and the setpoint signals of the PID controller. Select the unit for the actual value.

7.222 (ID 1041) Run Interlock 1

Location in the menu:

- INU application: **P3.5.1.16**
- AFE application: **P3.5.1.11**
- BCU application: **P3.4.1.8**

Use this parameter to select the digital input signal that prevents to start the drive. The drive can be ready but start is not possible when the state of the interlock signal is 'open' (damper interlock).

7.223 (ID 1042) Run Interlock 2

Location in the menu:

- INU application: **P3.5.1.17**
- AFE application: **P3.5.1.12**
- BCU application: **P3.4.1.9**

Use this parameter to select the digital input signal that prevents to start the drive. The drive can be ready but start is not possible when the state of the interlock signal is 'open' (damper interlock).

If an interlock is active, the drive cannot start.

You can use this function to prevent the start of the drive when the damper is closed. If you activate an interlock during the operation of the drive, the drive stops.

7.224 (ID 1044) Motor Preheat ON

Location in the menu:

- INU application: **P3.13.4**

Use this parameter to select the digital input signal that activates Motor Preheat function. This parameter is used when P3.13.1 is set to 2. When the value for P3.13.1 is 2, you can also connect time channels to this parameter.

7.225 (ID 1045) Preheat Motor Temperature

Location in the menu:

- INU application: **P3.13.5**

Use this parameter to select the temperature signal that is used to measure the motor temperature for motor preheat function.

N O T I C E

This parameter is not available if there is no option board for temperature measurement.

7.226 (ID 1047) PID Setpoint Selection

Location in the menu:

- INU application: **P3.5.1.26** and **P3.12.2.4**

Use this parameter to set the digital input signal that selects the PID setpoint value to be used.

7.227 (ID 1056) Dead Band

Location in the menu:

- INU application: **P3.12.1.9**

Use this parameter to set the dead band area around the PID setpoint value. The value of this parameter is given in the selected process unit. The output of the PID controller is locked if the feedback value stays in the dead band area for the set time.

7.228 (ID 1057) Dead Band Delay

Location in the menu:

- INU application: **P3.12.1.10**

Use this parameter to set the time that the feedback value must stay in the dead band area before the output of the PID controller is locked. If the actual value stays in the dead band area for a time set in Dead Band Delay, the PID controller output is locked. This function prevents wear and unwanted movements of the actuators, for example valves.

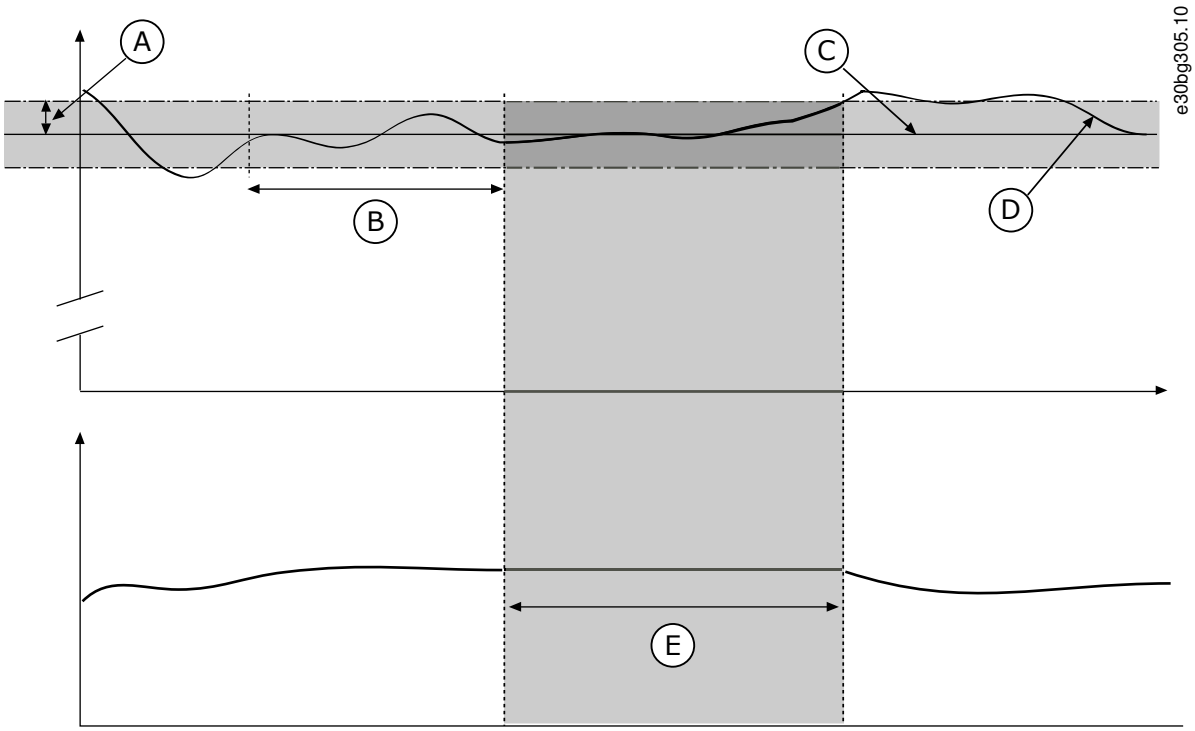


Illustration 45: The Dead band function

A	Dead band (ID1056)	D	Actual value
B	Dead band delay (ID1057)	E	Output locked
C	Reference		

7.229 (ID 1058) Feedback Function Gain

Location in the menu:

- INU application: **P3.12.3.1**

Use this parameter to adjust the gain of the feedback signal. This parameter is used, for example, with the value 2 in Feedback Function.

7.230 (ID 1068) Setpoint Ramp Time

Location in the menu:

- INU application: **P3.12.2.3**

Use this parameter to set the rising and falling ramp times for the setpoint changes. Ramp time is the time that is necessary for the setpoint value to change from minimum to maximum. If the value of this parameter is set to 0, no ramps are used.

7.231 (ID 1069) Setpoint 1 Minimum

Location in the menu:

- INU application: **P3.12.2.6**

Use this parameter to set the minimum value of the setpoint signal.

7.232 (ID 1070) Setpoint 1 Maximum

Location in the menu:

- INU application: **P3.12.2.7**

Use this parameter to set the maximum value of the setpoint signal.

7.233 (ID 1073) Setpoint 2 Minimum

Location in the menu:

- INU application: **P3.12.2.9**

Use this parameter to set the minimum value of the setpoint signal.

7.234 (ID 1074) Setpoint 2 Maximum

Location in the menu:

- INU application: **P3.12.2.10**

Use this parameter to set the maximum value of the setpoint signal.

7.235 (ID 1075) SP2 Sleep Frequency

Location in the menu:

- INU application: **P3.12.4.4**

Use this parameter to set the limit below which the output frequency of the drive must stay for a set time before the drive goes to the sleep state.

The value of this parameter is used when the signal of the PID controller setpoint is taken from the setpoint source 1.

Criteria for going to sleep mode

- Output frequency remains below sleep frequency for longer than defined sleep delay time.
- PID feedback signal remains above defined wake-up level.

Criteria for waking from sleep

- PID feedback signal falls below defined wake-up level.

N O T I C E

An incorrectly set wake-up level might not allow the drive to go into sleep mode.

7.236 (ID 1076) SP2 Sleep Delay

Location in the menu:

- INU application: **P3.12.4.5**

Use this parameter to set the minimum duration that the output frequency of the drive must stay below the set limit before the drive goes to the sleep state. The value of this parameter is used when the signal of the PID controller setpoint is taken from the setpoint source 1.

7.237 (ID 1077) SP2 Wake-Up Level

Location in the menu:

- INU application: **P3.12.4.6**

Use this parameter to set the level at which the drive wakes up from the sleep state. When the PID feedback value goes below the level that is set with this parameter, drive wakes up from the sleep state. The operation of this parameter is selected with wake-up mode parameter.

7.238 (ID 1085) Brake Current Limit

Location in the menu:

- INU application: **P3.14.5**

Use this parameter to set the brake current limit. The Mechanical brake closes immediately if the motor current is below the limit set in parameter Brake Current Limit.

We recommend setting the value to approximately half of the magnetization current.

When the drive operates on the field weakening area, the brake current limit decreases automatically as a function of output frequency.

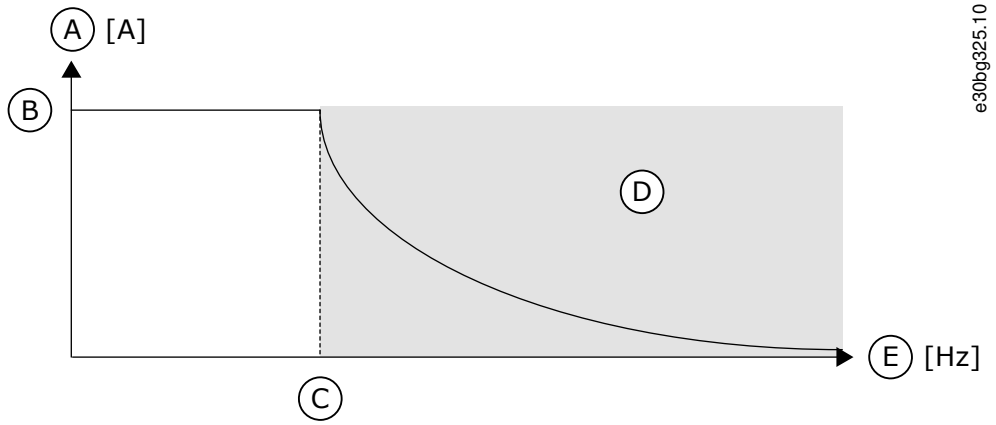


Illustration 46: Internal reduction of the brake current limit

A	Current	D	Field weakening area
B	Brake current limit (*ID 1085*)	E	Output frequency
C	Field weakening point (*ID 602*)		

7.239 (ID 1104) Counter 1 Mode

Location in the menu

- AFE application: **P3.11.1**

Use this parameter to enable the maintenance counter. A maintenance counter tells you that the maintenance must be done when the counter value goes above the set limit.

A maintenance counter tells you that maintenance must be done. For example, it is necessary to replace a belt or to replace the oil in a gearbox. There are 2 different modes for the maintenance counters, hours or revolutions*1000. The value of the counters increases only during the RUN status of the drive.

⚠ C A U T I O N ⚠

MAINTENANCE HAZARD

Only an approved electrician can do maintenance. There is a risk of injury.

– Do not do maintenance if you are not approved to do it.

N O T I C E

The revolutions mode uses motor speed, which is only an estimate. The drive measures the speed every second.

When the value of a counter is more than its limit, an alarm or a fault shows. You can connect the alarm and fault signals to a digital output or a relay output.

When the maintenance is completed, reset the counter with a digital input or parameter Counter 1 Reset (ID 1107).

7.240 (ID 1105) Counter 1 Alarm Limit

Location in the menu: **P3.11.2**

Use this parameter to set the alarm limit for the maintenance counter. When the value of the counter goes above this limit, a maintenance alarm occurs.

7.241 (ID 1106) Counter 1 Fault Limit

Location in the menu: **P3.11.3**

Use this parameter to set the fault limit for the maintenance counter. When the value of the counter goes above this limit, a maintenance fault occurs.

7.242 (ID 1107) Counter 1 Reset

Location in the menu: **P3.11.4**

Use this parameter to reset the maintenance counter.

7.243 (ID 1195) FUNCT Button Configuration

Location in the menu:

- INU application: **P3.11.5**
- AFE application: **P3.10.5**
- BCU application: **P3.8.5**

Use this parameter to set the values of the FUNCT button. The values that you set with this parameter will be available when you push the FUNCT button on the keypad.

7.244 (ID 1196) Multimonitor View

Location in the menu:

- INU application: **P3.11.4**
- AFE application: **P3.10.4**

Use this parameter to set the division of the display of the control panel into sections in the multimonitor view.

7.245 (ID 1197) C/F Selection

Location in the menu:

- INU application: **P3.11.2**
- AFE application: **P3.10.2**
- BCU application: **P3.8.2**

Use this parameter to set the temperature measuring unit. The system shows all the temperature-related parameters and monitoring values in the set unit.

7.246 (ID 1198) KW/HP Selection

Location in the menu:

- INU application: **P3.11.3**
- AFE application: **P3.10.3**
- BCU application: **P3.8.3**

Use this parameter to set the power measuring unit. The system shows all the power-related parameters and monitoring values in the set unit.

7.247 (ID 1201) Set Supply Voltage

Location in the menu: **P3.1.3.12**

Use this parameter to set the supply voltage value.

7.248 (ID 1210) Mechanical Brake Feedback

- Location in the menu: **P3.5.1.30** (In I/O Configuration menu)
- Location in the menu: **P3.14.8** (In Mechanical Brake menu)

Use this parameter to set the brake status feedback signal from mechanical brake. The Brake feedback signal is used if the value for parameter P3.14.1 is Enabled with brake status supervision.

Connect this digital input signal to an auxiliary contact of the mechanical brake.

- The contact is open = the mechanical brake is closed.
- The contact is closed = the mechanical brake is open.

If the brake opening command is given, but the contact of the brake feedback signal does not close in given time, a mechanical brake fault shows (fault code 58).

7.249 (ID 1213) Quick Stop Activation

Location in the menu: **P3.5.1.25** and **P3.9.5.2**

Use this parameter to select the digital input signal that activates a Quick Stop function. The Quick Stop function stops the drive regardless of the control place or the state of the control signals.

7.250 (ID 1225) Motor Preheat Function

Location in the menu: **P3.13.1**

Use this parameter to enable or disable the Motor Preheat function. The motor preheat function keeps the drive and the motor warm during the STOP status. In the motor preheat, the system gives the motor a DC current. The motor preheat prevents, for example, condensation.

Selection number	Selection name	Description
0	Not used	The motor preheat function is disabled.
1	Always in Stop state	The motor preheat function is activated always when the drive is in the Stop state.
2	Controlled by digital input	The motor preheat function is activated by a digital input signal, when the drive is in the Stop state.
3	Temperature limit (heat sink)	The motor preheat function is activated if the drive is in the Stop state, and the temperature of the heat sink of the drive goes below the temperature limit that was set with parameter P3.13.2.
4	Temperature limit (measured motor temperature)	The motor preheat function is activated if the drive is in the Stop state, and the measured motor temperature goes below the temperature limit that was set with parameter P3.13.2. You can set the measurement signal of the motor temperature with parameter P3.13.5. **NOTICE** To use this operation mode, you must have an option board for temperature measurement (for example OPTBH).

7.251 (ID 1226) Preheat Temperature Limit

Location in the menu: **P3.13.2**

Use this parameter to set the temperature limit of the Motor Preheat function. The motor preheat becomes active when the heat sink temperature or the measured motor temperature goes below this level, and when P3.13.1 is set to 3 or 4.

7.252 (ID 1227) Motor Preheat Current

Location in the menu: **P3.13.3**

Use this parameter to set the DC current of the Motor Preheat function. The DC current for the pre-heating of the motor and the drive in stop state. Activated as in P3.13.1.

7.253 (ID 1239) Jogging reference 1

Location in the menu: **P3.3.6.4**

Use this parameter to set the frequency references for the jogging function. With the parameters P3.3.6.4 and P3.3.6.5, it is possible set the frequency references for the jogging function. The references are bi-directional. A reverse command does not affect the direction of the jogging references. The reference for the forward direction has a positive value, and the reference for the reverse direction has a negative value. The jogging function can be activated with digital input signals or from Fieldbus in bypass mode with Control Word bits 10 and 11.

7.254 (ID 1240) Jogging reference 2

Location in the menu: **P3.3.6.5**

Use this parameter to set the frequency references for the jogging function. With the parameters P3.3.6.4 and P3.3.6.5, it is possible to set the frequency references for the jogging function. The references are bi-directional. A reverse command does not affect the direction of the jogging references. The reference for the forward direction has a positive value, and the reference for the reverse direction has a negative value. The jogging function can be activated with digital input signals or from Fieldbus in bypass mode with Control Word bits 10 and 11.

7.255 (ID 1244) Torque Reference Filter Time

Location in the menu: **P3.3.2.4**

Use this parameter to set the filtering time for the final torque reference.

7.256 (ID 1250) Flux Reference

Location in the menu: **P3.1.5.11**

Use this parameter to adjust the flux reference. The value 100% means a nominal flux.

7.257 (ID 1256) Quick Stop Deceleration Time

Location in the menu: **P3.9.5.3**

Use this parameter to set the time that is necessary for the output frequency to decrease from maximum frequency to 0 when a quick stop command is given. The value of this parameter is applied only when the quick stop mode parameter is set to 'Quick Stop Deceleration time'.

7.258 (ID 1257) Jogging Ramp

Location in the menu: **P3.3.6.6**

Use this parameter to set the ramp time when jogging is active. This parameter gives the acceleration and deceleration times when the Jogging function is active.

7.259 (ID 1276) Quick Stop Mode

Location in the menu: **P3.9.5.1**

Use this parameter to select how the drive stops when the quick stop command is given from DI or Fieldbus.

7.260 (ID 1285) Positive Frequency Reference Limit

Location in the menu: **P3.3.1.3**

Use this parameter to set the final frequency reference limit for the positive direction.

7.261 (ID 1286) Negative Frequency Reference Limit

Location in the menu: **P3.3.1.4**

Use this parameter to set the final frequency reference limit for the negative direction. Use this parameter for example to prevent the motor from running in the reverse direction.

7.262 (ID 1287) Motor Torque Limit

Location in the menu: **P3.1.3.2**

Use this parameter to set the maximum torque limit of the motoring side.

7.263 (ID 1288) Generator Torque Limit

Location in the menu: **P3.1.3.3**

Use this parameter to set the maximum torque limit of the generating side.

7.264 (ID 1289) Motor Power Limit

Location in the menu: **P3.1.3.4**

Use this parameter to set the maximum power limit of the motoring side.

7.265 (ID 1290) Generator Power Limit

Location in the menu: **P3.1.3.5**

Use this parameter to set the maximum power limit of the generating side.

7.266 (ID 1316) Response to Brake Fault

Location in the menu: **P3.14.7**

Use this parameter to set the response type to a brake fault.

7.267 (ID 1412) Torque Stabilator Gain

Location in the menu: **P3.1.4.13.1**

Use this parameter to set the gain of the torque stabilator in an open loop control operation.

7.268 (ID 1413) Torque Stabilator Damping Time Constant

Location in the menu: **P3.1.4.13.3**

Use this parameter to set the damping time constant of the torque stabilizer.

7.269 (ID 1414) Torque Stabilator Gain at Field Weakening Point

Location in the menu: **P3.1.4.13.2**

Use this parameter to set the gain of the torque stabilator at field weakening point in an open loop control operation. The torque stabilizer stabilizes the possible oscillations in the estimated torque.

Two gains are used. TorqStabGainFWP is a constant gain at all the output frequencies. TorqStabGain changes linearly between the zero frequency and the field weakening point frequency. The full gain is at 0 Hz and the gain is zero at the field weakening point. The figure shows the gains as a function of output frequency.

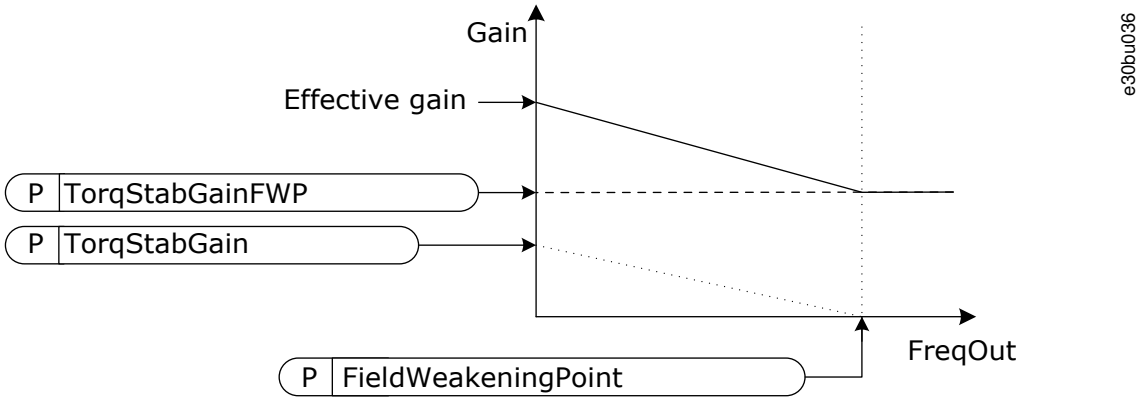


Illustration 47: The Torque Stabilator Gain

7.270 (ID 1424) Restart Delay

Location in the menu: **P3.2.11**

Use this parameter to set the time delay during which the drive cannot be restarted after coast stop (flying start not in use).

7.271 (ID 1431) Supervision #1 Item Selection

Location in the menu:

- INU application: **P3.8.1**
- AFE application: **P3.7.1**

Use this parameter to select the supervision item. The output of the supervision function can be selected to the relay output.

7.272 (ID 1432) Supervision #1 Mode

Location in the menu:

- INU application: **P3.8.2**
- AFE application: **P3.7.2**

Use this parameter to set the supervision mode.

When the 'Low limit' mode is selected, the output of the supervision function is active when the signal is below the supervision limit.

When the'High limit' mode is selected, the output of the supervision function is active when the signal is above the supervision limit.

7.273 (ID 1433) Supervision #1 Limit

Location in the menu:

- INU application: **P3.8.3**
- AFE application: **P3.7.3**

Use this parameter to set the supervision limit for the selected item. The unit shows automatically.

7.274 (ID 1434) Supervision #1 Limit Hysteresis

Location in the menu:

- INU application: **P3.8.4**
- AFE application: **P3.7.4**

Use this parameter to set the supervision limit hysteresis for the selected item. The unit shows automatically.

7.275 (ID 1435) Supervision #2 Item Selection

Location in the menu:

- INU application: **P3.8.5**
- AFE application: **P3.7.5**

Use this parameter to select the supervision item. The output of the supervision function can be selected to the relay output.

7.276 (ID 1436) Supervision #2 Mode

Location in the menu:

- INU application: **P3.8.6**
- AFE application: **P3.7.6**

Use this parameter to set the supervision mode.

7.277 (ID 1437) Supervision #2 Limit

Location in the menu:

- INU application: **P3.8.7**
- AFE application: **P3.7.7**

Use this parameter to set the supervision limit for the selected item. The unit shows automatically.

7.278 (ID 1438) Supervision #2 Limit Hysteresis

Location in the menu:

- INU application: **P3.8.8**
- AFE application: **P3.7.8**

Use this parameter to set the supervision limit hysteresis for the selected item. The unit shows automatically.

7.279 (ID 1439) Keypad Torque Reference

Location in the menu: **P3.3.2.6**

Use this parameter to set the keypad torque reference. This parameter is used when P3.3.2.1. is set to 1. The value of this parameter is limited between P3.3.2.3. and P3.3.2.2.

7.280 (ID 1515) Overmodulation

Location in the menu:

- AFE application: **P3.2.7.2**

Use this parameter to disable the overmodulation of the AC drive. Overmodulation maximizes the output voltage of the drive, but increases the motor current harmonics.

7.281 (ID 1534) Load Drooping Mode

Location in the menu: **P3.1.2.4.5**

Use this parameter to set the load drooping mode.

Selection number	Selection name	Description
0	Normal	The load drooping factor is constant through the frequency range.
1	Linear removal	The load drooping is removed linearly from the nominal frequency to zero frequency.

7.282 (ID 1535) Brake Opening Frequency Limit

Location in the menu: **P3.14.3**

Use this parameter to set the frequency limit for opening the mechanical brake. The value of the parameter P3.14.3 is the output frequency limit of the drive to open the mechanical brake. In open loop control, we recommend that you use a value that is equal to the nominal slip of the motor.

The output frequency of the drive stays at this level until the brake mechanical delay is expired, and the system receives the correct brake feedback signal.

7.283 (ID 1539) Brake Closing Frequency Limit

Location in the menu: **P3.14.4**

Use this parameter to set the frequency limit for closing the mechanical brake. The value of the parameter P3.14.4 is the output frequency limit of the drive to close the mechanical brake. The drive stops and the output frequency goes near 0. You can use the parameter for the 2 directions, positive and negative.

7.284 (ID 1541) Brake Control

Location in the menu: **P3.14.1**

Use this parameter to set the operation mode of the mechanical brake.

Mechanical brake status can be supervised via digital input when mode 2 is selected. Monitor the mechanical brake with the monitoring value Application Status Word 1 in the monitoring group Extras and advanced.

The Mechanical brake control function controls an external mechanical brake with a digital output signal. The mechanical brake is opened/closed when the drive output frequency breaks the opening/closing limits.

Selection number	Selection name	Description
0	Disabled	The mechanical brake control is not used.
1	Enabled	The mechanical brake control is used, but there is no supervision of the brake status.
2	Enabled with brake status supervision	The mechanical brake control is used, and a digital input signal monitors the brake status (P3.14.8).

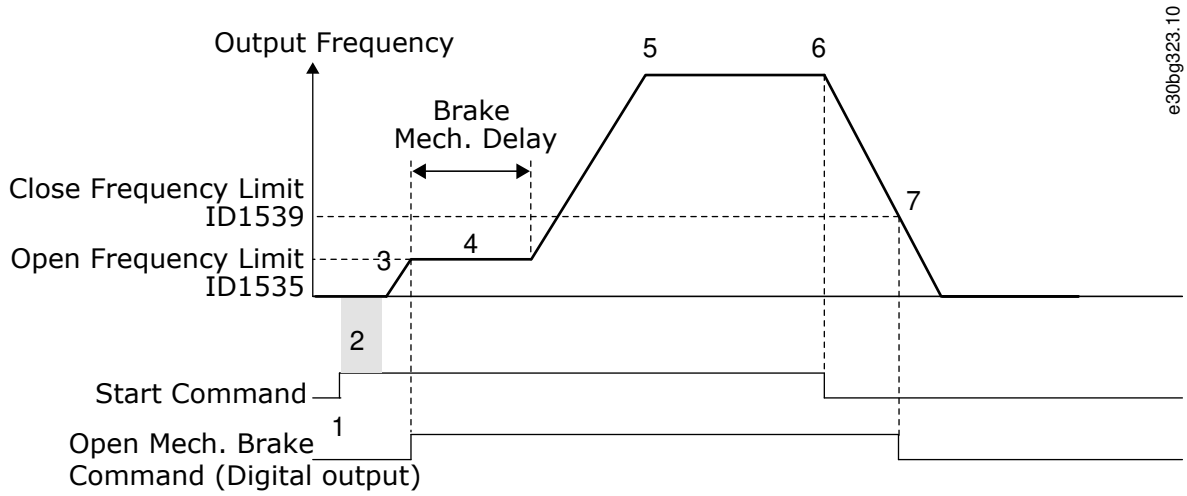


Illustration 48: The Mechanical brake function

1. A Start command is given.	5. The output frequency of the drive follows the normal frequency reference.
2. We recommend that you use start magnetization to build rotor flux fast and to decrease the time when the motor can produce nominal torque.	6. A Stop command is given.
3. When the start magnetization time is over, the system lets the frequency reference go to the open frequency limit.	7. The mechanical brake becomes closed when the output frequency goes below the close frequency limit.
4. The mechanical brake opens. The frequency reference stays at the open frequency limit until the brake mechanical delay is over, and the correct brake feedback signal is received.	

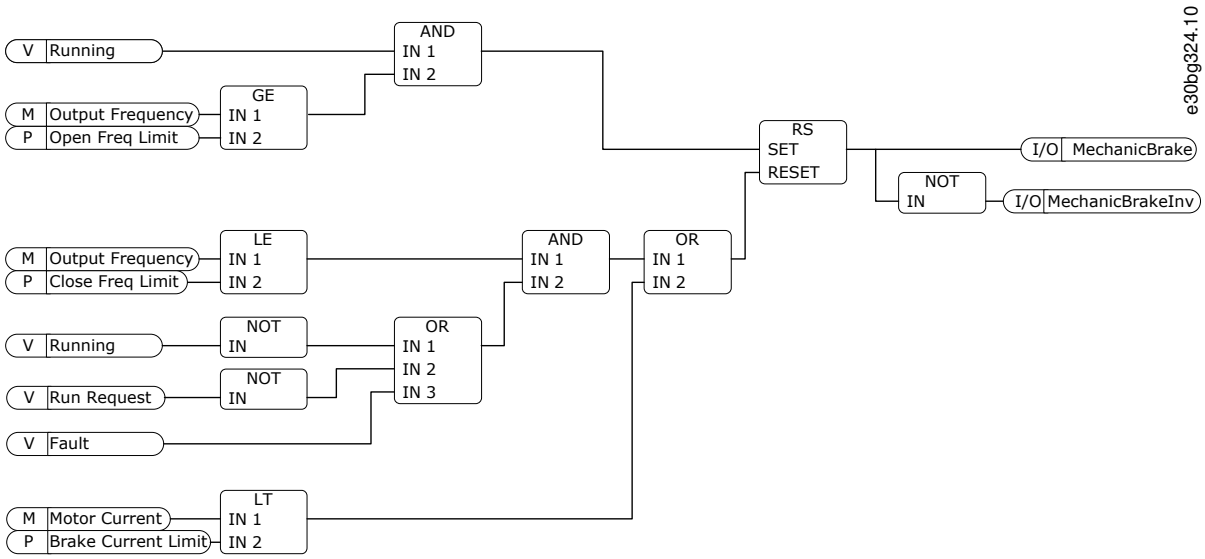


Illustration 49: The mechanical brake opening logic

7.285 (ID 1544) Brake Mechanical Delay

Location in the menu: **P3.14.2**

Use this parameter to set the mechanical delay that is necessary to open the brake. After the brake opening command is given, the speed stays at the value of the parameter P3.14.3 (Brake Opening Frequency Limit) until the brake mechanical delay is expired. Set the delay time to agree with the reaction time of the mechanical brake.

The Brake mechanical delay function is used to prevent current and/or torque spikes. This prevents the motor from operating at full speed against the brake. If you use P3.14.2 at the same time with P3.14.8, it is necessary to have the expired delay and the feedback signal to release the speed reference.

7.286 (ID 1550) Flux Trace Stabilator Damping Time Constant

Location in the menu: **P3.1.4.13.9**

Use this parameter to set the damping time constant of the flux trace stabilizer.

7.287 (ID 1551) Flux Stabilator Damping Time Constant

Location in the menu: **P3.1.4.13.5**

Use this parameter to set the damping time constant of the flux stabilizer.

7.288 (ID 1552) Voltage Stabilator Damping Time Constant

Location in the menu: **P3.1.4.13.7**

Use this parameter to set the damping time constant of the voltage stabilizer.

7.289 (ID 1568) Torque Control Speed Limiter Mode

Location in the menu: **P3.3.2.6**

Use this parameter to set the speed limiter operating mode for the torque control.

7.290 (ID 1590) Flying Start Options

Location in the menu: **P3.1.4.7**

Use this parameter to set the flying start options. The parameter Flying Start Options has a checkbox selection of values.

The bits can receive these values.

- Search the shaft frequency only from the same direction as the frequency reference
- Disable the AC scanning
- Use the frequency reference for an initial guess
- Disable the DC pulses
- Flux build with current control

The bit B0 controls the search direction. With the bit set to 0, the shaft frequency is searched in 2 directions, the positive and the negative. With the bit set to 1, the shaft frequency is searched only in the frequency reference direction. It prevents the shaft movements for the other direction.

The bit B1 controls the AC scanning that premagnetizes the motor. In the AC scanning, the system sweeps the frequency from the maximum towards zero frequency. The AC scanning stops when an adaptation to the shaft frequency occurs. To disable the AC scanning, set the bit B1 to 1. If the value of Motor Type is permanent magnet motor, the AC scanning is disabled automatically.

Use the bit B5 to disable the DC pulses. The primary function of the DC pulses is to premagnetize the motor and examine the rotation of the motor. If the DC pulses and the AC scanning are enabled, the slip frequency tells which procedure is applied. If the slip frequency is less than 2 Hz, or the motor type is PM motor, the DC pulses are disabled automatically.

The bit B7 controls the rotation direction of the injected high frequency signal, which is used in the flying start of synchronous reluctance machines. Signal injection is used to detect the frequency of the rotor. If the rotor is in a blind angle when the signal is injected, the rotor frequency is undetectable. Reversing the rotation direction of the injection signal solves this problem.

7.291 (ID 1610) Flying Start Scan Current

Location in the menu: **P3.1.4.8**

Use this parameter to set the flying start scan current as a percentage of the motor nominal current.

7.292 (ID 1724) Sensorless Control

Location in the menu: **P3.1.5.1**

Use this parameter to enable the sensorless control function.

Use the advanced sensorless control function in applications where good speed accuracy or high performance at low speed is necessary, but encoder speed feedback is not used. With the advanced sensorless control, a simple closed loop motor control can be replaced with a high-performance open loop motor control. An example of a possible application is an extruder.

The advanced sensorless control function is not supported when a sine-wave filter or a harmonic filter is used.

This control mode is sensitive about accurate motor parameterization and requires expert knowledge in the commissioning. We strongly recommend NOT to enable this mode for regular open loop motor control applications or when expert knowledge is not available.

The advanced sensorless control has a similar control structure to the closed loop control but with Voltage Vector Control. The selection between frequency, speed, and torque control is still done with P3.1.2.1 *Control Mode*.

When commissioning the sensorless control function, always do these steps:

- Do identification with rotation (P3.1.2.8.1 = 2).
- Set reasonable minimum frequencies (P3.3.1.1-3.3.1.4).
- Use motor stall protection (P3.9.3.1-3.9.3.4).

With an induction motor, always use start magnetization to build up rotor flux.

The identification with rotation is necessary because the advanced sensorless control is sensitive about accurate motor parameterization. We recommend using minimum frequencies because continuous operation at or near zero frequency can cause instability of control and should be prevented. The motor stall protection function protects the motor if there is instability at low frequency that can cause continuous high current that increases the motor temperature.

In the speed control mode with an induction motor, especially the generator side must be considered because the flux frequency is smaller than the shaft frequency because of the slip frequency.

N O T I C E

The characteristics of the application affect the optimal settings of the control mode parameters.

7.293 (ID 1725) Sensorless Control Mode

Location in the menu: **P3.1.5.2**

Use this parameter to set the sensorless control mode.

7.294 (ID 1726) Sensorless Control Options

Location in the menu: **P3.1.5.3**

Use this parameter to set the options of the advanced sensorless control. The parameter has a checkbox selection of values.

7.295 (ID 1727) Flux Model Coefficient 1

Location in the menu: **P3.1.5.4**

Use this parameter to set a value for the flux model coefficient 1.

7.296 (ID 1728) Flux Model Coefficient 2

Location in the menu: **P3.1.5.5**

Use this parameter to set a value for the flux model coefficient 2.

7.297 (ID 1729) Flux Model Coefficient 3

Location in the menu: **P3.1.5.6**

Use this parameter to set a value for the flux model coefficient 3.

7.298 (ID 1730) Voltage Drop IGBT

Location in the menu: **P3.1.5.7**

Use this parameter to set a value for the IGBT voltage drop in Volts.

7.299 (ID 1731) Sensorless Torque Control P Gain

Location in the menu: **P3.3.2.15.1**

Use this parameter to set the P gain for the torque controller in the sensorless control mode. The P Gain value 1.0 causes a 1 Hz change in the output frequency when the torque error is 1% of the motor nominal torque.

This parameter is always active in sensorless torque control.

7.300 (ID 1732) Sensorless Torque Control I Gain

Location in the menu: **P3.3.2.15.2**

Use this parameter to set the I gain for the torque controller in the sensorless control mode. The I Gain value 1.0 causes the integration to reach 1.0 Hz in 1 second when the torque error is 1% of the motor nominal torque.

This parameter is always active in sensorless torque control.

7.301 (ID 1736) Flux Trace Stabilator Gain

Location in the menu: **P3.1.4.13.8**

Use this parameter to set the gain of the flux trace stabilizer.

7.302 (ID 1737) Offset Voltage Alpha

Location in the menu: **P3.1.5.8**

Use this parameter to set a value for the offset voltage alpha in percent.

7.303 (ID 1738) Voltage Stabilator Gain

Location in the menu: **P3.1.4.13.6**

Use this parameter to set the gain of the voltage stabilizer.

7.304 (ID 1739) Offset Voltage Beta

Location in the menu: **P3.1.5.9**

Use this parameter to set a value for the offset voltage beta in percent.

7.305 (ID 1797) Flux Stabilator Gain

Location in the menu: **P3.1.4.13.4**

Use this parameter to set the gain of the flux stabilizer for induction motors.

7.306 (ID 1806) Password

Location in the menu:

- INU application: **P3.11.1**
- AFE application: **P3.10.1**
- BCU application: **P3.8.1**

Use this parameter to set the administrator password.

7.307 (ID 1807) Fieldbus Watchdog Fault Mode

Location in the menu:

- INU application: **P3.9.1.10**
- AFE application: **P3.8.1.19**
- BCU application: **P3.6.1.8**

Use this parameter to select the response of the drive to a 'Fieldbus Watchdog Fault'.

If *Warning + Ramp up* is used, the ramp speed can be set in the parameter.

7.308 (ID 1808) Fieldbus Watchdog Delay

Location in the menu:

- INU application: **P3.9.1.11**
- AFE application: **P3.8.1.18**
- BCU application: **P3.6.1.9**

Use this parameter to set the delay for the response of the drive to a 'Fieldbus Watchdog Fault'.

The parameter defines the time how long the watchdog life bit has to be stopped before any action is made. If the parameter is set to 0, the watchdog is disabled.

7.309 (ID 3001) Encoder Repeat Channel

Location in the menu: **P3.15.2**

Use this parameter to select which encoder channel to repeat:

- 0 = Repeat channel A
- 1 = Repeat channel B

7.310 (ID 3003) Encoder Advanced Control Word

Location in the menu: **P3.15.3**

Use this parameter to set the encoder advanced control word for encoder channel A.

7.311 (ID 3010) Input Control

Location in the menu: **P3.15.4.1**

Use this parameter to set the encoder input control word. Select single-ended or active low signaling from input A, B, Z, or M.

7.312 (ID 3011) Input AB Swap

Location in the menu: **P3.15.4.2**

Use this parameter to interchange input A and B for the encoder and thus change the nominal encoder direction.

7.313 (ID 3016) Resolution Prescale

Location in the menu: **P3.15.4.7**

Use this parameter to prescale the internal resolution. The function divides the encoder internal resolution by an integral value.

7.314 (ID 3012) Encoder Debounce Time

Location in the menu: **P3.15.4.3**

Use this parameter to set the debounce time (noise/error filter) applied to the encoder inputs A, B, and Z.

7.315 (ID 3017) Hysteresis Filter Prescale

Location in the menu: **P3.15.4.8**

Use this parameter to set the hysteresis prescale function. The function uses a subset of an internal position counter to determine a direction change and to supply a pulse/heartbeat signal.

7.316 (ID 3013) Marker Debounce Time

Location in the menu: **P3.15.4.4**

Use this parameter to set the debounce time (noise/error filter) applied to the encoder marker input M.

7.317 (ID 3018) Encoder Resolution

Location in the menu: **P3.15.4.9**

Use this parameter to set the native resolution or line count of the encoder.

7.318 (ID 3014) Marker Event Mode

Location in the menu: **P3.15.4.5**

Use this parameter to set the marker event source for encoder channel A.

7.319 (ID 3019) Motor Pole Pairs

Location in the menu: **P3.15.4.10**

Use this parameter to set the motor pole pair number. The number is used to calculate the electrical frequency of the encoder.

7.320 (ID 3015) Encoder Mode

Location in the menu: **P3.15.4.6**

Use this parameter to set the encoder operation mode.

Quadrature Mode

The phase order of the A and B input signals determines the counting direction. The direction of speed is determined from 90° difference in the signals.

- When the A pulses precede B pulses, rotational direction is forward. Position Counter counting direction is incrementing.
- When the A pulses succeed B pulses, rotational direction is reverse. Position Counter counting direction is decrementing.

The 16-bit position counter is incremented or decremented after each edge of A input and B input.

This input mode requires that both channels A and B are receiving pulses, differential connection is recommended.

Closed Loop speed control can only be used with this encoder mode.

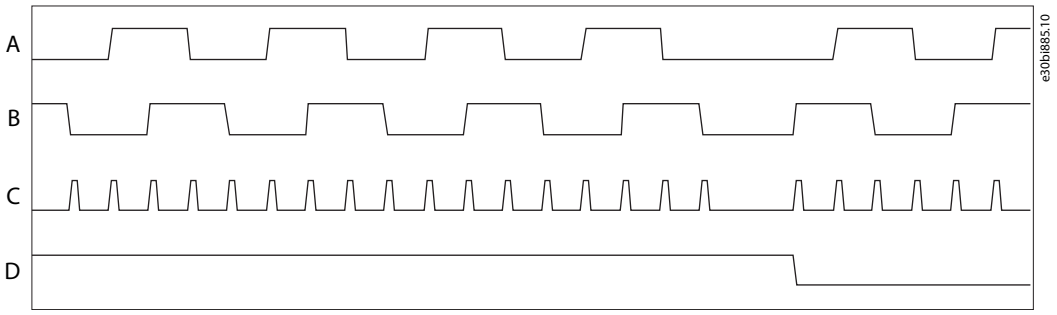


Illustration 50: Counter Function in Quadrature Mode

A	Input A signal	C	Counter
B	Input B signal	D	Direction

Directional Pulse Mode

In this mode, both channels are receiving signals but not at the same time.

Directional Pulse encoding provides pulses on input A when rotational direction is forward. Position Counter counting direction is incrementing.

Pulses on input B indicate reverse rotational direction. Position Counter counting direction is decrementing.

The 16-bit Position Counter is incremented after each edge of input A. The counter is decremented after each edge of input B.

This mode cannot be used for closed loop control.

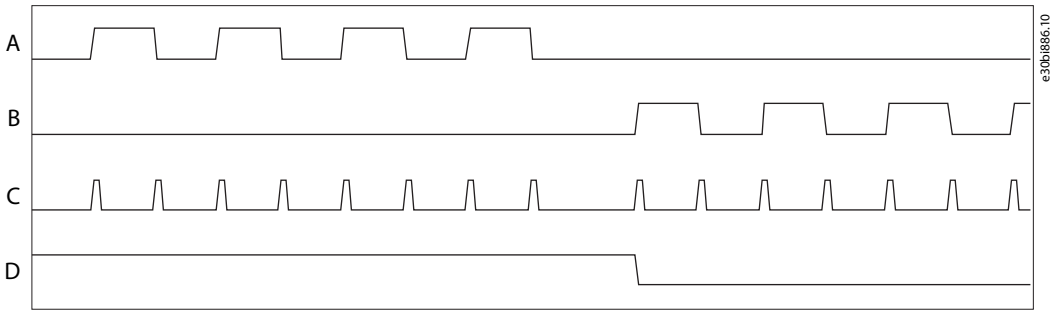


Illustration 51: Counter Function in Directional Pulse Mode

A	Input A signal	C	Counter
B	Input B signal	D	Direction

Pulse + Direction Mode

In this mode, only channel A is receiving pulses. Channel B determines if the direction is negative or positive. The input in channel B must be a static signal.

For Pulse + Direction encoding, the 16-bit Position Counter is incremented or decremented after each edge of input A.

Direction is indicated on input B: Logic high indicates forward rotational direction. Position Counter counting direction is incrementing.

When input B is logic low, reverse rotational direction is indicated and results in counter decrementing.

This mode cannot be used for closed loop control.

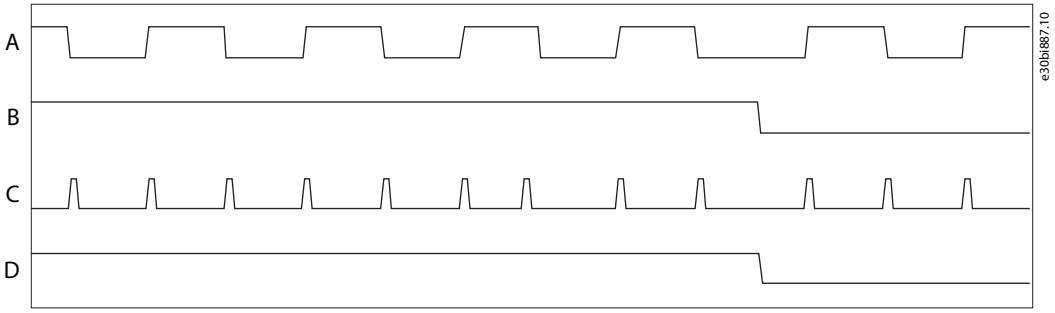


Illustration 52: Counter Function in Pulse + Direction Mode

A	Input A signal	C	Counter
B	Input B signal	D	Direction

7.321 (ID 3020) Offset Mode

Location in the menu: **P3.15.4.11**

Use this parameter to set the encoder to position or angular offset mode.

7.322 (ID 3021) Manual Offset

Location in the menu: **P3.15.4.12**

Use this parameter to set the manual position or angular offset of the encoder.

7.323 (ID 3022) Filter Time Constant

Location in the menu: **P3.15.4.13**

Use this parameter to set the Filter Time Constant frequency for the encoder. The function filters noise from the encoder signal to make sure it does not affect the speed control.

The Filter Time Constant frequency must not be too large. A too large constant has a negative effect on speed control performance. Values higher than 10 ms are usually too large.

7.324 (ID 3024) Frequency Monitor A Timeout

Location in the menu: **P3.15.4.14**

Use this parameter to set the integral time limit for the error excursion of the encoder frequency. Give the limit in ms.

7.325 (ID 3025) Frequency Monitor A Response

Location in the menu: **P3.15.4.15**

Use this parameter to set the response to an encoder failure:

- 0 = Give a fault
- 1 = Fall back to a secondary encoder
- 2 = Fall back to sensorless operation

7.326 (ID 3027) HW Glitch Filter Time

Location in the menu: **P3.15.4.16**

Use this parameter to set the encoder HW glitch filter threshold level (0.5 ms).

7.327 (ID 3028) SW Detection Limit

Location in the menu: **P3.15.4.17**

Use this parameter to set the encoder SW error threshold level in Hz.

7.328 (ID 3029) Encoder Repeated Error Limit

Location in the menu: **P3.15.4.18**

Use this parameter to set the encoder repeated error time limit in ms.

7.329 (ID 3030) Input Control

Location in the menu: **P3.15.5.1**

Use this parameter to set the encoder input control word. Select single-ended or active low signaling from input A, B, Z, or M.

7.330 (ID 3031) Input AB Swap

Location in the menu: **P3.15.5.2**

Use this parameter to interchange input A and B for the encoder and thus change the nominal encoder direction.

7.331 (ID 3032) Encoder Debounce Time

Location in the menu: **P3.15.5.3**

Use this parameter to set the debounce time (noise/error filter) applied to the encoder inputs A, B, and Z.

7.332 (ID 3033) Marker Debounce Time

Location in the menu: **P3.15.5.4**

Use this parameter to set the debounce time (noise/error filter) applied to the encoder marker input M.

7.333 (ID 3034) Marker Event Mode

Location in the menu: **P3.15.5.5**

Use this parameter to set the marker event source for encoder channel A.

7.334 (ID 3035) Encoder Mode

Location in the menu: **P3.15.5.6**

Use this parameter to set the encoder operation mode. See 7.320 (ID 3015) Encoder Mode.

7.335 (ID 3036) Resolution Prescale

Location in the menu: **P3.15.5.7**

Use this parameter to prescale the internal resolution. The function divides the encoder internal resolution by an integral value.

7.336 (ID 3037) Hysteresis Filter Prescale

Location in the menu: **P3.15.5.8**

Use this parameter to set the hysteresis prescale function. The function uses a subset of an internal position counter to determine a direction change and to supply a pulse/heartbeat signal.

7.337 (ID 3038) Encoder Resolution

Location in the menu: **P3.15.5.9**

Use this parameter to set the native resolution or line count of the encoder.

7.338 (ID 3039) Motor Pole Pairs

Location in the menu: **P3.15.5.10**

Use this parameter to set the motor pole pair number. The number is used to calculate the electrical frequency of the encoder.

7.339 (ID 3040) Offset Mode

Location in the menu: **P3.15.5.11**

Use this parameter to set the encoder to position or angular offset mode.

7.340 (ID 3041) Manual Offset

Location in the menu: **P3.15.5.12**

Use this parameter to set the manual position or angular offset of the encoder.

7.341 (ID 3042) Filter Time Constant

Location in the menu: **P3.15.5.13**

Use this parameter to set the Filter Time Constant frequency for the encoder. The function filters noise from the encoder signal to make sure it does not affect the speed control.

The Filter Time Constant frequency must not be too large. A too large constant has a negative effect on speed control performance. Values higher than 10 ms are usually too large.

7.342 (ID 3044) Frequency Monitor B Timeout

Location in the menu: **P3.15.5.14**

Use this parameter to set the integral time limit for the error excursion of the encoder frequency. Give the limit in ms.

7.343 (ID 3045) Frequency Monitor B Response

Location in the menu: **P3.15.5.15**

Use this parameter to set the response to an encoder failure:

- 0 = Give a fault
- 1 = Fall back to a secondary encoder
- 2 = Fall back to sensorless operation

7.344 (ID 3301) Modulator Options

Location in the menu:

- INU application: **P3.1.2.6.3**
- AFE application: **P3.2.7.3**

Use this parameter to select the modulator options:

- Deadtime compensation.
- Switching frequency reduction at start.

7.345 (ID 3302) Synchronous Modulation

Location in the menu:

- INU application: **P3.1.2.6.4**
- AFE application: **P3.2.7.4**

Use this parameter to set the synchronous modulation type:

- Asynchronous.
- Symmetric synchronous.
- Synchronous
- Soft synchronous.

7.346 (ID 3303) Fsw Reduction Min

Location in the menu: **P3.1.2.6.6**

Use this parameter to set the minimum switching frequency reduction level in kHz.

7.347 (ID 3304) HS Cap Vrms Enable

Location in the menu:

- AFE application: **P3.8.1.10**

Use this parameter to set the V_{rms} enable command for HS capacitor.

7.348 (ID 3305) DC-Link Compensation TC

Location in the menu: **P3.1.2.6.7**

Use this parameter to select the time constant specification for the low-pass filter that is used to slow down the DC-link voltage compensation.

0 = Disable the low-pass filter.

7.349 (ID 3306) PHM Temperature Sensor Disable

Location in the menu:

- INU application: **P3.9.12.6**
- AFE application: **P3.8.5.6**
- BCU application: **P3.8.6.1**

Use this parameter to disable a phase module from using the heat sink sensor as feedback.

7.350 (ID 3307) DTM Backwards Compatibility Mode

Location in the menu:

- INU application: **P3.9.12.5**
- AFE application: **P3.8.5.5**

Use this parameter to enable backward compatibility for DTM.

7.351 (ID 3308) Coolant Temperature Input Select

Location in the menu:

- INU application: **P3.9.12.1**
- AFE application: **P3.8.5.1**

Use this parameter to select the coolant temperature input.

7.352 (ID 3310) PCC Feedback INU Run

Location in the menu:

- AFE application: **P3.3.2.1.1**

Use this parameter to set the INU run feedback input selection.

When the AFE is selected as the precharge controller, it requires status feedback about the running state of the INU. Select the digital input that corresponds to this feedback.

7.353 (ID 3314) PCC Feedback Remote No Fault

Location in the menu:

- AFE application: **P3.3.2.1.2**

Use this parameter to set the remote (INU/AFE) fault feedback.

The feedback provides information to the precharge control system about the state of the remote converter. The input must be active for no fault.

7.354 (ID 3315) PCC Interlock

Location in the menu:

- INU application: **P3.17.2.1.1**
- AFE application: **P3.3.2.1.3**

Use this parameter to set the digital input for the precharge and front-end interlock. The interlock must be enabled to start the precharge and to continue the front-end operation.

7.355 (ID 3321) Nominal DC Precharge Voltage

Location in the menu:

- INU application: **P3.17.3.1**
- AFE application: **P3.3.3.1**

Use this parameter to set the nominal (relative to grid) DC voltage at which the synchronization starts.

7.356 (ID 3322) Minimum DC Precharge Voltage

Location in the menu:

- INU application: **P3.17.3.2**
- AFE application: **P3.3.3.2**

Use this parameter to set the minimum (relative to grid) DC voltage after the synchronization at which the main contactor closes.

7.357 (ID 3323) Precharge Restart Limit

Location in the menu:

- INU application: **P3.17.3.3**
- AFE application: **P3.3.3.3**

Use this parameter to set the restart voltage limit for the precharge operation.

7.358 (ID 3324) Maximum DC Slew Rate

Location in the menu:

- INU application: **P3.17.3.4**
- AFE application: **P3.3.3.4**

Use this parameter to set the maximum DC voltage slew rate in V/s, which is permitted during the precharge operation.

7.359 (ID 3325) Minimum DC Slew Rate

Location in the menu:

- INU application: **P3.17.3.5**
- AFE application: **P3.3.3.5**

Use this parameter to set the minimum DC voltage slew rate in V/s, which is possible during the precharge operation.

7.360 (ID 3330) Fault Clear Timeout

Location in the menu:

- INU application: **P3.17.4.1**
- AFE application: **P3.3.4.1**

Use this parameter to set the maximum fault clear timeout for the front end.

7.361 (ID 3331) MX Open Timeout

Location in the menu:

- INU application: **P3.17.4.2**
- AFE application: **P3.3.4.2**

Use this parameter to set the maximum open response time for the main contactor.

7.362 (ID 3332) MX Close Timeout

Location in the menu:

- INU application: **P3.17.4.3**
- AFE application: **P3.3.4.3**

Use this parameter to set the maximum close response time for the main contactor.

7.363 (ID 3333) KMX Open Timeout

Location in the menu:

- INU application: **P3.17.4.4**
- AFE application: **P3.3.4.4**

Use this parameter to set the maximum open response time for the main contactor pilot.

7.364 (ID 3334) KMX Close Timeout

Location in the menu:

- INU application: **P3.17.4.5**
- AFE application: **P3.3.4.5**

Use this parameter to set the maximum close response time for the main contactor pilot.

7.365 (ID 3335) KPC Open Timeout

Location in the menu:

- INU application: **P3.17.4.6**
- AFE application: **P3.3.4.6**

Use this parameter to set the maximum open response time for the precharge contactor.

7.366 (ID 3336) Minimum Slew Rate Timeout

Location in the menu:

- INU application: **P3.17.4.7**
- AFE application: **P3.3.4.7**

Use this parameter to set the delay until the test for the minimum precharge slew rate.

7.367 (ID 3337) DC Discharge Timeout

Location in the menu:

- INU application: **P3.17.4.8**
- AFE application: **P3.3.4.8**

Use this parameter to set the maximum DC-link discharge time.

7.368 (ID 3338) DC Precharge Timeout

Location in the menu:

- INU application: **P3.17.4.9**
- AFE application: **P3.3.4.9**

Use this parameter to set the maximum time to try the precharge operation.

7.369 (ID 3339) Activate Timeout

Location in the menu:

- INU application: **P3.17.4.10**
- AFE application: **P3.3.4.10**

Use this parameter to set the fixed delay from the drive initialization until the precharge is permitted.

7.370 (ID 3340) Synch Timeout

Location in the menu:

- AFE application: **P3.3.4.11**

Use this parameter to set the maximum duration for which the AFE is allowed to synchronize.

7.371 (ID 3341) Stabilize Timeout

Location in the menu:

- AFE application: **P3.3.4.12**

Use this parameter to set the maximum duration by which the AFE must attain DC regulation.

7.372 (ID 3342) KPC Close Timeout

Location in the menu:

- INU application: **P3.17.4.11**
- AFE application: **P3.3.4.13**

Use this parameter to set the maximum close response time for the precharge contactor.

7.373 (ID 3343) Cooling Off Delay

Location in the menu:

- INU application: **P3.17.4.12**
- AFE application: **P3.3.4.14**

Use this parameter to set the delay time for the cooling system to turn off.

7.374 (ID 3344) Cooling OK Timeout

Location in the menu:

- INU application: **P3.17.4.13**
- AFE application: **P3.3.4.15**

Use this parameter to set the timeout for the "Cooling OK" and "HEX OK" for the cooling system.

7.375 (ID 3345) Breaker Close Pulse Time

Location in the menu:

- INU application: **P3.17.4.14**
- AFE application: **P3.3.4.16**

Use this parameter to set the pulse time for breaker close.

7.376 (ID 3346) Breaker Open Pulse Time

Location in the menu:

- INU application: **P3.17.4.15**
- AFE application: **P3.3.4.17**

Use this parameter to set the pulse time for breaker open.

7.377 (ID 3351) Precharge Master

Location in the menu:

- INU application: **P3.17.5.1**
- AFE application: **P3.3.5.1**

Use this parameter to set the precharge control logic location.
Set the parameter to 1 (Yes), if there is no AFE and the precharge control is done by the INU control unit.
Set the parameter to 0 (No), if the drive has an AFE and the precharge control is done by the AFE control unit.

7.378 (ID 3352) Start Request Mode

Location in the menu:

- INU application: **P3.17.5.2**
- AFE application: **P3.3.5.2**

Use this parameter to set the start request mode.

- To use external precharge control, select 0 (implicit).
- To use internal precharge control, select 1 (explicit).

7.379 (ID 3353) Commissioning Test Mode

Location in the menu:

- INU application: **P3.17.5.3**
- AFE application: **P3.3.5.3**

Use this parameter to enable the precharge control commissioning test mode to do tests on the precharge control and feedback connections.
The test mode can only be selected when the precharge auxiliary voltage is off and the mains voltage is not connected.

7.380 (ID 3354) Test Mode - Disable MX

Location in the menu:

- INU application: **P3.17.5.4**
- AFE application: **P3.3.5.4**

Use this parameter to enable the precharge synchronization test mode. When enabled, the main contactor is not commanded to close.
Use this mode to check the phase order and scaling of the grid voltage feedback.

7.381 (ID 3355) Supply Voltage Select

Location in the menu:

- Standard application: **P3.1.3.11**

Use this parameter to set the supply voltage definition.

- Estimated.
- Selected by parameter Set supply voltage (ID 1201).

7.382 (ID 3360) Enclosure Humidity and Temperature

Location in the menu:

- INU application: **P3.9.1.18**
- AFE application: **P3.8.1.11**

Use this parameter to set the response when a humidity or temperature switch detects an out of range limit in the enclosure.

7.383 (ID 3365) FB Coolant Decimal Places

Location in the menu:

- INU application: **P3.9.12.4**
- AFE application: **P3.8.5.4**

Use this parameter to select the number of decimal places used in the process data coolant temperature.

- 2D = 2 decimals, for example, 24.50.
- 1D = 1 decimal, for example, 24.5.

7.384 (ID 3366) Coolant Scale Minimum

Location in the menu:

- INU application: **P3.9.12.2**
- AFE application: **P3.8.5.2**

Use this parameter to set the temperature in °C, which corresponds to the minimum of the analog signal range. For example, 0 mA corresponds to 0 °C.

7.385 (ID 3367) Coolant Scale Maximum

Location in the menu:

- INU application: **P3.9.12.3**
- AFE application: **P3.8.5.3**

Use this parameter to set the temperature in °C, which corresponds to the maximum of the analog signal range. For example, 20 mA corresponds to 100 °C.

7.386 (ID 3400) Enable Precharge Feedback MVS DIN1

Location in the menu:

- INU application: **P3.17.2.1.2**
- AFE application: **P3.3.2.1.4**

Use this parameter to enable the precharge contactor feedback on the MV star DIN1 input.

7.387 (ID 3401) Enable MX Feedback MVS DIN2

Location in the menu:

- INU application: **P3.17.2.1.3**
- AFE application: **P3.3.2.1.5**

Use this parameter to enable the main contactor/breaker feedback on the MV star DIN2 input.

7.388 (ID 3402) Enable KMX Feedback MVS DIN3

Location in the menu:

- INU application: **P3.17.2.1.4**
- AFE application: **P3.3.2.1.6**

Use this parameter to enable the main contactor/breaker pilot relay feedback on the MV star DIN3 input.

7.389 (ID 3403) MV Star Relay Configuration

Location in the menu:

- INU application: **P3.17.1.1**
- AFE application: **P3.3.1.1**

Use this parameter to set the MSC output configuration mask.

7.390 (ID 3404) Aux14 KPC Feedback Configuration

Location in the menu:

- INU application: **P3.17.2.1.5**
- AFE application: **P3.3.2.1.7**

Use this parameter to set the input configuration for KPC Status.

- 4x (per byte) aux DIN number 1–40.

7.391 (ID 3405) Aux14 MX Feedback Configuration

Location in the menu:

- INU application: **P3.17.2.1.6**
- AFE application: **P3.3.2.1.8**

Use this parameter to set the input configuration for MX Status.

- 4x (per byte) aux DIN number 1–40.

7.392 (ID 3406) Aux14 KMX Feedback Configuration

Location in the menu:

- INU application: **P3.17.2.1.7**
- AFE application: **P3.3.2.1.9**

Use this parameter to set the input configuration for KMX Status.

- 4x (per byte) aux DIN number 1–40.

7.393 (ID 3407) Aux1A Relay Configuration

Location in the menu:

- INU application: **P3.17.1.2**
- AFE application: **P3.3.1.2**

Use this parameter to set the AUX 0 output configuration mask.

7.394 (ID 3550) Power On

Location in the menu:

- INU application: **P3.5.1.34** and **P3.17.2.2.1**
- AFE application: **P3.3.2.2.1** and **P3.5.1.15**

Use this parameter to select the digital input signal for the Power On state of the AC drive. Pulse close starts the power on sequence.

7.395 (ID 3551) Power Off

Location in the menu:

- INU application: **P3.5.1.35** and **P3.17.2.2.2**
- AFE application: **P3.3.2.2.2** and **P3.5.1.16**

Use this parameter to select the digital input signal for the Power Off state of the AC drive. Open contact indicates power off.

7.396 (ID 3552) Reset Power On State

Location in the menu:

- INU application: **P3.5.1.36** and **P3.17.2.2.3**
- AFE application: **P3.3.2.2.3** and **P3.5.1.17**

Use this parameter to select the digital input signal that activates the reset of the power-up sequence faults.

7.397 (ID 3553) GSW Unlock

Location in the menu:

- INU application: **P3.5.1.37** and **P3.17.2.2.7**
- AFE application: **P3.3.2.2.7** and **P3.5.1.18**

Use this parameter to activate the grounding switch unlock solenoid if allowed.

- DC voltage must be below 50 V and the main breaker/contactor must be open.
- If not operated, the grounding switch solenoid deactivates after 60 s.
- Also configure an output for GSW unlock.

7.398 (ID 3600) DC Choke Overtemperature 1

Location in the menu: **P3.17.2.2.8**

Use this parameter to select the digital input signal for the DC Choke Overtemperature 1 switch status.

- Active = Temperature is below the limit.

7.399 (ID 3601) DC Choke Overtemperature 2

Location in the menu: **P3.17.2.2.9**

Use this parameter to select the digital input signal for the DC Choke Overtemperature 2 switch status.

- Active = Temperature is below the limit.

7.400 (ID 3602) DC Capacitor Overpressure 1

Location in the menu: **P3.17.2.2.10**

Use this parameter to select the digital input signal for the DC-link capacitor overpressure status 1.

- Active = Capacitor is normal.

7.401 (ID 3603) DC Capacitor Overpressure 2

Location in the menu: **P3.17.2.2.11**

Use this parameter to select the digital input signal for the DC-link capacitor overpressure status 2.

- Active = Capacitor is normal.

7.402 (ID 3604) DC Capacitor Overpressure 3

Location in the menu: **P3.17.2.2.12**

Use this parameter to select the digital input signal for the DC-link capacitor overpressure status 3.

- Active = Capacitor is normal.

7.403 (ID 3605) DC Capacitor Overpressure 4

Location in the menu: **P3.17.2.2.13**

Use this parameter to select the digital input signal for the DC-link capacitor overpressure status 4.

- Active = Capacitor is normal.

7.404 (ID 3607) Arc Fault Relay Online

Location in the menu:

- INU application: **P3.17.2.2.4**
- AFE application: **P3.3.2.2.4**

Use this parameter to select the digital input signal for the arc fault relay online status.

- Active = Arc system is operating and is online.

7.405 (ID 3608) Arc Fault Relay Fault

Location in the menu:

- INU application: **P3.17.2.2.5**
- AFE application: **P3.3.2.2.5**

Use this parameter to select the digital input signal for the arc fault relay fault status.

- Active = Arc fault.

7.406 (ID 3609) Door Safety Interlock

Location in the menu:

- INU application: **P3.17.2.2.6**
- AFE application: **P3.3.2.2.6**

Use this parameter to select the digital input signal for the door safety interlock status.

- Active = Door is closed.

7.407 (ID 3610) Grounding Switch Open 1

Location in the menu:

- INU application: **P3.17.2.2.14**
- AFE application: **P3.3.2.2.8**

Use this parameter to select the digital input signal for the grounding switch open position 1 status.

7.408 (ID 3611) Grounding Switch Open 2

Location in the menu:

- INU application: **P3.17.2.2.15**
- AFE application: **P3.3.2.2.9**

Use this parameter to select the digital input signal for the grounding switch open position 2 status.

7.409 (ID 3612) Grounding Switch Open 3

Location in the menu:

- INU application: **P3.17.2.2.16**
- AFE application: **P3.3.2.2.10**

Use this parameter to select the digital input signal for the grounding switch open position 3 status.

7.410 (ID 3613) Grounding Switch Open 4

Location in the menu:

- INU application: **P3.17.2.2.17**
- AFE application: **P3.3.2.2.11**

Use this parameter to select the digital input signal for the grounding switch open position 4 status.

7.411 (ID 3614) Grounding Switch Closed 1

Location in the menu:

- INU application: **P3.17.2.2.18**
- AFE application: **P3.3.2.2.12**

Use this parameter to select the digital input signal for the grounding switch closed position 1 status.

7.412 (ID 3615) Grounding Switch Closed 2

Location in the menu:

- INU application: **P3.17.2.2.19**
- AFE application: **P3.3.2.2.13**

Use this parameter to select the digital input signal for the grounding switch closed position 2 status.

7.413 (ID 3616) Grounding Switch Closed 3

Location in the menu:

- INU application: **P3.17.2.2.20**
- AFE application: **P3.3.2.2.14**

Use this parameter to select the digital input signal for the grounding switch closed position 3 status.

7.414 (ID 3617) Grounding Switch Closed 4

Location in the menu:

- INU application: **P3.17.2.2.21**
- AFE application: **P3.3.2.2.15**

Use this parameter to select the digital input signal for the grounding switch closed position 4 status.

7.415 (ID 3618) UFES Test 1

Location in the menu:

- AFE application: **P3.3.2.2.16**

Use this parameter to select the digital input signal for the UFES test mode status.

- Active = UFES is in test mode and power-up is not allowed.

7.416 (ID 3619) UFES Test 2

Location in the menu:

- AFE application: **P3.3.2.2.17**

Use this parameter to select the digital input signal for the UFES test mode status.

- Active = UFES is in test mode and power-up is not allowed.

7.417 (ID 3620) UFES Test 3

Location in the menu:

- AFE application: **P3.3.2.2.18**

Use this parameter to select the digital input signal for the UFES test mode status.

- Active = UFES is in test mode and power-up is not allowed.

7.418 (ID 3621) UFES Test 4

Location in the menu:

- AFE application: **P3.3.2.2.19**

Use this parameter to select the digital input signal for the UFES test mode status.

- Active = UFES is in test mode and power-up is not allowed.

7.419 (ID 3624) Interlock NC 1

Location in the menu:

- INU application: **P3.17.2.2.22**
- AFE application: **P3.3.2.2.20**

Use this parameter to select the digital input signal for interlock NC 1.

- High = Active interlock for precharge and power from mains voltage.

7.420 (ID 3625) Interlock NC 2

Location in the menu:

- INU application: **P3.17.2.2.23**
- AFE application: **P3.3.2.2.21**

Use this parameter to select the digital input signal for interlock NC 2.

- High = Active interlock for precharge and power from mains voltage.

7.421 (ID 3626) Interlock NC 3

Location in the menu:

- INU application: **P3.17.2.2.24**
- AFE application: **P3.3.2.2.22**

Use this parameter to select the digital input signal for interlock NC 3.

- High = Active interlock for precharge and power from mains voltage.

7.422 (ID 3627) Interlock NC 4

Location in the menu:

- INU application: **P3.17.2.2.25**
- AFE application: **P3.3.2.2.23**

Use this parameter to select the digital input signal for interlock NC 4.

- High = Active interlock for precharge and power from mains voltage.

7.423 (ID 3628) Interlock NO 1

Location in the menu:

- INU application: **P3.17.2.2.26**
- AFE application: **P3.3.2.2.24**

Use this parameter to select the digital input signal for interlock NO 1.

- Low = Active interlock for precharge and power from mains voltage.

7.424 (ID 3629) Interlock NO 2

Location in the menu:

- INU application: **P3.17.2.2.27**
- AFE application: **P3.3.2.2.25**

Use this parameter to select the digital input signal for interlock NO 2.

- Low = Active interlock for precharge and power from mains voltage.

7.425 (ID 3630) Interlock NO 3

Location in the menu:

- INU application: **P3.17.2.2.28**
- AFE application: **P3.3.2.2.26**

Use this parameter to select the digital input signal for interlock NO 3.

- Low = Active interlock for precharge and power from mains voltage.

7.426 (ID 3631) Interlock NO 4

Location in the menu:

- INU application: **P3.17.2.2.29**
- AFE application: **P3.3.2.2.27**

Use this parameter to select the digital input signal for interlock NO 4.

- Low = Active interlock for precharge and power from mains voltage.

7.427 (ID 3632) Enclosure Heat Exchanger Breaker Status 1

Location in the menu:

- INU application: **P3.17.2.2.30**
- AFE application: **P3.3.2.2.28**

Use this parameter to select the digital input signal that shows the breaker status 1 for the fan supply of the enclosure heat exchanger.

- Active = Breaker is closed.

7.428 (ID 3633) Enclosure Heat Exchanger Breaker Status 2

Location in the menu:

- INU application: **P3.17.2.2.31**
- AFE application: **P3.3.2.2.29**

Use this parameter to select the digital input signal that shows the breaker status 2 for the fan supply of the enclosure heat exchanger.

- Active = Breaker is closed.

7.429 (ID 3634) Enclosure Heat Exchanger Breaker Status 3

Location in the menu:

- INU application: **P3.17.2.2.32**
- AFE application: **P3.3.2.2.30**

Use this parameter to select the digital input signal that shows the breaker status 3 for the fan supply of the enclosure heat exchanger.

- Active = Breaker is closed.

7.430 (ID 3635) Enclosure Heat Exchanger Breaker Status 4

Location in the menu:

- INU application: **P3.17.2.2.33**
- AFE application: **P3.3.2.2.31**

Use this parameter to select the digital input signal that shows the breaker status 4 for the fan supply of the enclosure heat exchanger.

- Active = Breaker is closed.

7.431 (ID 3636) Temperature Control Breaker Status 1

Location in the menu:

- INU application: **P3.17.2.2.34**
- AFE application: **P3.3.2.2.32**

Use this parameter to select the digital input signal for the breaker status 1 for enclosure temperature controls.

7.432 (ID 3637) Temperature Control Breaker Status 2

Location in the menu:

- INU application: **P3.17.2.2.35**
- AFE application: **P3.3.2.2.33**

Use this parameter to select the digital input signal for the breaker status 2 for enclosure temperature controls.

7.433 (ID 3638) Temperature Control Breaker Status 3

Location in the menu:

- INU application: **P3.17.2.2.36**
- AFE application: **P3.3.2.2.34**

Use this parameter to select the digital input signal for the breaker status 3 for enclosure temperature controls.

7.434 (ID 3639) Temperature Control Breaker Status 4

Location in the menu:

- INU application: **P3.17.2.2.37**
- AFE application: **P3.3.2.2.35**

Use this parameter to select the digital input signal for the breaker status 4 for enclosure temperature controls.

7.435 (ID 3640) Cabinet Heat Exchanger Status 1

Location in the menu:

- INU application: **P3.17.2.2.38**
- AFE application: **P3.3.2.2.36**

Use this parameter to select the digital input signal for the breaker status 1 of the enclosure heat exchanger fan.

- Active = Contactor is closed.

7.436 (ID 3641) Cabinet Heat Exchanger Status 2

Location in the menu:

- INU application: **P3.17.2.2.39**
- AFE application: **P3.3.2.2.37**

Use this parameter to select the digital input signal for the breaker status 2 of the enclosure heat exchanger fan.

- Active = Contactor is closed.

7.437 (ID 3642) Cabinet Heat Exchanger Status 3

Location in the menu:

- INU application: **P3.17.2.2.40**
- AFE application: **P3.3.2.2.38**

Use this parameter to select the digital input signal for the breaker status 3 of the enclosure heat exchanger fan.

- Active = Contactor is closed.

7.438 (ID 3643) Cabinet Heat Exchanger Status 4

Location in the menu:

- INU application: **P3.17.2.2.41**
- AFE application: **P3.3.2.2.39**

Use this parameter to select the digital input signal for the breaker status 4 of the enclosure heat exchanger fan.

- Active = Contactor is closed.

7.439 (ID 3644) Leak Detection System OK 1

Location in the menu:

- INU application: **P3.17.2.2.42**
- AFE application: **P3.3.2.2.40**

Use this parameter to select the digital input signal for the leak detection system status 1.

- Active signal = System OK.

7.440 (ID 3645) Leak Detection System OK 2

Location in the menu:

- INU application: **P3.17.2.2.43**
- AFE application: **P3.3.2.2.41**

Use this parameter to select the digital input signal for the leak detection system status 2.

- Active signal = System OK.

7.441 (ID 3646) Leak Detection System OK 3

Location in the menu:

- INU application: **P3.17.2.2.44**
- AFE application: **P3.3.2.2.42**

Use this parameter to select the digital input signal for the leak detection system status 3.

- Active signal = System OK.

7.442 (ID 3647) Leak Detection System OK 4

Location in the menu:

- INU application: **P3.17.2.2.45**
- AFE application: **P3.3.2.2.43**

Use this parameter to select the digital input signal for the leak detection system status 4.

- Active signal = System OK.

7.443 (ID 3648) Leak Detection No Leak 1

Location in the menu:

- INU application: **P3.17.2.2.46**
- AFE application: **P3.3.2.2.44**

Use this parameter to select the digital input signal for the leak detection status 1.

- Active signal = No leak.

7.444 (ID 3649) Leak Detection No Leak 2

Location in the menu:

- INU application: **P3.17.2.2.47**
- AFE application: **P3.3.2.2.45**

Use this parameter to select the digital input signal for the leak detection status 2.

- Active signal = No leak.

7.445 (ID 3650) Leak Detection No Leak 3

Location in the menu:

- INU application: **P3.17.2.2.48**
- AFE application: **P3.3.2.2.46**

Use this parameter to select the digital input signal for the leak detection status 3.

- Active signal = No leak.

7.446 (ID 3651) Leak Detection No Leak 4

Location in the menu:

- INU application: **P3.17.2.2.49**
- AFE application: **P3.3.2.2.47**

Use this parameter to select the digital input signal for the leak detection status 4.

- Active signal = No leak.

7.447 (ID 3656) Heat Exchanger Fan Status 1.1

Location in the menu:

- INU application: **P3.17.2.2.50**
- AFE application: **P3.3.2.2.48**

Use this parameter to select the digital input signal for fan status 1.1 from the current sensor relay of the inductor liquid-to-air heat exchanger.

7.448 (ID 3657) Heat Exchanger Fan Status 1.2

Location in the menu:

- INU application: **P3.17.2.2.51**
- AFE application: **P3.3.2.2.49**

Use this parameter to select the digital input signal for fan status 1.2 from the current sensor relay of the inductor liquid-to-air heat exchanger.

7.449 (ID 3658) Heat Exchanger Fan Status 1.3

Location in the menu:

- INU application: **P3.17.2.2.52**
- AFE application: **P3.3.2.2.50**

Use this parameter to select the digital input signal for fan status 1.3 from the current sensor relay of the inductor liquid-to-air heat exchanger.

7.450 (ID 3659) Heat Exchanger Fan Status 2.1

Location in the menu:

- INU application: **P3.17.2.2.53**
- AFE application: **P3.3.2.2.51**

Use this parameter to select the digital input signal for fan status 2.1 from the current sensor relay of the inductor liquid-to-air heat exchanger.

7.451 (ID 3660) Heat Exchanger Fan Status 2.2

Location in the menu:

- INU application: **P3.17.2.2.54**
- AFE application: **P3.3.2.2.52**

Use this parameter to select the digital input signal for fan status 2.2 from the current sensor relay of the inductor liquid-to-air heat exchanger.

7.452 (ID 3661) Heat Exchanger Fan Status 2.3

Location in the menu:

- INU application: **P3.17.2.2.55**
- AFE application: **P3.3.2.2.53**

Use this parameter to select the digital input signal for fan status 2.3 from the current sensor relay of the inductor liquid-to-air heat exchanger.

7.453 (ID 3662) Heat Exchanger Fan Status 3.1

Location in the menu:

- INU application: **P3.17.2.2.56**
- AFE application: **P3.3.2.2.54**

Use this parameter to select the digital input signal for fan status 3.1 from the current sensor relay of the inductor liquid-to-air heat exchanger.

7.454 (ID 3663) Heat Exchanger Fan Status 3.2

Location in the menu:

- INU application: **P3.17.2.2.57**
- AFE application: **P3.3.2.2.55**

Use this parameter to select the digital input signal for fan status 3.2 from the current sensor relay of the inductor liquid-to-air heat exchanger.

7.455 (ID 3664) Heat Exchanger Fan Status 3.3

Location in the menu:

- INU application: **P3.17.2.2.58**
- AFE application: **P3.3.2.2.56**

Use this parameter to select the digital input signal for fan status 3.3 from the current sensor relay of the inductor liquid-to-air heat exchanger.

7.456 (ID 3665) Heat Exchanger Fan Status 4.1

Location in the menu:

- INU application: **P3.17.2.2.59**
- AFE application: **P3.3.2.2.57**

Use this parameter to select the digital input signal for fan status 4.1 from the current sensor relay of the inductor liquid-to-air heat exchanger.

7.457 (ID 3666) Heat Exchanger Fan Status 4.2

Location in the menu:

- INU application: **P3.17.2.2.60**
- AFE application: **P3.3.2.2.58**

Use this parameter to select the digital input signal for fan status 4.2 from the current sensor relay of the inductor liquid-to-air heat exchanger.

7.458 (ID 3667) Heat Exchanger Fan Status 4.3

Location in the menu:

- INU application: **P3.17.2.2.61**
- AFE application: **P3.3.2.2.59**

Use this parameter to select the digital input signal for fan status 4.3 from the current sensor relay of the inductor liquid-to-air heat exchanger.

7.459 (ID 3670) Cooling Monitor 1

Location in the menu:

- INU application: **P3.17.2.2.62**
- AFE application: **P3.3.2.2.60**

Use this parameter to select the digital input signal for the status of the liquid-to-liquid cooling unit or cooling system.

"Cooling OK" = The flow and temperature of the liquid coolant feeding the system are within limits.

7.460 (ID 3671) Cooling Monitor 2

Location in the menu:

- INU application: **P3.17.2.2.63**
- AFE application: **P3.3.2.2.61**

Use this parameter to select the digital input signal for the status of the liquid-to-liquid cooling unit or cooling system.

"Cooling OK" = The flow and temperature of the liquid coolant feeding the system are within limits.

7.461 (ID 3672) Cooling Monitor 3

Location in the menu:

- INU application: **P3.17.2.2.64**
- AFE application: **P3.3.2.2.62**

Use this parameter to select the digital input signal for the status of the liquid-to-liquid cooling unit or cooling system.
"Cooling OK" = The flow and temperature of the liquid coolant feeding the system are within limits.

7.462 (ID 3673) Cooling Monitor 4

Location in the menu:

- INU application: **P3.17.2.2.65**
- AFE application: **P3.3.2.2.63**

Use this parameter to select the digital input signal for the status of the liquid-to-liquid cooling unit or cooling system.
"Cooling OK" = The flow and temperature of the liquid coolant feeding the system are within limits.

7.463 (ID 3680) AFE Inductor Temperature Switch 1

Location in the menu:

- AFE application: **P3.3.2.2.64**

Use this parameter to select the digital input signal for the AFE inductor temperature switch status.

7.464 (ID 3681) AFE Inductor Temperature Switch 2

Location in the menu:

- AFE application: **P3.3.2.2.65**

Use this parameter to select the digital input signal for the AFE inductor temperature switch status.

7.465 (ID 3682) AFE Inductor Temperature Switch 3

Location in the menu:

- AFE application: **P3.3.2.2.66**

Use this parameter to select the digital input signal for the AFE inductor temperature switch status.

7.466 (ID 3683) AFE Inductor Temperature Switch 4

Location in the menu:

- AFE application: **P3.3.2.2.67**

Use this parameter to select the digital input signal for the AFE inductor temperature switch status.

7.467 (ID 3684) Grid Inductor Temperature Switch 1

Location in the menu:

- AFE application: **P3.3.2.2.68**

Use this parameter to select the digital input signal for the grid inductor temperature switch status.

7.468 (ID 3685) Grid Inductor Temperature Switch 2

Location in the menu:

- AFE application: **P3.3.2.2.69**

Use this parameter to select the digital input signal for the grid inductor temperature switch status.

7.469 (ID 3686) Grid Inductor Temperature Switch 3

Location in the menu:

- AFE application: **P3.3.2.2.70**

Use this parameter to select the digital input signal for the grid inductor temperature switch status.

7.470 (ID 3687) Grid Inductor Temperature Switch 4

Location in the menu:

- AFE application: **P3.3.2.2.71**

Use this parameter to select the digital input signal for the grid inductor temperature switch status.

7.471 (ID 3688) Common-mode Inductor Temperature Switch 1

Location in the menu:

- AFE application: **P3.3.2.2.72**

Use this parameter to select the digital input signal for the common-mode inductor temperature switch status.

7.472 (ID 3689) Common-mode Inductor Temperature Switch 2

Location in the menu:

- AFE application: **P3.3.2.2.73**

Use this parameter to select the digital input signal for the common-mode inductor temperature switch status.

7.473 (ID 3690) Common-mode Inductor Temperature Switch 3

Location in the menu:

- AFE application: **P3.3.2.2.74**

Use this parameter to select the digital input signal for the common-mode inductor temperature switch status.

7.474 (ID 3691) Common-mode Inductor Temperature Switch 4

Location in the menu:

- AFE application: **P3.3.2.2.75**

Use this parameter to select the digital input signal for the common-mode inductor temperature switch status.

7.475 (ID 3700) Output Inductor TempSW 1

Location in the menu: **P3.5.1.39**

Output filter inductor temperature switch status 1.

7.476 (ID 3701) Output Inductor TempSW 2

Location in the menu: **P3.5.1.40**

Output filter inductor temperature switch status 2.

7.477 (ID 3702) Output Inductor TempSW 3

Location in the menu: **P3.5.1.41**

Output filter inductor temperature switch status 3.

7.478 (ID 3703) Output Inductor TempSW 4

Location in the menu: **P3.5.1.42**

Output filter inductor temperature switch status 4.

7.479 (ID 3704) Output RC TempSW 1

Location in the menu: **P3.5.1.43**

Output filter RC temperature switch status 1.

7.480 (ID 3705) Output RC TempSW 2

Location in the menu: **P3.5.1.44**

Output filter RC temperature switch status 2.

7.481 (ID 3706) Output RC TempSW 3

Location in the menu: **P3.5.1.45**

Output filter RC temperature switch status 3.

7.482 (ID 3707) Output RC TempSW 4

Location in the menu: **P3.5.1.46**

Output filter RC temperature switch status 4.

7.483 (ID 3708) Output RC PressSW 1

Location in the menu: **P3.5.1.47**

Output filter capacitor pressure switch status 1.

7.484 (ID 3709) Output RC PressSW 2

Location in the menu: **P3.5.1.48**

Output filter capacitor pressure switch status 2.

7.485 (ID 3710) Output RC PressSW 3

Location in the menu: **P3.5.1.49**

Output filter capacitor pressure switch status 3.

7.486 (ID 3711) Output RC PressSW 4

Location in the menu: **P3.5.1.50**

Output filter capacitor pressure switch status 4.

7.487 (ID 3720) Enclosure Humidity Status 1

Location in the menu:

- INU application: **P3.17.2.2.67**
- AFE application: **P3.3.2.2.77**

Use this parameter to select the digital input signal for the humidity status of the enclosure.

By default, humidity is OK when the signal is active. To invert the signal, so that humidity is OK when the signal is inactive, use parameter ID 3736.

7.488 (ID 3721) Enclosure Humidity Status 2

Location in the menu:

- INU application: **P3.17.2.2.68**
- AFE application: **P3.3.2.2.78**

Use this parameter to select the digital input signal for the humidity status of the enclosure.

By default, humidity is OK when the signal is active. To invert the signal, so that humidity is OK when the signal is inactive, use parameter ID 3736.

7.489 (ID 3722) Enclosure Humidity Status 3

Location in the menu:

- INU application: **P3.17.2.2.69**
- AFE application: **P3.3.2.2.79**

Use this parameter to select the digital input signal for the humidity status of the enclosure.

By default, humidity is OK when the signal is active. To invert the signal, so that humidity is OK when the signal is inactive, use parameter ID 3736.

7.490 (ID 3723) Enclosure Humidity Status 4

Location in the menu:

- INU application: **P3.17.2.2.70**
- AFE application: **P3.3.2.2.80**

Use this parameter to select the digital input signal for the humidity status of the enclosure.

By default, humidity is OK when the signal is active. To invert the signal, so that humidity is OK when the signal is inactive, use parameter ID 3736.

7.491 (ID 3724) Enclosure Temperature Status 1.1

Location in the menu:

- INU application: **P3.17.2.2.71**
- AFE application: **P3.3.2.2.81**

Use this parameter to select the digital input signal for the temperature status of the enclosure.

By default, temperature is OK when the signal is active. To invert the signal, so that temperature is OK when the signal is inactive, use parameter ID 3736.

7.492 (ID 3725) Enclosure Temperature Status 1.2

Location in the menu:

- INU application: **P3.17.2.2.72**
- AFE application: **P3.3.2.2.82**

Use this parameter to select the digital input signal for the temperature status of the enclosure.

By default, temperature is OK when the signal is active. To invert the signal, so that temperature is OK when the signal is inactive, use parameter ID 3736.

7.493 (ID 3726) Enclosure Temperature Status 1.3

Location in the menu:

- INU application: **P3.17.2.2.73**
- AFE application: **P3.3.2.2.83**

Use this parameter to select the digital input signal for the temperature status of the enclosure.

By default, temperature is OK when the signal is active. To invert the signal, so that temperature is OK when the signal is inactive, use parameter ID 3736.

7.494 (ID 3727) Enclosure Temperature Status 2.1

Location in the menu:

- INU application: **P3.17.2.2.74**
- AFE application: **P3.3.2.2.84**

Use this parameter to select the digital input signal for the temperature status of the enclosure.

By default, temperature is OK when the signal is active. To invert the signal, so that temperature is OK when the signal is inactive, use parameter ID 3736.

7.495 (ID 3728) Enclosure Temperature Status 2.2

Location in the menu:

- INU application: **P3.17.2.2.75**
- AFE application: **P3.3.2.2.85**

Use this parameter to select the digital input signal for the temperature status of the enclosure.

By default, temperature is OK when the signal is active. To invert the signal, so that temperature is OK when the signal is inactive, use parameter ID 3736.

7.496 (ID 3729) Enclosure Temperature Status 2.3

Location in the menu:

- INU application: **P3.17.2.2.76**
- AFE application: **P3.3.2.2.86**

Use this parameter to select the digital input signal for the temperature status of the enclosure.

By default, temperature is OK when the signal is active. To invert the signal, so that temperature is OK when the signal is inactive, use parameter ID 3736.

7.497 (ID 3730) Enclosure Temperature Status 3.1

Location in the menu:

- INU application: **P3.17.2.2.77**
- AFE application: **P3.3.2.2.87**

Use this parameter to select the digital input signal for the temperature status of the enclosure.

By default, temperature is OK when the signal is active. To invert the signal, so that temperature is OK when the signal is inactive, use parameter ID 3736.

7.498 (ID 3731) Enclosure Temperature Status 3.2

Location in the menu:

- INU application: **P3.17.2.2.78**
- AFE application: **P3.3.2.2.88**

Use this parameter to select the digital input signal for the temperature status of the enclosure.

By default, temperature is OK when the signal is active. To invert the signal, so that temperature is OK when the signal is inactive, use parameter ID 3736.

7.499 (ID 3732) Enclosure Temperature Status 3.3

Location in the menu:

- INU application: **P3.17.2.2.79**
- AFE application: **P3.3.2.2.89**

Use this parameter to select the digital input signal for the temperature status of the enclosure.

By default, temperature is OK when the signal is active. To invert the signal, so that temperature is OK when the signal is inactive, use parameter ID 3736.

7.500 (ID 3733) Enclosure Temperature Status 4.1

Location in the menu:

- INU application: **P3.17.2.2.80**
- AFE application: **P3.3.2.2.90**

Use this parameter to select the digital input signal for the temperature status of the enclosure.

By default, temperature is OK when the signal is active. To invert the signal, so that temperature is OK when the signal is inactive, use parameter ID 3736.

7.501 (ID 3734) Enclosure Temperature Status 4.2

Location in the menu:

- INU application: **P3.17.2.2.81**
- AFE application: **P3.3.2.2.91**

Use this parameter to select the digital input signal for the temperature status of the enclosure.

By default, temperature is OK when the signal is active. To invert the signal, so that temperature is OK when the signal is inactive, use parameter ID 3736.

7.502 (ID 3735) Enclosure Temperature Status 4.3

Location in the menu:

- INU application: **P3.17.2.2.82**
- AFE application: **P3.3.2.2.92**

Use this parameter to select the digital input signal for the temperature status of the enclosure.

By default, temperature is OK when the signal is active. To invert the signal, so that temperature is OK when the signal is inactive, use parameter ID 3736.

7.503 (ID 3736) Enclosure Humidity, Temp Status Invert

Location in the menu:

- INU application: **P3.17.2.2.66**
- AFE application: **P3.3.2.2.76**

Use this parameter to invert the enclosure humidity and temperature status signals (IDs 3720–3735).

7.504 (ID 4001) Acceleration Compensation Filter TC

Location in the menu: **P3.1.2.4.4**

Use this parameter to set the acceleration compensation filter TC.

7.505 (ID 4003) AFE In Use?

Location in the menu: **P3.1.2.5.3**

Use this parameter to set the front-end type of the AC drive.

- Set the parameter to 1 (Yes), if the drive has an active front end (AFE).
- Set the parameter to 0 (No), if the drive has a passive front end (diode front end, DFE).

7.506 (ID 4004) Overvoltage Control Reference Selection

Location in the menu: **P3.1.2.5.4**

Use this parameter to set the high voltage level in closed-loop mode:

- Supply voltage.
- DC voltage high maximum.
- Parameter DC voltage high limit.

7.507 (ID 4005) Overvoltage Control Reference

Location in the menu: **P3.1.2.5.5**

Use this parameter to set the reference voltage for overvoltage control.

7.508 (ID 4006) Motor Voltage Fault Limit

Location in the menu: **P3.1.3.13**

Use this parameter to set the motor voltage fault limit.

7.509 (ID 4007) Input Phase Fault Ripple Limit

Location in the menu:

- INU application: **P3.1.3.14**
- AFE application: **P3.8.1.12**

Use this parameter to set the voltage ripple limit for the input phase supervision.

7.510 (ID 4010) Torque Reference Interpolation Time

Location in the menu: **P3.3.2.9**

Use this parameter to set the interpolator time constant in seconds for the torque reference input. The function makes step type changes more linear. If the parameter is set to 0, the function is not used.

7.511 (ID 4011) Torque Reference Ramp Time

Location in the menu: **P3.3.2.8**

Use this parameter to set the ramp time for the nominal torque step in seconds. If the parameter is set to 0, the function is not used.

7.512 (ID 4015) Torque Reference Gain

Location in the menu: **P3.3.2.7**

Use this parameter to set the gain for the torque reference.

7.513 (ID 4017) Flux Ready Limit

Location in the menu: **P3.1.5.14**

Use this parameter to set the limit for Flux ready. The Flux ready bit is enabled in CW when rotor flux is above this limit for sensorless modes.

7.514 (ID 4020) Closed Loop Motoring Torque Limit

Location in the menu: **P3.1.3.7**

Use this parameter to set the additional torque limit for the motoring torque direction between 0.0–300.0%. 100% equals to motor nominal torque.

7.515 (ID 4021) Closed Loop Generative Torque Limit

Location in the menu: **P3.1.3.8**

Use this parameter to set the additional torque limit for the generative torque direction between 0.0–300.0%. 100% equals to motor nominal torque.

7.516 (ID 4022) Closed Loop Motoring Power Limit

Location in the menu: **P3.1.3.9**

Use this parameter to set the motoring electric power limit between 0.0–300.0%. 100% equals to motor nominal power ($\sqrt{3}\times U_n\times I_n$).

7.517 (ID 4023) Closed Loop Generating Power Limit

Location in the menu: **P3.1.3.10**

Use this parameter to set the generating electric power limit between 0.0–300.0%. 100% equals to motor nominal power ($\sqrt{3}\times U_n\times I_n$).

7.518 (ID 4025) Speed Error Filter

Location in the menu: **P3.1.2.4.8**

Use this parameter to set the filtering time for the speed reference and the actual speed error.

7.519 (ID 4026) Motor Speed Filter Time

Location in the menu: **P3.11.6**

Use this parameter to set the *Motor Speed Filter Time*. A value higher than 0 activates the low pass filtering function for this signal. The filtering time is the time it takes to reach 63% of a step change in the signal.

7.520 (ID 4027) FW Control Kp

Location in the menu: **P3.1.5.12**

Use this parameter to set a value for FW Control Kp in percent.

7.521 (ID 4028) FW Control Ti

Location in the menu: **P3.1.5.13**

Use this parameter to set a value for FW Control Ti in seconds.

7.522 (ID 4030) Speed Error Limit

Location in the menu: **P3.9.11.2**

Use this parameter to set the limit when the speed error fault is generated. The limit is the maximum difference between the speed reference and the encoder speed. When the difference goes outside this limit, a fault occurs.

7.523 (ID 4031) Speed Error Delay

Location in the menu: **P3.9.11.3**

Use this parameter to set the delay after which the AC drive goes to *FAULT* state when there is a speed error.

7.524 (ID 4032) Speed Error Fault Response

Location in the menu: **P3.9.11.1**

Use this parameter to select the response of the drive to the speed error (fault ID 1061).

7.525 (ID 4034) Speed Difference Limit

Location in the menu: **P3.9.11.6**

Use this parameter to set the limit (difference between successive encoder measurements) when the fault situation is noted.

7.526 (ID 4035) Speed Difference Fault Delay

Location in the menu: **P3.9.11.7**

Use this parameter to set the delay before the speed error is considered as a fault.

7.527 (ID 4036) Speed Delta Error Fault Response

Location in the menu: **P3.9.11.5**

Use this parameter to set the response of the drive to the speed measurement difference error (fault ID 1740).

7.528 (ID 4038) Output Filter

Location in the menu: **P3.9.1.17**

Use this parameter to set the response when the Output Filter fault is detected.

7.529 (ID 4039) Current Imbalance - Belt

Location in the menu:

- INU application: **P3.9.1.19**
- AFE application: **P3.8.1.13**

Use this parameter to set the response when the current imbalance exceeds the threshold on the same phase between parallel belts.

7.530 (ID 4040) Neutral to Ground Fault Response

Location in the menu:

- INU application: **P3.9.1.20**
- AFE application: **P3.8.1.14**
- BCU application: **P3.6.1.10**

Use this parameter to set the response when a neutral to ground fault is detected on the phase modules.

7.531 (ID 4401) STO Status

Location in the menu: **P3.5.1.38**

STO status feedback from STO safety relay.

7.532 (ID 5001) DC Voltage Reference

Location in the menu:

- AFE application: **P3.2.3.1**

Use this parameter to set the DC voltage reference. The value is given in percent of the nominal unit voltage.

7.533 (ID 5002) DC Voltage Control KP

Location in the menu:

- AFE application: **P3.2.3.2**

Use this parameter to adjust the P-gain of the DC voltage controller.

7.534 (ID 5003) DC Voltage Control Time

Location in the menu:

- AFE application: **P3.2.3.3**

Use this parameter to adjust the integrator time constant of the DC voltage controller.

7.535 (ID 5004) Regeneration Current Limit

Location in the menu:

- AFE application: **P3.2.3.5**

Use this parameter to set the saturation current limit for the DC voltage control when the AC drive is in regenerative operation mode. Give the value in percent of the nominal current.

7.536 (ID 5005) Motoring Current Limit

Location in the menu:

- AFE application: **P3.2.3.4**

Use this parameter to set the saturation current limit for the DC voltage control when the AC drive is in motor operation mode. Give the value in percent of the nominal current.

7.537 (ID 5010) Reactive Current Reference

Location in the menu:

- AFE application: **P3.2.6.1**

Use this parameter to set the current reference for the reactive power control. Give the value in percent of the nominal current of the unit.

7.538 (ID 5011) PFC Control KI

Location in the menu:

- AFE application: **P3.2.6.3**

Use this parameter to set the integral gain value for the reactive current control.

7.539 (ID 5012) Reactive Current Limit

Location in the menu:

- AFE application: **P3.2.6.2**

Use this parameter to set the saturation current limit for the reactive current control. Give the value in percent of the nominal current.

7.540 (ID 5015) Nominal Grid Voltage

Location in the menu:

- AFE application: **P3.1.1.1**

Use this parameter to set the nominal line-to-line voltage of the supply network.

7.541 (ID 5016) Nominal Grid Frequency

Location in the menu:

- AFE application: **P3.1.1.2**

Use this parameter to set the nominal frequency of the supply network.

7.542 (ID 5020) Grid Voltage Feedback Mode

Location in the menu:

- AFE application: **P3.1.1.3**

Use this parameter to set the location of the supply network voltage measurement.

7.543 (ID 5021) Grid Voltage Feedback Channel A

Location in the menu:

- AFE application: **P3.1.1.4**

Use this parameter to set the supply network voltage measurement type for channel A.

7.544 (ID 5022) Grid Voltage Feedback Channel B

Location in the menu:

- AFE application: **P3.1.1.5**

Use this parameter to set the supply network voltage measurement type for channel B.

7.545 (ID 5023) Grid Voltage Feedback Channel C

Location in the menu:

- AFE application: **P3.1.1.6**

Use this parameter to set the supply network voltage measurement type for channel C.

7.546 (ID 5024) Grid Voltage Feedback Scale

Location in the menu:

- AFE application: **P3.1.1.7**

Use this parameter to set the nominal secondary voltage of the potential transformer.

7.547 (ID 5030) Filter Topology

Location in the menu:

- AFE application: **P3.1.1.8**

Use this parameter to set the input filter type (LCL or LC).

7.548 (ID 5039) Regen Filter Select

Location in the menu:

- INU application: **P3.1.2.9.1**
- AFE application: **P3.1.1.9**

Use this parameter to set the AFE power unit type for the regen filter.

7.549 (ID 5040) Special Filter Index

Location in the menu:

- INU application: **P3.1.2.9.2**
- AFE application: **P3.1.1.10**

Use this parameter to set the special filter index value.

7.550 (ID 5053) Virtual LCCL Mix

Location in the menu:

- AFE application: **P3.2.4.5**

Use this parameter to set the virtual LCCL mix value in percent.

7.551 (ID 5054) Active Damp Resistance

Location in the menu:

- INU application: **P3.1.2.9.3**
- AFE application: **P3.2.4.1**

Use this parameter to set the quantity of virtual resistance damping. Give the value in % of the system base impedance.

7.552 (ID 5055) Active Damp Cutoff Frequency

Location in the menu: **P3.1.2.9.4**

Use this parameter to set the active damping cutoff frequency in Hz.

7.553 (ID 5060) Line PLL Gain

Location in the menu:

- AFE application: **P3.2.5.1**

Use this parameter to set the gain value for the line PLL.

7.554 (ID 5061) Line PLL Integration Time

Location in the menu:

- AFE application: **P3.2.5.2**

Use this parameter to set the integration time for the line PLL.

7.555 (ID 5062) PLL Minimum Frequency

Location in the menu:

- AFE application: **P3.2.5.3**

Use this parameter to set the minimum frequency for the line PLL.

7.556 (ID 5063) PLL Maximum Frequency

Location in the menu:

- AFE application: **P3.2.5.4**

Use this parameter to set the maximum frequency for the line PLL.

7.557 (ID 5064) Reference Frame Adapt Angle

Location in the menu:

- AFE application: **P3.2.5.5**

Use this parameter to set the reference frame adapt angle.

7.558 (ID 6040) RO1 Function

Location in the menu:

- INU application: **P3.5.3.6.1**
- AFE application: **P3.5.3.6.1**

Use this parameter to select a function or a signal that is connected to the relay output.

Selection number	Selection name	Description
0	Not used	The output is not used.
1	TEST (Always closed)	
2	Ready	The AC drive is ready to operate.
3	Run	The AC drive operates (the motor runs).
4	General fault	A fault trip occurred.
5	General fault inverted	A fault trip did not occur.
6	General alarm	An alarm occurred.
7	Fieldbus Control Word bit 13	The digital (relay) output control from the Fieldbus control word bit 13.
8	Fieldbus Control Word bit 14	The digital (relay) output control from the Fieldbus control word bit 14.
9	Fieldbus Control Word bit 15	The digital (relay) output control from the Fieldbus control word bit 15.
10	Fieldbus Process Data In1 bit 0	The digital (relay) output control from the Fieldbus Process Data In1, bit 0.
11	Fieldbus Process Data In1 bit 1	The digital (relay) output control from the Fieldbus Process Data In1, bit 1.
12	Fieldbus Process Data In1 bit 2	The digital (relay) output control from the Fieldbus Process Data In1, bit 2.
13	Main contactor permissive	The permission to close the main contactor is given.
14	Main contactor close	The main contactor is closed.

Selection number	Selection name	Description
15	Precharge permissive	The permission to start the precharge operation is given.
16	GSW unlock	–
17	Run cooling	–
18	Close breaker	–
19	STO active	–
20	Pulse close breaker	–
21	Pulse open breaker	–

7.559 (ID 6041) RO2 Function

Location in the menu:

- INU application: **P3.5.3.6.2**
- AFE application: **P3.5.3.6.2**

Use this parameter to select a function or a signal that is connected to the relay output. See 7.558 (ID 6040) RO1 Function.

7.560 (ID 6042) RO3 Function

Location in the menu:

- INU application: **P3.5.3.6.3**
- AFE application: **P3.5.3.6.3**

Use this parameter to select a function or a signal that is connected to the relay output. See 7.558 (ID 6040) RO1 Function.

7.561 (ID 6400) FB DataIn 1 Selection

Location in the menu:

- INU application: **P3.6.17**
- AFE application: **P3.6.17**
- BCU application: **P3.5.17**

Use this parameter to select the fieldbus controlled data with the ID number of the parameter.

7.562 (ID 6401) FB DataIn 2 Selection

Location in the menu:

- INU application: **P3.6.18**
- AFE application: **P3.6.18**
- BCU application: **P3.5.18**

Use this parameter to select the fieldbus controlled data with the ID number of the parameter.

7.563 (ID 6402) FB DataIn 3 Selection

Location in the menu:

- INU application: **P3.6.19**
- AFE application: **P3.6.19**
- BCU application: **P3.5.19**

Use this parameter to select the fieldbus controlled data with the ID number of the parameter.

7.564 (ID 6403) FB DataIn 4 Selection

Location in the menu:

- INU application: **P3.6.20**
- AFE application: **P3.6.20**
- BCU application: **P3.5.20**

Use this parameter to select the fieldbus controlled data with the ID number of the parameter.

7.565 (ID 6404) FB DataIn 5 Selection

Location in the menu:

- INU application: **P3.6.21**
- AFE application: **P3.6.21**
- BCU application: **P3.5.21**

Use this parameter to select the fieldbus controlled data with the ID number of the parameter.

7.566 (ID 6405) FB DataIn 6 Selection

Location in the menu:

- INU application: **P3.6.22**
- AFE application: **P3.6.22**
- BCU application: **P3.5.22**

Use this parameter to select the fieldbus controlled data with the ID number of the parameter.

7.567 (ID 6406) FB DataIn 7 Selection

Location in the menu:

- INU application: **P3.6.23**
- AFE application: **P3.6.23**
- BCU application: **P3.5.23**

Use this parameter to select the fieldbus controlled data with the ID number of the parameter.

7.568 (ID 6407) FB DataIn 8 Selection

Location in the menu:

- INU application: **P3.6.24**
- AFE application: **P3.6.24**
- BCU application: **P3.5.24**

Use this parameter to select the fieldbus controlled data with the ID number of the parameter.

7.569 (ID 6408) FB DataIn 9 Selection

Location in the menu:

- INU application: **P3.6.25**
- AFE application: **P3.6.25**
- BCU application: **P3.5.25**

Use this parameter to select the fieldbus controlled data with the ID number of the parameter.

7.570 (ID 6409) FB DataIn 10 Selection

Location in the menu:

- INU application: **P3.6.26**
- AFE application: **P3.6.26**
- BCU application: **P3.5.26**

Use this parameter to select the fieldbus controlled data with the ID number of the parameter.

7.571 (ID 6410) FB DataIn 11 Selection

Location in the menu:

- INU application: **P3.6.27**
- AFE application: **P3.6.27**
- BCU application: **P3.5.27**

Use this parameter to select the fieldbus controlled data with the ID number of the parameter.

7.572 (ID 6411) FB DataIn 12 Selection

Location in the menu:

- INU application: **P3.6.28**
- AFE application: **P3.6.28**
- BCU application: **P3.5.28**

Use this parameter to select the fieldbus controlled data with the ID number of the parameter.

7.573 (ID 6412) FB DataIn 13 Selection

Location in the menu:

- INU application: **P3.6.29**
- AFE application: **P3.6.29**
- BCU application: **P3.5.29**

Use this parameter to select the fieldbus controlled data with the ID number of the parameter.

7.574 (ID 6413) FB DataIn 14 Selection

Location in the menu:

- INU application: **P3.6.30**
- AFE application: **P3.6.30**
- BCU application: **P3.5.30**

Use this parameter to select the fieldbus controlled data with the ID number of the parameter.

7.575 (ID 6414) FB DataIn 15 Selection

Location in the menu:

- INU application: **P3.6.31**
- AFE application: **P3.6.31**
- BCU application: **P3.5.31**

Use this parameter to select the fieldbus controlled data with the ID number of the parameter.

7.576 (ID 6415) FB DataIn 16 Selection

Location in the menu:

- INU application: **P3.6.32**
- AFE application: **P3.6.32**
- BCU application: **P3.5.32**

Use this parameter to select the fieldbus controlled data with the ID number of the parameter.

7.577 (ID 6417) Fieldbus Profile

Location in the menu:

- INU application: **P3.6.33**
- AFE application: **P3.6.33**

Use this parameter to select the fieldbus profile.

- 1: Standard.
- 2: Bypass.

7.578 (ID 10050) AO1 Function

Location in the menu:

- INU application: **P3.5.4.1.1**
- AFE application: **P3.5.4.1.1**
- BCU application: **P3.4.4.1.1**

Use this parameter to select a function or a signal that is connected to the analog output. The contents of the analog output signal 1 are specified in this parameter. The scaling of the analog output signal depends on the signal.

Selection number	Selection name	Description
0	Test 0% (Not used)	The analog output is set to 0% or 20% so that it agrees with parameter P3.5.4.1.3.
1	TEST 100%	The analog output is set to 100% of the signal (10V / 20mA).
2	Output frequency	The actual output frequency from 0 to Maximum frequency reference.
3	Frequency reference	The actual frequency reference from 0 to Maximum frequency reference.
4	Motor speed	The actual motor speed from 0 to Motor nominal speed.
5	Output current	The output current of the drive from 0 to Motor nominal current.
6	Motor torque	The actual motor torque from 0 to motor nominal torque (100%).
7	Motor power	The actual motor power from 0 to Motor nominal power (100%).
8	Motor voltage	The actual motor voltage from 0 to Motor nominal voltage.
9	DC-link voltage	The actual DC-link voltage 0…1000 V.
10	PID Setpoint	The actual setpoint value of the PID Controller (0…100%).
11	PID Feedback	The actual feedback value of the PID Controller (0…100%).
12	PID output	The output of the PID controller (0…100%).
13	Fieldbus Process Data In 1	Fieldbus Process Data In 1: 0…10000 (this agrees with 0… 100.00%).
14	Fieldbus Process Data In 2	Fieldbus Process Data In 2: 0…10000 (this agrees with 0… 100.00%).
15	Fieldbus Process Data In 3	Fieldbus Process Data In 3: 0…10000 (this agrees with 0… 100.00%).
16	Fieldbus Process Data In 4	Fieldbus Process Data In 4: 0…10000 (this agrees with 0… 100.00%).
17	Fieldbus Process Data In 5	Fieldbus Process Data In 5: 0…10000 (this agrees with 0… 100.00%).
18	Fieldbus Process Data In 6	Fieldbus Process Data In 6: 0…10000 (this agrees with 0… 100.00%).
19	Fieldbus Process Data In 7	Fieldbus Process Data In 7: 0…10000 (this agrees with 0… 100.00%).
20	Fieldbus Process Data In 8	Fieldbus Process Data In 8: 0…10000 (this agrees with 0… 100.00%).

Selection number	Selection name	Description
0	Test 0% (Not used)	The analog output is set to 0% or 20% so that it agrees with parameter P3.5.4.1.3.
1	TEST 100%	The analog output is set to 100% of the signal (10V / 20mA).

Selection number	Selection name	Description
2	Output frequency	The actual output frequency from 0 to Maximum frequency reference.
3	Frequency reference	The actual frequency reference from 0 to Maximum frequency reference.
4	Motor speed	The actual motor speed from 0 to Motor nominal speed.
5	Output current	The output current of the drive from 0 to Motor nominal current.
6	Motor torque	The actual motor torque from 0 to motor nominal torque (100%).
7	Motor power	The actual motor power from 0 to Motor nominal power (100%).
8	Motor voltage	The actual motor voltage from 0 to Motor nominal voltage.
9	DC-link voltage	The actual DC-link voltage 0…1000 V.
10	Fieldbus Process Data In 1	Fieldbus Process Data In 1: 0…10000 (this agrees with 0… 100.00%).
11	Fieldbus Process Data In 2	Fieldbus Process Data In 2: 0…10000 (this agrees with 0… 100.00%).
12	Fieldbus Process Data In 3	Fieldbus Process Data In 3: 0…10000 (this agrees with 0… 100.00%).
13	Fieldbus Process Data In 4	Fieldbus Process Data In 4: 0…10000 (this agrees with 0… 100.00%).
14	Fieldbus Process Data In 5	Fieldbus Process Data In 5: 0…10000 (this agrees with 0… 100.00%).
15	Fieldbus Process Data In 6	Fieldbus Process Data In 6: 0…10000 (this agrees with 0… 100.00%).
16	Fieldbus Process Data In 7	Fieldbus Process Data In 7: 0…10000 (this agrees with 0… 100.00%).
17	Fieldbus Process Data In 8	Fieldbus Process Data In 8: 0…10000 (this agrees with 0… 100.00%).

7.579 (ID 10051) AO1 Filter Time

Location in the menu:

- INU application: **P3.5.4.1.2**
- AFE application: **P3.5.4.1.2**
- BCU application: **P3.4.4.1.2**

Use this parameter to set the filtering time for the analog signal. The filtering function is disabled when the filtering time is 0. See ID 378.

7.580 (ID 10052) AO1 Minimum

Location in the menu:

- INU application: **P3.5.4.1.3**
- AFE application: **P3.5.4.1.3**
- BCU application: **P3.4.4.1.3**

Use this parameter to change the range of the analog output signal. For example, if '4 mA' is selected, the range of analog output signal is 4...20 mA. Select the signal type (current/voltage) with the DIP switches. The analog output scaling is different in ID 10053. See also ID 379.

7.581 (ID 10053) AO1 Minimum Scale

Location in the menu:

- INU application: **P3.5.4.1.4**
- AFE application: **P3.5.4.1.4**
- BCU application: **P3.4.4.1.4**

Use this parameter to scale the analog output signal. The scaling values (min and max) are given in the process unit that is specified by the selection of the AO function.

7.582 (ID 10054) AO1 Maximum Scale

Location in the menu:

- INU application: **P3.5.4.1.5**
- AFE application: **P3.5.4.1.5**
- BCU application: **P3.4.4.1.5**

Use this parameter to scale the analog output signal. The scaling values (min and max) are given in the process unit that is specified by the selection of the AO function.

For example, you can select the output frequency of the drive for the contents of the analog output signal, and set parameters ID 10053 and ID 10054 between 10 and 40 Hz. Then the output frequency of the drive changes between 10 and 40 Hz, and the analog output signal changes between 0 and 20 mA.

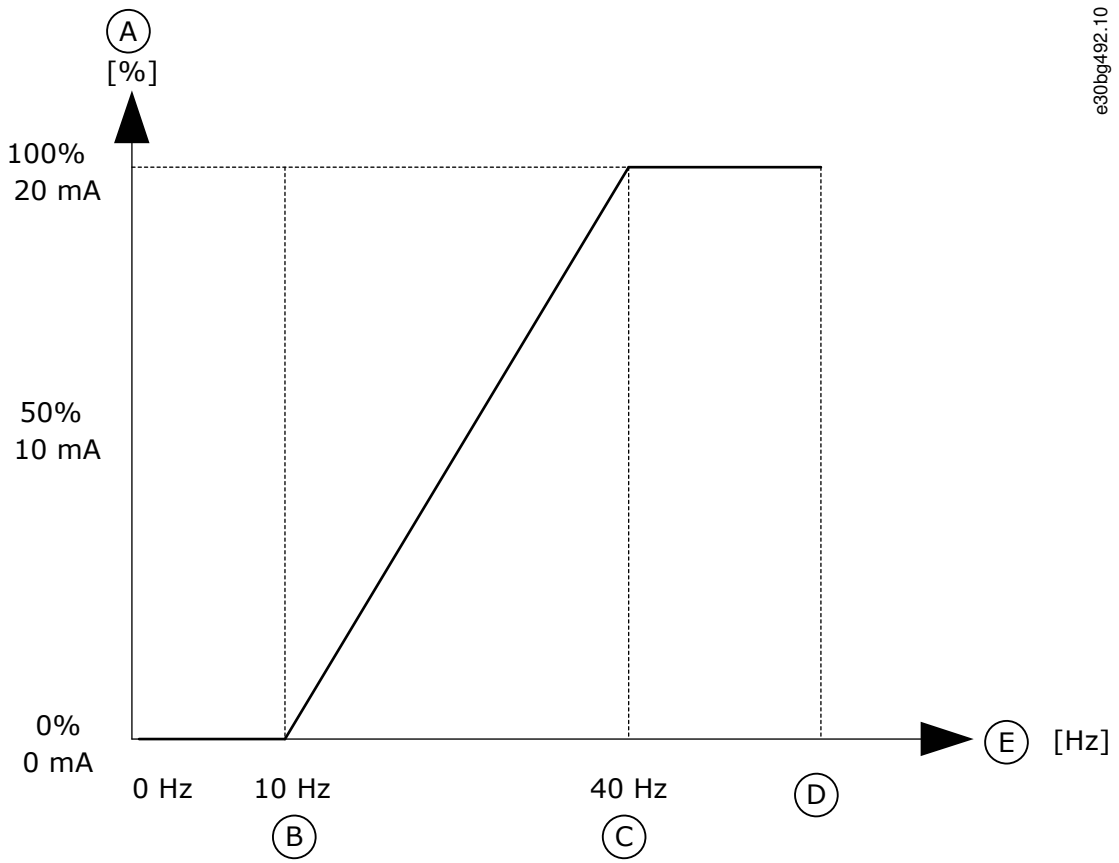


Illustration 53: Scaling of the AO1 signal

A	Analog output signal	D	Max freq reference
B	AO min scale	E	Output frequency
C	AO max scale		

7.583 (ID 11001) RO1 Function

Location in the menu:

- INU application: **P3.5.3.2.1**
- AFE application: **P3.5.3.2.1**
- BCU application: **P3.4.3.2.1**

Use this parameter to select a function or a signal that is connected to the relay output.

Selection number	Selection name	Description
0	Not used	The output is not used.
1	TEST (Always closed)	
2	Ready	The AC drive is ready to operate.
3	Run	The AC drive operates (the motor runs).
4	General fault	A fault trip occurred.
5	General fault inverted	A fault trip did not occur.
6	General alarm	An alarm occurred.
7	Reversed	The reverse command is given.
8	At speed	The output frequency has become the same as the set frequency reference.
9	Thermistor fault	A thermistor fault occurred.
10	Motor regulator activated	One of the limit regulators (for example current limit or torque limit) is activated.
11	Start signal active	The start command of the drive is active.
12	Keypad control active	The selection is keypad control (the active control place is keypad).
13	I/O control B active	The selection is I/O control place B (the active control place is I/O B).
14	Limit supervision 1	The limit supervision activates if the signal value goes below or above the set supervision limit (P3.8.3 or P3.8.7).
15	Limit supervision 2	The limit supervision activates if the signal value goes below or above the set supervision limit (P3.8.3 or P3.8.7).
16	Jogging active	The Jogging function is active.
17	Preset Frequency active	The selection of preset frequency was made with digital input signals.
18	Quick Stop active	The Quick stop function is activated.
19	PID in Sleep mode	The PID controller is in the sleep mode.
20	Fieldbus Control Word bit 13	The digital (relay) output control from the Fieldbus control word bit 13.
21	Fieldbus Control Word bit 14	The digital (relay) output control from the Fieldbus control word bit 14.
22	Fieldbus Control Word bit 15	The digital (relay) output control from the Fieldbus control word bit 15.
23	Fieldbus Process Data In1 bit 0	The digital (relay) output control from the Fieldbus Process Data In1, bit 0.
24	Fieldbus Process Data In1 bit 1	The digital (relay) output control from the Fieldbus Process Data In1, bit 1.
25	Fieldbus Process Data In1 bit 2	The digital (relay) output control from the Fieldbus Process Data In1, bit 2.
26	Mechanical brake control	The Open mechanical brake command.
27	Mechanical brake control (Inverted)	The Open mechanical brake command (inverted).
28	Motor Switch Open	The Motor Switch function has detected that the switch between the drive and the motor is open.
29	Main contactor permissive	The permission to close the main contactor is given.

Selection number	Selection name	Description
30	Main contactor close	The main contactor is closed.
31	Precharge permissive	The permission to start the precharge operation is given
32	INU run enable	INU operation is enabled.
33	Precharge ready	The precharge operation is ready to start.
34	Precharge started	The precharge operation started.
35	Precharge inhibit	The precharge operation is prevented.
36	Precharge coil	
37	HXL coil	
38	MV HX coil	
39	LV HX coil	
40	MCB coil	

Selection number	Selection name	Description
0	Not used	The output is not used.
1	TEST (Always closed)	
2	Ready	The AC drive is ready to operate.
3	Run	The AC drive operates (the motor runs).
4	General fault	A fault trip occurred.
5	General fault inverted	A fault trip did not occur.
6	General alarm	An alarm occurred.
7	Reversed	The reverse command is given.
8	At speed	The output frequency has become the same as the set frequency reference.
9	Thermistor fault	A thermistor fault occurred.
10	Motor regulator activated	One of the limit regulators (for example current limit or torque limit) is activated.
11	Start signal active	The start command of the drive is active.
12	Keypad control active	The selection is keypad control (the active control place is keypad).
13	Limit supervision 1	The limit supervision activates if the signal value goes below or above the set supervision limit (P3.8.3 or P3.8.7).
14	Limit supervision 2	The limit supervision activates if the signal value goes below or above the set supervision limit (P3.8.3 or P3.8.7).
15	Fieldbus Control Word bit 13	The digital (relay) output control from the Fieldbus control word bit 13.
16	Fieldbus Control Word bit 14	The digital (relay) output control from the Fieldbus control word bit 14.
17	Fieldbus Control Word bit 15	The digital (relay) output control from the Fieldbus control word bit 15.

Selection number	Selection name	Description
18	Fieldbus Process Data In1 bit 0	The digital (relay) output control from the Fieldbus Process Data In1, bit 0.
19	Fieldbus Process Data In1 bit 1	The digital (relay) output control from the Fieldbus Process Data In1, bit 1.
20	Fieldbus Process Data In1 bit 2	The digital (relay) output control from the Fieldbus Process Data In1, bit 2.
21	Main contactor permissive	The permission to close the main contactor is given.
22	Main contactor close	The main contactor is closed.
23	Precharge permissive	The permission to start the precharge operation is given
24	INU run enable	INU operation is enabled.
25	Precharge ready	The precharge operation is ready to start.
26	Precharge started	The precharge operation started.
27	Precharge inhibit	The precharge operation is prevented.
28	Precharge coil	
29	HXL coil	
30	MV HX coil	
31	LV HX coil	
32	MCB coil	

7.584 (ID 11002) RO1 ON Delay

Location in the menu:

- INU application: **P3.5.3.2.2**
- AFE application: **P3.5.3.2.2**
- BCU application: **P3.4.3.2.2**

Use this parameter to set the ON delay for the relay output.

7.585 (ID 11003) RO1 OFF Delay

Location in the menu:

- INU application: **P3.5.3.2.3**
- AFE application: **P3.5.3.2.3**
- BCU application: **P3.4.3.2.3**

Use this parameter to set the OFF delay for the relay output.

7.586 (ID 11004) RO2 Function

Location in the menu:

- INU application: **P3.5.3.2.4**
- AFE application: **P3.5.3.2.4**
- BCU application: **P3.4.3.2.4**

Use this parameter to select a function or a signal that is connected to the relay output. See 7.583 (ID 11001) RO1 Function.

7.587 (ID 11005) RO2 ON Delay

Location in the menu:

- INU application: **P3.5.3.2.5**
- AFE application: **P3.5.3.2.5**
- BCU application: **P3.4.3.2.5**

Use this parameter to set the ON delay for the relay output.

7.588 (ID 11006) RO2 OFF Delay

Location in the menu:

- INU application: **P3.5.3.2.6**
- AFE application: **P3.5.3.2.6**
- BCU application: **P3.4.3.2.6**

Use this parameter to set the OFF delay for the relay output.

7.589 (ID 11007) RO3 Function

Location in the menu:

- INU application: **P3.5.3.2.7**
- AFE application: **P3.5.3.2.7**
- BCU application: **P3.4.3.2.7**

Use this parameter to select a function or a signal that is connected to the relay output. The parameter is not visible if only 2 output relays are installed. See 7.583 (ID 11001) RO1 Function.

7.590 (ID 11008) RO3 ON Delay

Location in the menu: **P3.5.3.2.8**

Use this parameter to set the ON delay for the relay output. The parameter is not visible if only 2 output relays are installed.

7.591 (ID 11009) RO3 OFF Delay

Location in the menu: **P3.5.3.2.9**

Use this parameter to set the OFF delay for the relay output. The parameter is not visible if only 2 output relays are installed.

7.592 (ID 15523) User Defined Fault 1

- Location in the menu: **P3.5.1.32** (In I/O Configuration parameter menu)
- Location in the menu: **P3.9.9.1** (In Protections parameter menu)

Use this parameter to set the digital input signal that activates *User Defined Fault 1* (Fault ID 1114).

7.593 (ID 15524) User Defined Fault 2

- Location in the menu: **P3.5.1.33** (In I/O Configuration parameter menu)
- Location in the menu: **P3.9.10.1** (In Protections parameter menu)

Use this parameter to set the digital input signal that activates *User Defined Fault 2* (Fault ID 1115).

7.594 (ID 15525) Response to User Defined Fault 1

Location in the menu: **P3.9.9.2**

Use this parameter to select the response of the drive to User Defined Fault 1 (Fault ID 1114).

7.595 (ID 15526) Response to User Defined Fault 2

Location in the menu: **P3.9.10.2**

Use this parameter to select the response of the drive to User Defined Fault 2 (Fault ID 1115).

7.596 (ID 15647) Frequency Filter Time Constant

Location in the menu: **P3.1.5.10**

Use this parameter to set the filter time constant for the shaft frequency estimate in sensorless control.

8 Fault tracing

8.1 Fault Types

When the control diagnostics of the AC drive finds an unusual condition in the operation of the drive, the drive shows a notification about the condition. The notification can be seen on the display of the control panel. The display shows the code, the name, and a short description of the fault or alarm.

The source info tells the source of the fault, what caused it, where it occurred, and other data.

There are 3 different types of notification.

- An **info** does not affect the operation of the drive. Reset the info.
- An **alarm** informs of unusual operation on the drive. It does not stop the drive. Reset the alarm.
- A **fault** stops the drive. Reset the drive and find a solution to the problem.

It is possible to program different responses for some faults in the application. See 4.5.9 Group 3.9: Protections.

Reset the fault with the [BACK/RESET] button on the keypad, or through the I/O terminal, fieldbus, or PC tool. The faults stay in the Fault history where they can be examined. See the different fault codes in 8.2 Fault Code Definitions and Troubleshooting.

Before contacting the distributor or the factory because of unusual operation, prepare some data. Write down:

- All the texts on the display.
- The fault code.
- The fault ID.
- The source information.
- The *Active Faults* list.
- The *Fault History*.

8.2 Fault Code Definitions and Troubleshooting

8.2.1 Fault Code 1 - Overcurrent

8.2.1.1 Fault Code 1, ID 1 - Overcurrent (Hardware Fault)

Cause

There is too high a current (> 4 × I_H) in the motor cable.

- a sudden heavy load increase
- a short circuit in the motor cables
- the motor is not the correct type
- the parameter settings are not properly made

Troubleshooting

- Check the loading.
- Check the motor.
- Check the cables and connections.
- Make an identification run.
- Set the acceleration time longer (P3.4.1.2 and P3.4.2.2).

8.2.1.2 Fault Code 1, ID 2 - Overcurrent (Software Fault)

Cause

Troubleshooting

- Check the loading.
- Check the motor.
- Check the cables and connections.
- Make an identification run.
- Set the acceleration time longer (P3.4.1.2 and P3.4.2.2).

8.2.1.3 Fault Code 1, ID 4 - Phase Overcurrent

Cause

The phase current is too high.

Troubleshooting

- Check the loading.
- Check the motor.
- Check the cables and connections.
- Make an identification run.
- Set the acceleration time longer (P3.4.1.2 and P3.4.2.2).

8.2.2 Fault Code 2 - Overvoltage

8.2.2.1 Fault Code 2, ID 10 - Overvoltage (Hardware Fault)

Cause

The DC link voltage is higher than the limits.

- too short a deceleration time
- high overvoltage spikes in the supply

Troubleshooting

- Set the deceleration time longer (P3.4.1.3 and P3.4.2.3).
- Use a brake chopper. It is available as an option.
- Activate the overvoltage controller.
- Check the input voltage.

8.2.2.2 Fault Code 2, ID 11 - Overvoltage (Software Fault)

Cause

The DC link voltage is higher than the limits.

- too short a deceleration time
- high overvoltage spikes in the supply

Troubleshooting

- Set the deceleration time longer (P3.4.1.3 and P3.4.2.3).
- Use a brake chopper. It is available as an option.
- Activate the overvoltage controller.
- Check the input voltage.

8.2.2.3 Fault Code 2, ID 13 - DC+ Overvoltage

Cause

The positive DC-link voltage is higher than the limits.

- too short a deceleration time
- high overvoltage spikes in the supply

Troubleshooting

- Set the deceleration time longer (P3.4.1.3 and P3.4.2.3).
- Use a brake chopper. It is available as an option.
- Activate the overvoltage controller.
- Check the input voltage.

8.2.2.4 Fault Code 2, ID 14 - DC- Overvoltage

Cause

The negative DC-link voltage is higher than the limits.

- too short a deceleration time
- high overvoltage spikes in the supply

Troubleshooting

- Set the deceleration time longer (P3.4.1.3 and P3.4.2.3).
- Use a brake chopper. It is available as an option.
- Activate the overvoltage controller.
- Check the input voltage.

8.2.2.5 Fault Code 2, ID 16 - DC-Link Overvoltage

Cause

The DC-link voltage is too high for the motor.

Troubleshooting

- Set the deceleration time longer (P3.4.1.3 and P3.4.2.3).
- Use a brake chopper. It is available as an option.
- Activate the overvoltage controller.
- Check the input voltage.

8.2.3 Fault Code 3 - Earth Fault

8.2.3.1 Fault Code 3, ID 20 - Earth Fault (Hardware Fault)

Cause

The ground current sensor has detected a too high current flowing to the ground or the current measurement has detected that the sum of output phase currents is not zero (0 A).

- an insulation malfunction in the cables or the motor
- a filter (dU/dt, sine) malfunction

Troubleshooting

- Check the motor cables and the motor.
- Check the filters.

8.2.3.2 Fault Code 3, ID 21 - Earth fault (Software Fault)

Cause

The ground current sensor has detected a too high current flowing to the ground or the current measurement has detected that the sum of output phase currents is not zero (0 A).

- an insulation malfunction in the cables or the motor
- a filter (dU/dt, sine) malfunction

Troubleshooting

- Check the motor cables and the motor.
- Check the filters.

8.2.3.3 Fault Code 3, ID 22 - Ground Fault

Cause

The DC link neutral to ground voltage is higher than the fault level.

Troubleshooting

- Check the motor cables and the motor.
- Check the filters.

8.2.4 Fault Code 5 - Charging Switch

8.2.4.1 Fault Code 5, ID 40 - Charging Switch

Cause

The charging switch is closed and the feedback information is OPEN.

- operation malfunction
- defective component

Troubleshooting

- Reset the fault and restart the drive.
- If the fault occurs again, ask for instructions from your nearest distributor.

8.2.5 Fault Code 7 - Saturation

8.2.5.1 Fault Code 7, ID 60 - Saturation

Cause

The fault is hardware triggered. The fault is detected by measuring the collector to emitter voltage on the IGBT module. Excessive voltage when the IGBT is on indicates excess current flow.

- Defective IGBT.
- An IGBT does not execute its operation.
- De-saturation short circuit in the IGBT.
- A short circuit or an overload in the brake resistor.
- Noise issues can cause saturation faults.
- Extreme temperatures can cause saturation faults

Troubleshooting

- Check the source information for the fault. It indicates which module to check.
- This fault cannot be reset from the control panel.
- Switch off the power.
- After switching off the power from the drive, including the control supply, switch on the control supply and try to reset the fault.
  - If the fault cannot be reset, there is probably an issue on a circuit board inside the phase module. The entire phase module must be replaced.
- If the fault is on an INU module, check the motor cables and the motor for short circuits with a Megger tester.
- **Do not connect the main power to the phase modules until all the tests are done to the modules!**
- Ask for instructions from the factory.

8.2.6 Fault Code 8 - System Fault

8.2.6.1 Fault Code 8, ID 600 - System Fault

Cause

Troubleshooting

- Reset the fault and restart the drive.
- Download the latest software from the Danfoss Drives website. Update the drive with it.
- If the fault occurs again, ask for instructions from your nearest distributor.

8.2.6.2 Fault Code 8, ID 601 - System Fault

Cause

- There is no communication between the control board and the power.

Troubleshooting

- Reset the fault and restart the drive.
- Download the latest software from the Danfoss Drives website. Update the drive with it.
- If the fault occurs again, ask for instructions from your nearest distributor.

8.2.6.3 Fault Code 8, ID 602 - System Fault

Cause

- Defective component.
- Operation malfunction.

Troubleshooting

- Reset the fault and restart the drive.
- Download the latest software from the Danfoss Drives website. Update the drive with it.
- If the fault occurs again, ask for instructions from your nearest distributor.

8.2.6.4 Fault Code 8, ID 603 - System Fault

Cause

- Defective component.
- Operation malfunction.
- The voltage of auxiliary power in the power unit is too low.

Troubleshooting

- Reset the fault and restart the drive.
- Download the latest software from the Danfoss Drives website. Update the drive with it.
- If the fault occurs again, ask for instructions from your nearest distributor.

8.2.6.5 Fault Code 8, ID 604 - System Fault

Cause

- Defective component.
- Operation malfunction.
- Output phase voltage does not agree to the reference.
- Feedback fault.

Troubleshooting

- Reset the fault and restart the drive.
- Download the latest software from the Danfoss Drives website. Update the drive with it.
- If the fault occurs again, ask for instructions from your nearest distributor.

8.2.6.6 Fault Code 8, ID 605 - System Fault

Cause

- Defective component.
- Operation malfunction.

Troubleshooting

- Reset the fault and restart the drive.
- Download the latest software from the Danfoss Drives website. Update the drive with it.
- If the fault occurs again, ask for instructions from your nearest distributor.

8.2.6.7 Fault Code 8, ID 606 - System Fault

Cause

- The software of the control unit is not compatible with the software of the power unit.

Troubleshooting

- Reset the fault and restart the drive.
- Download the latest software from the Danfoss Drives website. Update the drive with it.
- If the fault occurs again, ask for instructions from your nearest distributor.

8.2.6.8 Fault Code 8, ID 607 - System Fault

Cause

- The software version cannot be read. There is no software in the power unit.
- Defective component.

Troubleshooting

- Reset the fault and restart the drive.
- Download the latest software from the Danfoss Drives website. Update the drive with it.
- If the fault occurs again, ask for instructions from your nearest distributor.

8.2.6.9 Fault Code 8, ID 608 - System Fault

Cause

Troubleshooting

- Reset the fault and restart the drive.
- Download the latest software from the Danfoss Drives website. Update the drive with it.
- If the fault occurs again, ask for instructions from your nearest distributor.

8.2.6.10 Fault Code 8, ID 609 - System Fault

Cause

- Defective component.
- Operation malfunction.

Troubleshooting

- Reset the fault and make a power down of the drive twice.
- Download the latest software from the Danfoss Drives website. Update the drive with it.

8.2.6.11 Fault Code 8, ID 610 - System Fault

Cause

- Defective component.
- Operation malfunction.

Troubleshooting

- Reset the fault and restart.
- Download the latest software from the Danfoss Drives website. Update the drive with it.
- If the fault occurs again, ask for instructions from your nearest distributor.

8.2.6.12 Fault Code 8, ID 614 - System Fault

Cause

- Configuration error.
- Software error.
- Defective component (a defective control board).
- Operation malfunction.

Troubleshooting

- Reset the fault and restart.
- Download the latest software from the Danfoss Drives website. Update the drive with it.
- If the fault occurs again, ask for instructions from your nearest distributor.

8.2.6.13 Fault Code 8, ID 615 - System Fault

Cause

- Powerbus high-speed process data failure.
- Error in the communication between two power units.

Troubleshooting

- Reset the fault and restart.
- Download the latest software from the Danfoss Drives website. Update the drive with it.
- If the fault occurs again, ask instructions from your nearest distributor.

8.2.6.14 Fault Code 8, ID 616 - System Fault

Cause

- Powerbus high-speed socket communication failure.
- Error in the communication between two power units.

Troubleshooting

- Reset the fault and restart.
- Download the latest software from the Danfoss Drives website. Update the drive with it.
- If the fault occurs again, ask instructions from your nearest distributor.

8.2.6.15 Fault Code 8, ID 618 - System Fault

Cause

- Powerbus high-speed link error.
- Error in the communication between two power units.

Troubleshooting

- Reset the fault and restart.
- Download the latest software from the Danfoss Drives website. Update the drive with it.
- If the fault occurs again, ask instructions from your nearest distributor.

8.2.6.16 Fault Code 8, ID 620 - System Fault

Cause

- Gate driver board error A.

Troubleshooting

- Reset the fault and restart.
- Download the latest software from the Danfoss Drives website. Update the drive with it.
- If the fault occurs again, ask instructions from your nearest distributor.

8.2.6.17 Fault Code 8, ID 621 - System Fault

Cause

- Gate driver board error B.

Troubleshooting

- Reset the fault and restart.
- Download the latest software from the Danfoss Drives website. Update the drive with it.
- If the fault occurs again, ask instructions from your nearest distributor.

8.2.6.18 Fault Code 8, ID 622 - System Fault

Cause

- The connection between the gate driver board and the measurement board is broken.

Troubleshooting

- Reset the fault and restart.
- Download the latest software from the Danfoss Drives website. Update the drive with it.
- If the fault occurs again, ask instructions from your nearest distributor.

8.2.6.19 Fault Code 8, ID 623 - System Fault

Cause

- The negative voltage of the 24 V supply is below the limit.

Troubleshooting

- Reset the fault and restart.
- Download the latest software from the Danfoss Drives website. Update the drive with it.
- If the fault occurs again, ask instructions from your nearest distributor.

8.2.6.20 Fault Code 8, ID 624 - System Fault

Cause

- The positive voltage of the 24 V supply is below the limit.

Troubleshooting

- Check the 24 V power supply.

8.2.6.21 Fault Code 8, ID 625 - System Fault

Cause

- The positive voltage of the 24 V supply is below the limit in a follower unit.

Troubleshooting

- Check the 24 V power supply.

8.2.6.22 Fault Code 8, ID 647 - System Fault

Cause

- Defective component.
- Operation malfunction.

Troubleshooting

- Reset the fault and restart.
- Download the latest software from the Danfoss Drives website. Update the drive with it.
- If the fault occurs again, ask for instructions from your nearest distributor.

8.2.6.23 Fault Code 8, ID 648 - System Fault

Cause

- Operation malfunction.
- The system software is not compatible with the application.

Troubleshooting

- Reset the fault and restart.
- Download the latest software from the Danfoss Drives website. Update the drive with it.
- If the fault occurs again, ask for instructions from your nearest distributor.

8.2.6.24 Fault Code 8, ID 667 - System Fault

Cause

- Ethernet PHY is not recognized or it is in the wrong state.

Troubleshooting

- Reset the fault and restart the AC drive.
- Download the newest software from the Danfoss Drives website. Update the drive with it.
- If the fault occurs again, ask for instructions from your nearest distributor.

8.2.6.25 Fault Code 8, ID 670 - System Fault

Cause

Troubleshooting

- Check the loading of the auxiliary output.
- Reset the fault and restart the AC drive.
- Download the newest software from the Danfoss Drives website. Update the drive with it.
- If the fault occurs again, ask for instructions from your nearest distributor.

8.2.6.26 Fault Code 8, ID 681 - System Fault

Cause

- The maximum amount of datatables has been reserved.

Troubleshooting

- Reset faults and alarms that are waiting to be reset. Active faults cannot be reset.
- Return to previous working software version.
- If the fault occurs again, ask instructions from your nearest service center or distributor.

8.2.6.27 Fault Code 8, ID 827 - System Fault

Cause

- Invalid/incorrect license key provided (via keypad or VCX).
- The license key is incorrect or not for this drive.

Troubleshooting

- Reset the fault and restart the AC drive.
- Download the newest software from the Danfoss Drives website. Update the drive with it.
- If the fault occurs again, ask for instructions from your nearest distributor.

8.2.6.28 Fault Code 8, ID 828 - System Fault

Cause

- The entered license key was accepted and stored to the drive.

Troubleshooting

- No actions required. Notification only.

8.2.6.29 Fault Code 8, ID 829 - System Fault

Cause

- A license vcx-file has been loaded to the drive.
- New licenses have been taken into use since the previous start-up.

Troubleshooting

- No actions required. Notification only.

8.2.6.30 Fault Code 8, ID 830 - System Fault

Cause

- Licenses have been removed from the drive.

Troubleshooting

- No actions required. Notification only.

8.2.7 Fault Code 9 - Undervoltage

8.2.7.1 Fault Code 9, ID 80 - Undervoltage (Fault)

Cause

The DC link voltage is lower than the limits.

- too low a supply voltage
- defective component
- a defective input fuse
- the external charge switch is not closed

NOTE! This fault becomes active only if the drive is in Run state.

Troubleshooting

- If there is a temporary supply voltage break, reset the fault and restart the drive.
- Do a check of the supply voltage. If the supply voltage is sufficient, there is an internal fault.
- Examine the electrical network for fault.
- Ask for instructions from your nearest distributor.

8.2.8 Fault Code 10 - Input Phase

8.2.8.1 Fault Code 10, ID 91 - Input Phase

Cause

- supply voltage malfunction
- a defective fuse or malfunction in the supply cables

The load must be a minimum of 10–20% for the supervision to work.

Troubleshooting

- Check the supply voltage.
- Check the fuses.
- Check the supply cable.
- Check the rectifying bridge.

8.2.8.2 Fault Code 10, ID 92 - Input Phase

Cause

- Software-based input phase supervision.

Troubleshooting

- Check the supply voltage.
- Check the fuses.
- Check the supply cable.

8.2.8.3 Fault Code 10, ID 93 - Input Phase

Cause

- Software based input phase supervision

Troubleshooting

- Check the supply voltage.
- Check the fuses.
- Check the supply cable.

8.2.8.4 Fault Code 10, ID 94 - Input Phase

Cause

- Software-based input phase supervision.

Troubleshooting

- Check the supply voltage.
- Check the fuses.
- Check the supply cable.

8.2.8.5 Fault Code 10, ID 95 - Input Phase

Cause

- Software based input phase supervision.

Troubleshooting

- Check the supply voltage.
- Check the fuses.
- Check the supply cable.

8.2.8.6 Fault Code 10, ID 96 - Input Phase

Cause

- Software based input phase supervision

Troubleshooting

- Check the supply voltage.
- Check the fuses.
- Check the supply cable.

8.2.8.7 Fault Code 10, ID 192 - Input Phase (Alarm)

Cause

- Software based input phase supervision

Troubleshooting

- Check the supply voltage.
- Check the fuses.
- Check the supply cable.

8.2.8.8 Fault Code 10, ID 193 - Input Phase (Alarm)

Cause

- Software based input phase supervision

Troubleshooting

- Check the supply voltage.
- Check the fuses.
- Check the supply cable.

8.2.8.9 Fault Code 10, ID 195 - Input Phase (Alarm)

Cause

- Software based input phase supervision

Troubleshooting

- Check the supply voltage.
- Check the fuses.
- Check the supply cable.

8.2.8.10 Fault Code 10, ID 196 - Input Phase (Alarm)

Cause

- Software based input phase supervision

Troubleshooting

- Check the supply voltage.
- Check the fuses.
- Check the supply cable.

8.2.9 Fault Code 11 - Output Phase Supervision

8.2.9.1 Fault Code 11, ID 100 - Output Phase Supervision

Cause

The current measurement tells that there is no current in 1 motor phase.

- A motor or motor cables malfunction.
- Filter (dU/dt, sine wave) malfunction.

Troubleshooting

- Check the motor cable and the motor.
- Check the dU/dt or sine wave filter.

8.2.9.2 Fault Code 11, ID 101 - Output Phase Supervision

Cause

- Output phase current di/dt is above the threshold level.

Troubleshooting

- Check the motor cable and the motor.

8.2.10 Fault Code 12 - Brake Chopper Supervision

8.2.10.1 Fault Code 12, ID 110 - Brake Chopper Supervision (Hardware Fault)

Cause

- There is no brake resistor.
- The brake resistor is broken.
- A defective brake chopper.

Troubleshooting

- Check the brake resistor and the cabling. If they are in good condition, there is a fault in the resistor or the brake chopper. Ask instructions from your nearest distributor.

8.2.10.2 Fault Code 12, ID 111 - Brake Chopper Saturation Alarm

Cause

- There is no brake resistor.
- The brake resistor is broken.
- A defective brake chopper.

Troubleshooting

- Check the brake resistor and the cabling. If they are in good condition, there is a fault in the resistor or the brake chopper. Ask instructions from your nearest distributor.

8.2.11 Fault Code 13 - AC Drive Undertemperature

8.2.11.1 Fault Code 13, ID 120 - AC Drive Undertemperature (Fault)

Cause

- Too low a temperature in the heat sink of the power unit or in the power board.

Troubleshooting

- The ambient temperature is too low for the drive. Move the drive in a warmer position.

8.2.11.2 Fault Code 13, ID 121 - AC Drive Undertemperature (Alarm)

Cause

- Too low a temperature in the heat sink of the power unit or in the power board.

Troubleshooting

- The ambient temperature is too low for the drive. Move the drive in a warmer position.

8.2.12 Fault Code 14 - AC Drive Overtemperature

8.2.12.1 Fault Code 14, ID 130 - AC Drive Overtemperature (Fault, Heat Sink)

Cause

- Too high a temperature in the heat sink of the power unit or in the power board.

Troubleshooting

- Check the actual amount and flow of cooling air.
- Examine the heat sink for dust.
- Check the ambient temperature.
- Make sure that the switching frequency is not too high in relation to the ambient temperature and the motor load.
- Check the cooling fan.

8.2.12.2 Fault Code 14, ID 131 - AC Drive Overtemperature (Alarm, Heat Sink)

Cause

- Too high a temperature in the heat sink of the power unit or in the power board.

Troubleshooting

- Check the actual amount and flow of cooling air.
- Examine the heat sink for dust.
- Check the ambient temperature.
- Make sure that the switching frequency is not too high in relation to the ambient temperature and the motor load.
- Check the cooling fan.

8.2.12.3 Fault Code 14, ID 132 - AC Drive Overtemperature (Fault, Board)

Cause

- Too high a temperature in the heat sink of the power unit or in the power board.

Troubleshooting

- Check the actual amount and flow of cooling air.
- Examine the heat sink for dust.
- Check the ambient temperature.
- Make sure that the switching frequency is not too high in relation to the ambient temperature and the motor load.
- Check the cooling fan.

8.2.12.4 Fault Code 14, ID 133 - AC Drive Overtemperature (Alarm, Board)

Cause

- Too high a temperature in the heat sink of the power unit or in the power board.

Troubleshooting

- Check the actual amount and flow of cooling air.
- Examine the heat sink for dust.
- Check the ambient temperature.
- Make sure that the switching frequency is not too high in relation to the ambient temperature and the motor load.
- Check the cooling fan.

8.2.12.5 Fault Code 14, ID 134 - AC Drive Overtemperature (Fault)

Cause

- Power unit auxiliary temperature is too high.

Troubleshooting

- Check the actual amount and flow of cooling air.
- Examine the heat sink for dust.
- Check the ambient temperature.
- Make sure that the switching frequency is not too high in relation to the ambient temperature and the motor load.
- Check the cooling fan.

8.2.12.6 Fault Code 14, ID 136 - Overvoltage Protection Circuit Temperature (Alarm)

Cause

- Too high an output capacitance or a ground fault in the floating network.

Troubleshooting

- Check the cables and the motor.

8.2.12.7 Fault Code 14, ID 137 - Overvoltage Protection Circuit Temperature (Fault)

Cause

- Too high an output capacitance or a ground fault in the floating network.

Troubleshooting

- Check the cables and the motor.

8.2.12.8 Fault Code 14, ID 138 - AC Drive Overtemperature (Fault)

Cause

- Output filter temperature is too high.

Troubleshooting

- Check the motor cables and the motor.
- Check the correct amount and flow of cooling air.
- Check the ambient temperature.

8.2.12.9 Fault Code 14, ID 139 - AC Drive Overtemperature (Fault)

Cause

- Brake chopper temperature is too high.

Troubleshooting

- Check the correct amount and flow of cooling air.
- Check the heat sink of the brake chopper for dust.
- Check the ambient temperature.

8.2.13 Fault Code 15 - Motor Stall

8.2.13.1 Fault Code 15, ID 140 - Motor Stall

Cause

- The motor stalled.

Troubleshooting

- Check the motor and the load.

8.2.14 Fault Code 16 - Motor Overtemperature

8.2.14.1 Fault Code 16, ID 150 - Motor Overtemperature

Cause

- There is too heavy a load on the motor.

Troubleshooting

8.2.15 Fault Code 17 - Motor Underload

8.2.15.1 Fault Code 17, ID 160 - Motor Underload

Cause

- There is not a sufficient load on the motor.

Troubleshooting

- Check the load.
- Check the parameters.
- Check the dU/dt and sine wave filters.

8.2.16 Fault Code 19 - Power Overload

8.2.16.1 Fault Code 19, ID 180 - Power Overload (Short-time Supervision)

Cause

- The power of the drive is too high.

Troubleshooting

- Decrease the load.
- Examine the dimensions of drive. Examine if it is too small for the load.

8.2.16.2 Fault Code 19, ID 181 - Power Overload (Long-time Supervision)

Cause

- The power of the drive is too high.

Troubleshooting

- Decrease the load.
- Examine the dimensions of drive. Examine if it is too small for the load.

8.2.17 Fault Code 25 - Motor Control Fault

8.2.17.1 Fault Code 25, ID 240 - Motor Control Fault

Cause

This fault is available only if you use a customer-specific application. A malfunction in the start angle identification.

- The rotor moves during identification.
- The new angle does not agree with the old value.

Troubleshooting

- Reset the fault and restart the drive.
- Increase the identification current.
- See the fault history source for more information.

8.2.17.2 Fault Code 25, ID 241 - Motor Control Fault

Cause

This fault is available only if you use a customer-specific application. A malfunction in the start angle identification.

- The rotor moves during identification.
- The new angle does not agree with the old value.

Troubleshooting

- Reset the fault and restart the drive.
- Increase the identification current.
- See the fault history source for more information.

8.2.18 Fault Code 26 - Start-up Prevented

8.2.18.1 Fault Code 26, ID 250 - Start-up Prevented

Cause

- It is not possible to do a start-up of the drive. When the Run request is ON, a new software (a firmware or an application), a parameter setting, or other file that affects the operation of the drive, is loaded to drive.

Troubleshooting

- Reset the fault and stop the drive.
- Load the software and start the drive.

8.2.19 Fault Code 29 - ATEX Thermistor

8.2.19.1 Fault Code 29, ID 280 - ATEX Thermistor

Cause

- The ATEX thermistor tells that there is an overtemperature.

Troubleshooting

- Reset the fault. Check the thermistor and its connections.

8.2.20 Fault Code 30 - Safety

8.2.20.1 Fault Code 30, ID 290 - Safe Off

Cause

- The safe Off signal A does not let you set the drive to the READY state.

Troubleshooting

- Reset the fault and restart the drive.
- Check the signals from the control board to the power unit and the D connector.

8.2.20.2 Fault Code 30, ID 291 - Safe Off

Cause

- The safe Off signal B does not let you set the drive to the READY state.

Troubleshooting

- Reset the fault and restart the drive.
- Check the signals from the control board to the power unit and the D connector.

8.2.20.3 Fault Code 30, ID 500 - Safety Configuration

Cause

- The safety configuration switch was installed.

Troubleshooting

- Remove the safety configuration switch from the control board.

8.2.20.4 Fault Code 30, ID 501 - Safety Configuration

Cause

- There are too many STO option boards. It is possible to have only 1.

Troubleshooting

- Keep 1 of the STO option boards. Remove the others. See the safety manual.

8.2.20.5 Fault Code 30, ID 502 - Safety Configuration

Cause

- The STO option board was installed in an incorrect slot.

Troubleshooting

- Put the STO option board into the correct slot. See the OPTBJ STO Safety manual.

8.2.20.6 Fault Code 30, ID 503 - Safety configuration

Cause

- There is no safety configuration switch on the control board.

Troubleshooting

- Install the safety configuration switch on the control board. See the safety manual.

8.2.20.7 Fault Code 30, ID 504 - Safety configuration

Cause

- The safety configuration switch was installed incorrectly on the control board.

Troubleshooting

- Install the safety configuration switch into the correct position on the control board. See the safety manual.

8.2.20.8 Fault Code 30, ID 505 - Safety configuration

Cause

- The safety configuration switch was installed incorrectly on the STO option board.

Troubleshooting

- Check the installation of the safety configuration switch on the STO option board. See the safety manual.

8.2.20.9 Fault Code 30, ID 506 - Safety configuration

Cause

- There is no communication with the STO option board.

Troubleshooting

- Check the installation of the STO option board. See the safety manual.

8.2.20.10 Fault Code 30, ID 507 - Safety configuration

Cause

- The STO option board is not compatible with the hardware.

Troubleshooting

- Reset the drive and restart it. If the fault occurs again, ask for instructions from your nearest distributor.

8.2.20.11 Fault Code 30, ID 520 - Safety diagnostics

Cause

- The STO inputs have a different status.

Troubleshooting

- Check the external safety switch. Check the input connection and cable of the safety switch.
- Reset the drive and restart.
- If the fault occurs again, ask for instructions from your nearest distributor.

8.2.20.12 Fault Code 30, ID 521 - Safety diagnostics

Cause

- A malfunction in the ATEX thermistor diagnostic. There is no connection in the ATEX thermistor input.

Troubleshooting

- Reset the drive and restart.
- If the fault occurs again, change the option board.

8.2.20.13 Fault Code 30, ID 522 - Safety diagnostics

Cause

- A short circuit in the connection of the ATEX thermistor input.

Troubleshooting

- Check the ATEX thermistor input connection.
- Check the external ATEX connection.
- Check the external ATEX thermistor.

8.2.20.14 Fault Code 30, ID 523 - Safety diagnostics

Cause

- A problem occurred in the internal safety circuit.

Troubleshooting

- Reset the drive and restart.
- If the fault occurs again, ask for instructions from your nearest distributor.

8.2.20.15 Fault Code 30, ID 524 - Safety diagnostics

Cause

- An overvoltage in the safety option board.

Troubleshooting

- Reset the drive and restart.
- If the fault occurs again, ask for instructions from your nearest distributor.

8.2.20.16 Fault Code 30, ID 525 - Safety Diagnostics

Cause

- An undervoltage in the safety option board.

Troubleshooting

- Reset the drive and restart.
- If the fault occurs again, ask for instructions from your nearest distributor.

8.2.20.17 Fault Code 30, ID 526 - Safety Diagnostics

Cause

- An internal malfunction in the safety option board CPU or in the memory handling.

Troubleshooting

- Reset the drive and restart.
- If the fault occurs again, ask for instructions from your nearest distributor.

8.2.20.18 Fault Code 30, ID 527 - Safety Diagnostics

Cause

- An internal malfunction in the safety function.

Troubleshooting

- Reset the drive and restart.
- If the fault occurs again, ask for instructions from your nearest distributor.

8.2.20.19 Fault Code 30, ID 530 - Safe Torque Off

Cause

- An emergency stop was connected or some other STO operation was activated.

Troubleshooting

- When the STO function is activated, the drive is in safe state.

8.2.21 Fault Code 32 - Fan Cooling

8.2.21.1 Fault Code 32, ID 311 - Fan Cooling

Cause

- The fan speed does not agree to the speed reference accurately, but the drive operates correctly.

Troubleshooting

- Reset the fault and restart the drive.
- Clean or replace the fan.

8.2.21.2 Fault Code 32, ID 312 - Fan Cooling

Cause

- The fan life time (that is, 50 000 h) is complete.

Troubleshooting

- Replace the fan and reset the life time counter of the fan.

8.2.22 Fault Code 33 - Fire Mode Enabled

8.2.22.1 Fault Code 33, ID 320 - Fire Mode Enabled

Cause

- The fire mode of the drive is enabled. The protections of the drive are disabled or autoreset.

Troubleshooting

- Check the parameter settings and the signals.
- This alarm is reset automatically when fire mode is disabled.

8.2.23 Fault Code 37 - Device Changed (Same Type)

8.2.23.1 Fault Code 37, ID 361 - Device Changed (Same Type)

Cause

- The power unit was replaced by a new one that has the same size. The device is ready to be used. The parameters are available in the drive.

Troubleshooting

- Reset the fault. The drive reboots after you reset the fault.

8.2.23.2 Fault Code 37, ID 362 - Device Changed (Same Type)

Cause

- The option board in slot B was replaced by a new one that you have used before in the same slot. The device is ready to be used.

Troubleshooting

- Reset the fault. The drive starts to use the old parameter settings.

8.2.23.3 Fault Code 37, ID 363 - Device Changed (Same Type)

Cause

- The option board in slot C was replaced by a new one that you have used before in the same slot. The device is ready to be used.

Troubleshooting

- Reset the fault. The drive starts to use the old parameter settings.

8.2.23.4 Fault Code 37, ID 364 - Device Changed (Same Type)

Cause

- The option board in slot D was replaced by a new one that you have used before in the same slot. The device is ready to be used.

Troubleshooting

- Reset the fault. The drive starts to use the old parameter settings.

8.2.23.5 Fault Code 37, ID 365 - Device Changed (Same Type)

Cause

- The option board in slot E was replaced by a new one that you have used before in the same slot. The device is ready to be used.

Troubleshooting

- Reset the fault. The drive starts to use the old parameter settings.

8.2.24 Fault Code 38 - Device Added (Same Type)

8.2.24.1 Fault Code 38, ID 372 - Device Added (Same Type)

Cause

- An option board was put into slot B. You have used the option board before in the same slot.

Troubleshooting

- The device is ready for use. The drive starts to use the old parameter settings.

8.2.24.2 Fault Code 38, ID 373 - Device Added (Same Type)

Cause

- An option board was put into slot C. You have used the option board before in the same slot.

Troubleshooting

- The device is ready for use. The drive starts to use the old parameter settings.

8.2.24.3 Fault Code 38, ID 374 - Device Added (Same Type)

Cause

- An option board was put into slot D. You have used the option board before in the same slot.

Troubleshooting

- The device is ready for use. The drive starts to use the old parameter settings.

8.2.24.4 Fault Code 38, ID 375 - Device Added (Same Type)

Cause

- An option board was put into slot E. You have used the option board before in the same slot.

Troubleshooting

- The device is ready for use. The drive starts to use the old parameter settings.

8.2.25 Fault Code 39 - Device Removed

8.2.25.1 Fault Code 39, ID 382 - Device Removed

Cause

- An option board was removed from slot A or B.

Troubleshooting

- The device is not available. Reset the fault.

8.2.25.2 Fault Code 39, ID 383 - Device Removed

Cause

- An option board was removed from slot C.

Troubleshooting

- The device is not available. Reset the fault.

8.2.25.3 Fault Code 39, ID 384 - Device Removed

Cause

- An option board was removed from slot D.

Troubleshooting

- The device is not available. Reset the fault.

8.2.25.4 Fault Code 39, ID 385 - Device Removed

Cause

- An option board was removed from slot E.

Troubleshooting

- The device is not available. Reset the fault.

8.2.26 Fault Code 40 - Device Unknown

8.2.26.1 Fault Code 40, ID 390 - Device Unknown

Cause

- An unknown device was connected (the power unit/option board).

Troubleshooting

- The device is not available. If the fault occurs again, ask for instructions from your nearest distributor.

8.2.27 Fault Code 41 - IGBT Temperature

8.2.27.1 Fault Code 41, ID 400 - IGBT Temperature

Cause

The calculated IGBT temperature is too high.

- too high a motor load
- too high an ambient temperature
- hardware malfunction

Troubleshooting

- Check the parameter settings.
- Examine the actual amount and flow of cooling air.
- Check the ambient temperature.
- Examine the heatsink for dust.
- Make sure that the switching frequency is not too high in relation to the ambient temperature and the motor load.

- Check the cooling fan.
- Make an identification run.

8.2.28 Fault Code 43 - Encoder Fault

8.2.28.1 Fault Code 43, ID 420 - Encoder Fault

Cause

- Problem detected in the encoder signals.
- Encoder 1 channel A is missing.

Troubleshooting

- Check the encoder connections.
- Check the encoder and the encoder cable.
- Check the encoder board.
- Check the encoder frequency in open-loop mode.

8.2.28.2 Fault Code 43, ID 421 - Encoder Fault

Cause

- Problem detected in the encoder signals.
- Encoder 1 channel B is missing.

Troubleshooting

- Check the encoder connections.
- Check the encoder and the encoder cable.
- Check the encoder board.
- Check the encoder frequency in open-loop mode.

8.2.28.3 Fault Code 43, ID 422 - Encoder Fault

Cause

- Problem detected in the encoder signals.
- Encoder 1 channels A and B are both missing.

Troubleshooting

- Check the encoder connections.
- Check the encoder and the encoder cable.
- Check the encoder board.
- Check the encoder frequency in open-loop mode.

8.2.28.4 Fault Code 43, ID 423 - Encoder Fault

Cause

The encoder is reversed.

Troubleshooting

- Check the encoder connections.
- Check the encoder and the encoder cable.
- Check the encoder board.
- Check the encoder frequency in open-loop mode.

8.2.28.5 Fault Code 43, ID 424 - Encoder Fault

Cause

The encoder board is missing.

Troubleshooting

- Check the encoder connections.
- Check the encoder and the encoder cable.
- Check the encoder board.
- Check the encoder frequency in open-loop mode.

8.2.28.6 Fault Code 43, ID 425 - Encoder Fault

Cause

Encoder speed deviation supervision.

Troubleshooting

- Check the encoder connections.
- Check the encoder and the encoder cable.
- Check the encoder board.
- Check the encoder frequency in open-loop mode.
- Check the basic motor parameters.

8.2.28.7 Fault Code 43, ID 426 - Encoder Fault

Cause

- Encoder pulse count supervision.
- The estimated encoder pulse count/revolution is different from the value set by the parameter.

Troubleshooting

- Check the encoder pulse count/revolution value.
- Check the encoder coupling (gear ratio, friction wheel).
- Check the basic motor parameters.

8.2.28.8 Fault Code 43, ID 427 - Encoder Fault

Cause

- The maximum acceleration rate is exceeded.
- The motor acceleration calculated from the encoder speed is higher than the actual maximum of the application.

Troubleshooting

- Check the encoder channel connections.
- Check the encoder board.
- Check the encoder and the encoder cable.
- Check the mechanical mounting of the encoder.
- Check the encoder frequency in open-loop mode.

8.2.29 Fault Code 44 - Device Changed (Different Type)

8.2.29.1 Fault Code 44, ID 431 - Device Changed (Different Type)

Cause

- There is a new power unit of a different type. Parameters are not available in the settings.

Troubleshooting

- Reset the fault. The drive reboots after you reset the fault.
- Set the power unit parameters again.

8.2.29.2 Fault Code 44, ID 432 - Device Changed (Different Type)

Cause

- The option board in slot B was replaced by a new one that you have not used before in the same slot. No parameter settings are saved.

Troubleshooting

- Reset the fault. Set the option board parameters again.

8.2.29.3 Fault Code 44, ID 433 - Device Changed (Different Type)

Cause

- The option board in slot C was replaced by a new one that you have not used before in the same slot. No parameter settings are saved.

Troubleshooting

- Reset the fault. Set the option board parameters again.

8.2.29.4 Fault Code 44, ID 434 - Device Changed (Different Type)

Cause

- The option board in slot D was replaced by a new one that you have not used before in the same slot. No parameter settings are saved.

Troubleshooting

- Reset the fault. Set the option board parameters again.

8.2.29.5 Fault Code 44, ID 435 - Device Changed (Different Type)

Cause

- The option board in slot E was replaced by a new one that you have not used before in the same slot. No parameter settings are saved.

Troubleshooting

- Reset the fault. Set the option board parameters again.

8.2.29.6 Fault Code 44, ID 436 - Device Changed (Different Type)

Cause

- The power configuration has changed. The power unit resets and initializes to a different configuration.

Troubleshooting

- Wait until the power unit is reset.

8.2.30 Fault Code 45 - Device Added (Different Type)

8.2.30.1 Fault Code 45, ID 441 - Device Added (Different Type)

Cause

- There is a new power unit of a different type. Parameters are not available in the settings.

Troubleshooting

- Reset the fault. The drive reboots after you reset the fault.
- Set the power unit parameters again.

8.2.30.2 Fault Code 45, ID 442 - Device Added (Different Type)

Cause

- A new option board, that you have not used before in the same slot, was put in slot B. No parameter settings are saved.

Troubleshooting

- Set the option board parameters again.

8.2.30.3 Fault Code 45, ID 443 - Device Added (Different Type)

Cause

- A new option board, that you have not used before in the same slot, was put in slot C. No parameter settings are saved.

Troubleshooting

- Set the option board parameters again.

8.2.30.4 Fault Code 45, ID 444 - Device Added (Different Type)

Cause

- A new option board, that you have not used before in the same slot, was put in slot D. No parameter settings are saved.

Troubleshooting

- Set the option board parameters again.

8.2.30.5 Fault Code 45, ID 445 - Device Added (Different Type)

Cause

- A new option board, that you have not used before in the same slot, was put in slot E. No parameter settings are saved.

Troubleshooting

- Set the option board parameters again.

8.2.31 Fault Code 46 - Real Time Clock

8.2.31.1 Fault Code 46, ID 662 - Real Time Clock

Cause

- The voltage of the RTC battery is low.

Troubleshooting

- Replace the battery.

8.2.32 Fault Code 47 - Software Update

8.2.32.1 Fault Code 47, ID 661 - Software Update

Cause

- A software update is in progress.
- The software is updating from the control unit to the power unit.

Troubleshooting

- No steps are necessary.

8.2.32.2 Fault Code 47, ID 663 - Software Updated

Cause

- The software of the drive was updated, the full software package or an application.

Troubleshooting

- No steps are necessary.

8.2.33 Fault Code 49 - Precharge

8.2.33.1 Fault Code 49, ID 901 - Pre-charge

Cause

- Main contactor pilot relay open timeout.

Troubleshooting

- Check the main contactor pilot relay wires.

8.2.33.2 Fault Code 49, ID 902 - Pre-charge

Cause

- Main contactor open timeout.

Troubleshooting

- Check the main contactor auxiliary contact wires.

8.2.33.3 Fault Code 49, ID 903 - Pre-charge

Cause

- Pre-charge transformer contactor open timeout.

Troubleshooting

- Check the pre-charge contactor auxiliary contact wires.

8.2.33.4 Fault Code 49, ID 904 - Pre-charge

Cause

- DC link discharge timeout.
- DC link discharge time exceeded the expected discharge time.

Troubleshooting

- Check the mains contactor state and pre-charge wires.

8.2.33.5 Fault Code 49, ID 905 - Pre-charge

Cause

- Front-end fault clear timeout.

Troubleshooting

- If the INU controls the pre-charge, make sure that the AFE does not have a fault. If there is a fault, the pre-charge cannot continue.

8.2.33.6 Fault Code 49, ID 906 - Pre-charge

Cause

- DC-link overvoltage. The pre-charge control sensed an overvoltage.

Troubleshooting

- Check the AFE control signal wires and that the fieldbus connection is active.

8.2.33.7 Fault Code 49, ID 907 - Pre-charge

Cause

- Front-end PLL phase lock lost. The PLL lost the synchronization during the operation.

Troubleshooting

- Make sure that there is no input phase or voltage missing during operation.

8.2.33.8 Fault Code 49, ID 908 - Pre-charge

Cause

- The front end had a fault after it reached the ready state. This fault applies only when the INU controls the pre-charge.

Troubleshooting

- –

8.2.33.9 Fault Code 49, ID 909 - Pre-charge

Cause

- The main contactor closes before the pre-charge control command.

Troubleshooting

- Check the main contactor actuation circuit wires and the feedback wires.

8.2.33.10 Fault Code 49, ID 910 - Pre-charge

Cause

- The main contactor pilot relay closes before the pre-charge control command.

Troubleshooting

- Check the main contactor pilot relay wires.

8.2.33.11 Fault Code 49, ID 911 - Pre-charge

Cause

- The pre-charge sequence was stopped before it was completed.
- The circuit breaker on the pre-charge circuit opened due to:
  - Overheating of the pre-charge unit transformer.
  - A short circuit in the DC link.

Troubleshooting

- If the sequence was not stopped manually, check the pre-charge circuit and protections (pre-charge transformer overcurrent or overtemperature).

8.2.33.12 Fault Code 49, ID 912 - Pre-charge

Cause

- The DC-link charge rate is above the maximum value.
- The DC-link voltage time rate of change exceeded the expected maximum for the given power stage configuration.

Troubleshooting

- Check the pre-charge transformer primary voltage.
- Check the cabling of the phase modules.
- Make sure that the drive configuration has not changed.

8.2.33.13 Fault Code 49, ID 913 - Pre-charge

Cause

- The DC link charge rate is below the minimum value during the pre-charge.
- The DC-link voltage time rate of change is below the expected minimum for the given drive configuration.

Troubleshooting

- Check the pre-charge transformer primary voltage.
- If the system has parallel power circuits, and therefore two pre-charge units, make sure that both pre-charge circuits have input power.
- Make sure that the drive configuration has not changed.

8.2.33.14 Fault Code 49, ID 914 - Pre-charge

Cause

- Pre-charge timeout during DC-link charging. The DC-link voltage rise time to the target voltage was too long.

Troubleshooting

- Check the pre-charge transformer primary voltage and the tap configuration.
- If the system has parallel power circuits, and therefore two pre-charge units, make sure that both pre-charge circuits have input power.

8.2.33.15 Fault Code 49, ID 915 - Pre-charge

Cause

- The DC-link voltage is too low to complete the synchronization.

Troubleshooting

- Make sure that the synchronization threshold voltage is sufficient.
- Make sure that the LC filter capacitance is not too large.

8.2.33.16 Fault Code 49, ID 916 - Pre-charge

Cause

- AFE cannot synchronize with the grid voltage in the approved time limit.

Troubleshooting

- Make sure that the grid voltage is stable or that the imbalance is not too high.

8.2.33.17 Fault Code 49, ID 917 - Pre-charge

Cause

- Main contactor pilot relay close timeout.
- The main contactor pilot relay did not close within the expected time.

Troubleshooting

- Check the relay wiring.

8.2.33.18 Fault Code 49, ID 918 - Pre-charge

Cause

- The AFE lost synchronization with the grid while it waited for the mains contactor to close.

Troubleshooting

- –

8.2.33.19 Fault Code 49, ID 919 - Pre-charge

Cause

- Main contactor close timeout.
- The main contactor did not close within the expected time.

Troubleshooting

- Check the main contactor wiring and main contactor pilot wiring.

8.2.33.20 Fault Code 49, ID 920 - Pre-charge

Cause

- The main contactor opened during the DC stabilization phase.

Troubleshooting

- Check the main contactor wiring and main contactor pilot wiring.

8.2.33.21 Fault Code 49, ID 921 - Pre-charge

Cause

- The front end could not make the DC-link voltage stable in the necessary time.
- The AFE was unable to commit to DC voltage control mode within the allotted time.

Troubleshooting

- Make sure that the grid voltage feedback configuration is correct (line or phase voltage measurement).
- Make sure that the feedback agrees with the AFE phase order.
- Make sure that the phase shift of the potential transformer is accounted for in the PLL adaptation angle parameter.

8.2.33.22 Fault Code 49, ID 922 - Pre-charge

Cause

- The AFE was stopped while the INU was in operation.

Troubleshooting

- Always stop the INU before shutting down the AFE.

8.2.33.23 Fault Code 49, ID 923 - Pre-charge

Cause

- The front end could not keep up the DC-link voltage stabilization.
- AFE or DFE voltage regulation could not be maintained.

Troubleshooting

- Check the DC voltage control parameters and the synchronous current controller parameters.

8.2.33.24 Fault Code 49, ID 924 - Pre-charge

Cause

- Parameter settings changed after the pre-charge sequence was activated.

Troubleshooting

- Do not change the pre-charge configuration after starting the pre-charge sequence.

8.2.33.25 Fault Code 49, ID 925 - Pre-charge

Cause

- The parameter settings are not valid.

Troubleshooting

- Do not select the test modes "disable mains contactor" and "dry run" at the same time.

8.2.33.26 Fault Code 49, ID 926 - Pre-charge

Cause

- Test mode activated while grid voltage is connected.

Troubleshooting

- Do not select the "dry run" test mode while grid voltage is connected.

8.2.33.27 Fault Code 49, ID 927 - Pre-charge

Cause

- The INU had a fault during the pre-charge sequence.

Troubleshooting

- Check the INU status.

8.2.33.28 Fault Code 49, ID 928 - Pre-charge

Cause

- The pre-charge transformer contactor closed unexpectedly after the pre-charge sequence was completed.

Troubleshooting

- Check the pre-charge contactor wiring.

8.2.33.29 Fault Code 49, ID 930 - Pre-charge

Cause

- Breaker enable was lost while the precharge output was active.

Troubleshooting

- –

8.2.34 Fault Code 50 - AI Low Fault

8.2.34.1 Fault Code 50, ID 1050 - AI Low Fault

Cause

- The used analog input signal has gone below 50% of the minimum signal range.
- A control cable is broken or loose.
- A signal source has failed.

Troubleshooting

- Check the control cable connection.
- Check the analog input circuit and signals.
- Replace the defective parts.
- Make sure that parameter AI1 Signal Range is set correctly.

8.2.35 Fault Code 51 - Device External Fault

8.2.35.1 Fault Code 51, ID 1051 - Device External Fault

Cause

- Digital input fault.
- The digital input signal that is set with parameter **Ext Fault Close** (ID 405) or **Ext Fault Open** (ID 406) was activated.

Troubleshooting

- This is a user-defined fault.
- Check the digital inputs and schematics.
- Remove the fault situation on external device.

8.2.36 Fault Code 52 - Keypad Communication Fault

8.2.36.1 Fault Code 52, ID 1052 - Keypad Communication Fault

Cause

- The connection between the control panel and the drive is defective.

Troubleshooting

- Check the control panel connection and the control panel cable if you have it.

8.2.36.2 Fault Code 52, ID 1352 - Keypad Communication Fault

Cause

- The connection between the control panel and the drive is defective.

Troubleshooting

- Check the control panel connection and the control panel cable if you have it.

8.2.37 Fault Code 53 - Fieldbus Communication Fault

8.2.37.1 Fault Code 53, ID 1053 - Fieldbus Communication Fault

Cause

- The data connection between the fieldbus master and the fieldbus board is defective.

Troubleshooting

- Check the installation and fieldbus master.

8.2.37.2 Fault Code 53, ID 1054 - Redundant Switchover

Cause

- The data connection between controlling fieldbus and the drive has timed out. Redundant control has changed the controlling fieldbus connection.

Troubleshooting

- Check the installation and the communication cables.

8.2.37.3 Fault Code 53, ID 1055 - Redundant Timeout

Cause

- The data connection between controlling fieldbus protocols and the drive has timed out.

Troubleshooting

- Check the installation and the communication cables.

8.2.38 Fault Code 54 - Slot Fault

8.2.38.1 Fault Code 54, ID 1354 - Slot A fault

Cause

- A defective option board or slot.

Troubleshooting

- Check the board and the slot.
- Ask for instructions from your nearest distributor.

8.2.38.2 Fault Code 54, ID 1454 - Slot B fault

Cause

- A defective option board or slot.

Troubleshooting

- Check the board and the slot.
- Ask for instructions from your nearest distributor.

8.2.38.3 Fault Code 54, ID 1554 - Slot C fault

Cause

- A defective option board or slot.

Troubleshooting

- Check the board and the slot.
- Ask for instructions from your nearest distributor.

8.2.38.4 Fault Code 54, ID 1654 - Slot D fault

Cause

- A defective option board or slot.

Troubleshooting

- Check the board and the slot.
- Ask for instructions from your nearest distributor.

8.2.38.5 Fault Code 54, ID 1754 - Slot E fault

Cause

- A defective option board or slot.

Troubleshooting

- Check the board and the slot.
- Ask for instructions from your nearest distributor.

8.2.39 Fault Code 57 - Identification

8.2.39.1 Fault Code 57, ID 1057 - Identification

Cause

- There was a failure in the identification run.

Troubleshooting

- Make sure that the motor is connected to the drive.
- Make sure that there is no load on the motor shaft.
- Make sure that the start command is not removed before the identification run is complete.

8.2.39.2 Fault Code 57, ID 1157 - Identification

Cause

- During the identification run, drive was not able to reach required frequency reference.

Troubleshooting

- Make sure that minimum and maximum frequency references are set correctly. Too low maximum frequency can prevent drive from reaching required frequency.

8.2.39.3 Fault Code 57, ID 1257 - Identification

Cause

- During the identification run, drive was not able to reach required frequency reference.

Troubleshooting

- Make sure that acceleration time is set correctly. Too long acceleration time can prevent drive from reaching required frequency in 40 seconds.

8.2.39.4 Fault Code 57, ID 1357 - Identification

Cause

- During the identification run, drive was not able to reach required frequency reference.

Troubleshooting

- Make sure that current, torque, and power limits of the drive are set correctly. Too low limit settings can prevent drive from reaching required frequency.

8.2.40 Fault Code 58 - Mechanical Brake

8.2.40.1 Fault Code 58, ID 1058 - Mechanical Brake

Cause

- The actual status of the mechanical brake is different from the control signal for longer than the value of *Brake Fault Delay* (ID 352).

Troubleshooting

- Check the status and connections of the mechanical brake.
- See parameter *Mech. Brake Feedback* (ID1210) and Mechanical brake parameter group.

8.2.41 Fault Code 59 - Communication

8.2.41.1 Fault Code 59, ID 590 - Communication

Cause

- The Source2 unit cannot connect to the Source3 unit.

Troubleshooting

- Check the power unit connections.

8.2.42 Fault Code 61 - Speed Error Fault

8.2.42.1 Fault Code 61, ID 1061 - Speed Error Fault

Cause

- The difference between encoder frequency and output frequency exceeds the fault limit.

Troubleshooting

- Check the encoder and encoder connections.

8.2.43 Fault Code 63 - Quick Stop

8.2.43.1 Fault Code 63, ID 1063 - Quick Stop Fault

Cause

- The quick stop function is activated by digital input signal or from fieldbus.

Troubleshooting

- Find the cause for the quick stop activation. After you find it, correct it. Reset the fault and restart the drive.
- See parameter *Quick Stop Activation* (ID 1213) and the quick stop parameters.

8.2.43.2 Fault Code 63, ID 1363 - Quick Stop Alarm

Cause

- The quick stop function is activated by digital input signal or from fieldbus.

Troubleshooting

- Find the cause for the quick stop activation. After you find it, correct it. Reset the fault and restart the drive.
- See parameter *Quick Stop Activation* (ID 1213) and the quick stop parameters.

8.2.44 Fault Code 65 - PC Communication Fault

8.2.44.1 Fault Code 65, ID 1065 - PC Communication Fault

Cause

- The data connection between the PC and the drive is defective.

Troubleshooting

- Check the installation, cable, and terminals between the PC and the drive.

8.2.45 Fault Code 66 - Thermistor Input Fault

8.2.45.1 Fault Code 66, ID 1366 - Thermistor Input 1 Fault

Cause

- The motor temperature increased.

Troubleshooting

- Check the motor cooling and the load.
- Check the thermistor connection.
- If the thermistor input is not used, you have to short-circuit it.
- Ask for instructions from your nearest distributor.

8.2.45.2 Fault Code 66, ID 1466 - Thermistor Input 2 Fault

Cause

- The motor temperature increased.

Troubleshooting

- Check the motor cooling and the load.
- Check the thermistor connection.
- If the thermistor input is not used, you have to short-circuit it.
- Ask for instructions from your nearest distributor.

8.2.45.3 Fault Code 66, ID 1566 - Thermistor Input 3 Fault

Cause

- The motor temperature increased.

Troubleshooting

- Check the motor cooling and the load.
- Check the thermistor connection.
- If the thermistor input is not used, you have to short-circuit it.
- Ask for instructions from your nearest distributor.

8.2.46 Fault Code 67 - Module Test Stand

8.2.46.1 Fault Code 67, ID 672 - Module Test Stand

Cause

- Fault ID and code reservation for internal production module test stand. Specific fault information is passed in Source2 and is readable via MtsErrorWord_fi.
- Not for external/customer use!

Troubleshooting

-

8.2.47 Fault Code 68 - Maintenance Counter

8.2.47.1 Fault Code 68, ID 1301 - Maintenance Counter 1 Alarm

Cause

- The value of the maintenance counter is higher than the alarm limit.

Troubleshooting

- Do the necessary maintenance.
- Reset the counter. See parameter *Maintenance Counter 1 Reset* (ID 490).

8.2.47.2 Fault Code 68, ID 1302 - Maintenance Counter 1 Fault

Cause

- The value of the maintenance counter is higher than the fault limit.

Troubleshooting

- Do the necessary maintenance.
- Reset the counter. See parameter *Maintenance Counter 1 Reset* (ID 490).

8.2.48 Fault Code 69 - Fieldbus Mapping Error

8.2.48.1 Fault Code 69, ID 1310 - Fieldbus Mapping Error

Cause

- The ID number that is used to map the values to Fieldbus Process Data Out is not valid.

Troubleshooting

- Check the parameters in the Fieldbus Data menu.

8.2.48.2 Fault Code 69, ID 1311 - Fieldbus Mapping Error

Cause

- It is not possible to convert 1 or more values for Fieldbus Process Data Out.
- The type of the value is undefined.

Troubleshooting

- Check the parameters in the Fieldbus Data menu.

8.2.48.3 Fault Code 69, ID 1312 - Fieldbus Mapping Error

Cause

- There is an overflow when the values for Fieldbus Process Data Out (16-bit) are mapped and converted.

Troubleshooting

- Check the parameters in the Fieldbus Data menu.

8.2.49 Fault Code 76 - Start Prevented

8.2.49.1 Fault Code 76, ID 1076 - Start Prevented

Cause

- The start command is blocked to prevent the accidental rotation of the motor during the first power-up.

Troubleshooting

- Reset the drive to start the correct operation. The parameter settings tell if it is necessary to restart the drive.

8.2.50 Fault Code 77 - >5 Connections

8.2.50.1 Fault Code 77, ID 1077 - > 5 Connections

Cause

- There are more than 5 active fieldbus or PC tool connections. You can use only 5 connections at the same time.

Troubleshooting

- Leave 5 active connections. Remove the other connections.

8.2.51 Fault Code 78 - Identification Ongoing

8.2.51.1 Fault Code 78, ID 1078 - Identification Ongoing

Cause

- The drive is running the identification for the motor.

Troubleshooting

- You can stop the identification run at any time by removing the start command. When the identification run is completed, a new start command is needed to start the drive.

8.2.52 Fault Code 80 - Fieldbus Watchdog Fault

8.2.52.1 Fault Code 80, ID 1080 - FB Watchdog Fault

Cause

- There is no communication between the fieldbus master and the fieldbus follower.

Troubleshooting

- Check the installation and the fieldbus master.

8.2.53 Fault Code 84 - Overspeed Error

8.2.53.1 Fault Code 84, ID 1084 - Overspeed Error

Cause

- The motor speed is over the speed limit.

Troubleshooting

- –

8.2.54 Fault Code 111 - Temperature Input Fault 1

8.2.54.1 Fault Code 111, ID 1315 - Temperature Fault 1

Cause

- 1 or more of the temperature input signals (set in parameter ID 739) is higher than the alarm limit (parameter ID 741).

Troubleshooting

- Find the cause of the temperature rise.
- Check the parameters in the *Temperature Input Fault 1* menu.
- Check the temperature sensor and connections.
- If no sensor is connected, make sure that the temperature input is hardwired.
- See the option board manual for more data.

8.2.54.2 Fault Code 111, ID 1316 - Temperature Fault 1

Cause

- 1 or more of the temperature input signals (set in parameter ID 739) is higher than the fault limit (parameter ID 742).

Troubleshooting

- Find the cause of the temperature rise.
- Check the parameters in the *Temperature Input Fault 1* menu.
- Check the temperature sensor and connections.
- If no sensor is connected, make sure that the temperature input is hardwired.
- See the option board manual for more data.

8.2.55 Fault Code 112 - Temperature Input Fault 2

8.2.55.1 Fault Code 112, ID 1317 - Temperature Fault 2

Cause

- 1 or more of the temperature input signals (set in parameter ID 763) is higher than the alarm limit (parameter ID 764).

Troubleshooting

- Find the cause of the temperature rise.
- Check the parameters in the *Temperature Input Fault 2* menu.
- Check the temperature sensor and connections.
- If no sensor is connected, make sure that the temperature input is hardwired.
- See the option board manual for more data.

8.2.55.2 Fault Code 112, ID 1318 - Temperature Fault 2

Cause

- 1 or more of the temperature input signals (set in parameter ID 763) is higher than the fault limit (parameter ID 765).

Troubleshooting

- Find the cause of the temperature rise.
- Check the parameters in the *Temperature Input Fault 2* menu.
- Check the temperature sensor and connections.
- If no sensor is connected, make sure that the temperature input is hardwired.
- See the option board manual for more data.

8.2.56 Fault Code 114 - User Defined Fault 1

8.2.56.1 Fault Code 114, ID 1114 - User Defined Fault 1

Cause

- This user-defined fault was activated either from a digital input, fieldbus, the drive customizer, or a time channel.

Troubleshooting

- See parameter menu *User Defined Fault 1* to find out the source of the fault activation.

8.2.57 Fault Code 115 - User Defined Fault 2

8.2.57.1 Fault Code 115, ID 1115 - User Defined Fault 2

Cause

- This user-defined fault was activated either from a digital input, fieldbus, the drive customizer, or a time channel.

Troubleshooting

- See parameter menu *User Defined Fault 2* to find out the source of the fault activation.

8.2.58 Fault Code 200 - Precharge

8.2.58.1 Fault Code 200, ID 1721 - MCB/Interlock Fault

Cause

- MCB is lost or interlock is required for power-on.

Troubleshooting

- –

8.2.58.2 Fault Code 200, ID 1722 - Leak Detector Fault

Cause

- Leak detection issue.

Troubleshooting

- –

8.2.58.3 Fault Code 200, ID 1723 - Overtemp in LCL

Cause

- Overtemperature detected in LCL component.

Troubleshooting

- –

8.2.58.4 Fault Code 200, ID 1724 - Cooling Fault

Cause

- Loss of "Cooling OK" from heat exchanger, or loss of cabinet cooling.

Troubleshooting

- –

8.2.58.5 Fault Code 200, ID 1725 - Cooling Ok Timeout

Cause

- The cooling system did not reach OK status in time.

Troubleshooting

- –

8.2.58.6 Fault Code 200, ID 1726 - Precharge Contactor Close Timeout

Cause

- Precharge contactor did not close within the timeout period after the close command.

Troubleshooting

- –

8.2.58.7 Fault Code 200, ID 1727 - Loss of Precharge Permissive

Cause

- Unexpected loss of "Precharge permissive".

Troubleshooting

- –

8.2.58.8 Fault Code 200, ID 1728 - Loss of MX Permissive

Cause

- Loss of breaker (MX) permissive.

Troubleshooting

- –

8.2.58.9 Fault Code 200, ID 1729 - GSW/UFES Fault

Cause

- GSW or UFES is in the wrong position.

Troubleshooting

- –

8.2.58.10 Fault Code 200, ID 1731 - DC Cap Overpressure

Cause

- Overpressure detected in the DC-link capacitors.

Troubleshooting

- –

8.2.59 Fault Code 201 - High Humidity/Temperature

8.2.59.1 Fault Code 201, ID 1730 - High Humidity/Temperature

Cause

- The humidity or temperature switches indicate a high condition.

Troubleshooting

- –

8.2.60 Fault Code 202 - Encoder

8.2.60.1 Fault Code 202, ID 1740 - Encoder Difference

Cause

- Encoder measurement difference exceeds 2x limit during operation.

Troubleshooting

- –

8.2.60.2 Fault Code 202, ID 1741 - Encoder Difference

Cause

- Encoder measurement difference exceeds the limit at overcurrent/overvoltage fault.

Troubleshooting

- –

8.2.60.3 Fault Code 202, ID 1742 - Fall Back to OL

Cause

- Overcurrent or overvoltage fault occurred during transition from closed loop to open loop.

Troubleshooting

- –

8.2.61 Fault Code 203 - STO Fault

8.2.61.1 Fault Code 203, ID 1735 - STO Fault

Cause

- The STO input is active.

Troubleshooting

- –

8.2.62 Fault Code 204 - Output Filter

8.2.62.1 Fault Code 204, ID 1744 - Output Filter

Cause

- A component in the output filter has overtemperature or overpressure.

Troubleshooting

- –

8.2.63 Fault Code 205 - Coolant Temperature

8.2.63.1 Fault Code 205, ID 1745 - Coolant Temperature

Cause

- Coolant temperature ≥ 70.0 °C (158 °F).

Troubleshooting

- –

8.2.63.2 Fault Code 205, ID 1745 - Coolant Temperature

Cause

- Coolant temperature ≤ -10.0 °C (14 °F).

Troubleshooting

- –

8.2.64 Fault Code 300 - Unsupported

8.2.64.1 Fault Code 300, ID 700 - Unsupported

Cause

- The application is not compatible (it is unsupported).

Troubleshooting

- Replace the application.

8.2.64.2 Fault Code 300, ID 701 - Unsupported

Cause

- The option board or the slot is not compatible (it is unsupported).

Troubleshooting

- Remove the option board.

8.3 Total and Trip Counters

The AC drive has different counters based on the operation time of the drive and the energy consumption. Some of the counters measure total values and some can be reset.

The energy counters measure the energy that is taken from the supply network. The other counters are used to measure, for example, the operation time of the drive or the run-time of the motor.

It is possible to monitor all the counter values from the PC, control panel, or fieldbus. When using the PC or the control panel, it is possible to monitor the counter values in the Diagnostics menu. When using fieldbus, it is possible to read the counter values with the ID numbers.

8.3.1 Operating Time Counter

Resetting: not possible

Location: submenu Total counters

The value of the counter has 5 different 16-bit values. To read the value of the counter through fieldbus, use these ID numbers.

ID number	Counter value
ID 1754	Operating Time Counter (years)
ID 1755	Operating Time Counter (days)
ID 1756	Operating Time Counter (hours)
ID 1757	Operating Time Counter (minutes)
ID 1758	Operating Time Counter (seconds)

Example

The value 1a 143d 02:21 is received from the operating time counter from the fieldbus.

- ID1754: 1 (years)
- ID1755: 143 (days)
- ID1756: 2 (hours)
- ID1757: 21 (minutes)
- ID1758: 0 (seconds)

8.3.2 Operating Time Trip Counter

The operating time trip counter of the control unit can be reset. It is in the submenu Trip counters. It is possible to reset the counter with the PC, the control panel, or the fieldbus. The value of the counter has 5 different 16-bit values. To read the value of the counter through fieldbus, use these ID numbers.

ID number	Counter value
ID 1766	Operating Time Trip Counter (years)
ID 1767	Operating Time Trip Counter (days)
ID 1768	Operating Time Trip Counter (hours)
ID 1769	Operating Time Trip Counter (minutes)
ID 1770	Operating Time Trip Counter (seconds)

Example

The value 1a 143d 02:21 is received from the operating time trip counter from the fieldbus.

- ID1766: 1 (years)
- ID1767: 143 (days)
- ID1768: 2 (hours)
- ID1769: 21 (minutes)
- ID1770: 0 (seconds)

ID number	Counter value
ID 2311	Operating Time Trip Counter Reset

To reset the energy trip counter, use the PC, the control panel, or the fieldbus. When using the PC or the control panel, reset the counter in the Diagnostics menu. When using the fieldbus, set a rising edge to ID 2311 Operating Time Trip Counter Reset.

8.3.3 Run Time Counter

The run time counter of the motor cannot be reset. It is in the submenu Total counters. The value of the counter has 5 different 16-bit values. To read the value of the counter through fieldbus, use these ID numbers.

ID number	Counter value
ID 1772	Run Time Counter (years)
ID 1773	Run Time Counter (days)
ID 1774	Run Time Counter (hours)
ID 1775	Run Time Counter (minutes)
ID 1776	Run Time Counter (seconds)

Example

The value 1a 143d 02:21 is received from the run time counter from the fieldbus.

- ID1772: 1 (years)
- ID1773: 143 (days)
- ID1774: 2 (hours)
- ID1775: 21 (minutes)
- ID1776: 0 (seconds)

8.3.4 Power on Time Counter

The power on time counter of the power unit is in the submenu Total counters. It is not possible to reset the counter. The value of the counter has 5 different 16-bit values. To read the value of the counter through fieldbus, use these ID numbers.

ID number	Counter value
ID 1777	Power On Time Counter (years)
ID 1778	Power On Time Counter (days)
ID 1779	Power On Time Counter (hours)
ID 1780	Power On Time Counter (minutes)
ID 1781	Power On Time Counter (seconds)

Example

The value 1a 240d 02:18 is received from the power on time counter from the fieldbus.

- ID1777: 1 (years)
- ID1778: 240 (days)
- ID1779: 2 (hours)
- ID1780: 18 (minutes)
- ID1781: 0 (seconds)

8.3.5 Energy Counter

The energy counter counts the total quantity of energy that the drive gets from the supply network. The counter cannot be reset. To read the value of the counter through fieldbus, use these ID numbers.

ID number	Counter value
ID 2291	Energy Counter

The value always has 4 digits. The format and the unit of the counter change to agree with the energy counter value.

Example

- 0.001 kWh
- 0.010 kWh
- 0.100 kWh
- 1.000 kWh
- 10.00 kWh
- 100.0 kWh
- 1.000 MWh
- 10.00 MWh
- 100.0 MWh
- 1.000 GWh
- and so on

ID number	Counter value
ID 2303	Energy Counter Format

The energy counter format gives the position of the decimal point in the value of the Energy Counter.

- 40 = 4 digits, 0 fractional digits
- 41 = 4 digits, 1 fractional digit
- 42 = 4 digits, 2 fractional digits
- 43 = 4 digits, 3 fractional digits

Example

- 0.001 kWh (Format = 43)
- 100.0 kWh (Format = 41)
- 10.00 MWh (Format = 42)

ID number	Counter value
ID 2305	Energy Counter Unit

The energy counter unit gives the unit for the value of the Energy Counter.

- 0 = kWh
- 1 = MWh
- 2 = GWh
- 3 = TWh
- 4 = PWh

Example

If the value 4500 is received from ID 2291, the value 42 from ID 2303, and the value 0 from ID 2305, the result is 45.00 kWh.

8.3.6 Energy Trip Counter

The energy trip counter counts the quantity of energy that the drive gets from the supply network. The counter is in the submenu Trip counters. It is possible to reset the counter with the PC, the control panel, or the fieldbus. To read the value of the counter through fieldbus, use these ID numbers.

ID number	Counter value
ID 2296	Energy Trip Counter

The value has always 4 digits. The format and the unit of the counter change to agree with the energy trip counter value. See the following example. It is possible to monitor the energy counter format and unit with ID 2307 Energy Trip Counter Format and ID 2309 Energy trip Counter unit.

Example

- 0.001 kWh
- 0.010 kWh
- 0.100 kWh
- 1.000 kWh
- 10.00 kWh
- 100.0 kWh
- 1.000 MWh
- 10.00 MWh
- 100.0 MWh
- 1.000 GWh
- and so on

ID number	Counter value
ID 2307	Energy Trip Counter Format

The energy trip counter format gives the position of the decimal point in the value of the Energy Trip Counter.

- 40 = 4 digits, 0 fractional digits
- 41 = 4 digits, 1 fractional digit
- 42 = 4 digits, 2 fractional digits
- 43 = 4 digits, 3 fractional digits

Example

- 0.001 kWh (Format = 43)
- 100.0 kWh (Format = 41)
- 10.00 MWh (Format = 42)

ID number	Counter value
ID 2309	Energy Trip Counter Unit

The energy trip counter unit gives the unit for the value of the Energy Trip Counter.

- 0 = kWh
- 1 = MWh
- 2 = GWh
- 3 = TWh
- 4 = PWh

ID number	Counter value
ID 2312	Energy Trip Counter Reset

To reset the energy trip counter, use the PC, the control panel, or the fieldbus. When using the PC or the control panel, reset the counter in the Diagnostics menu. When using the fieldbus, set a rising edge to ID 2312 Energy Trip Counter Reset.

9 Precharge

9.1 Pre-charge State Diagram

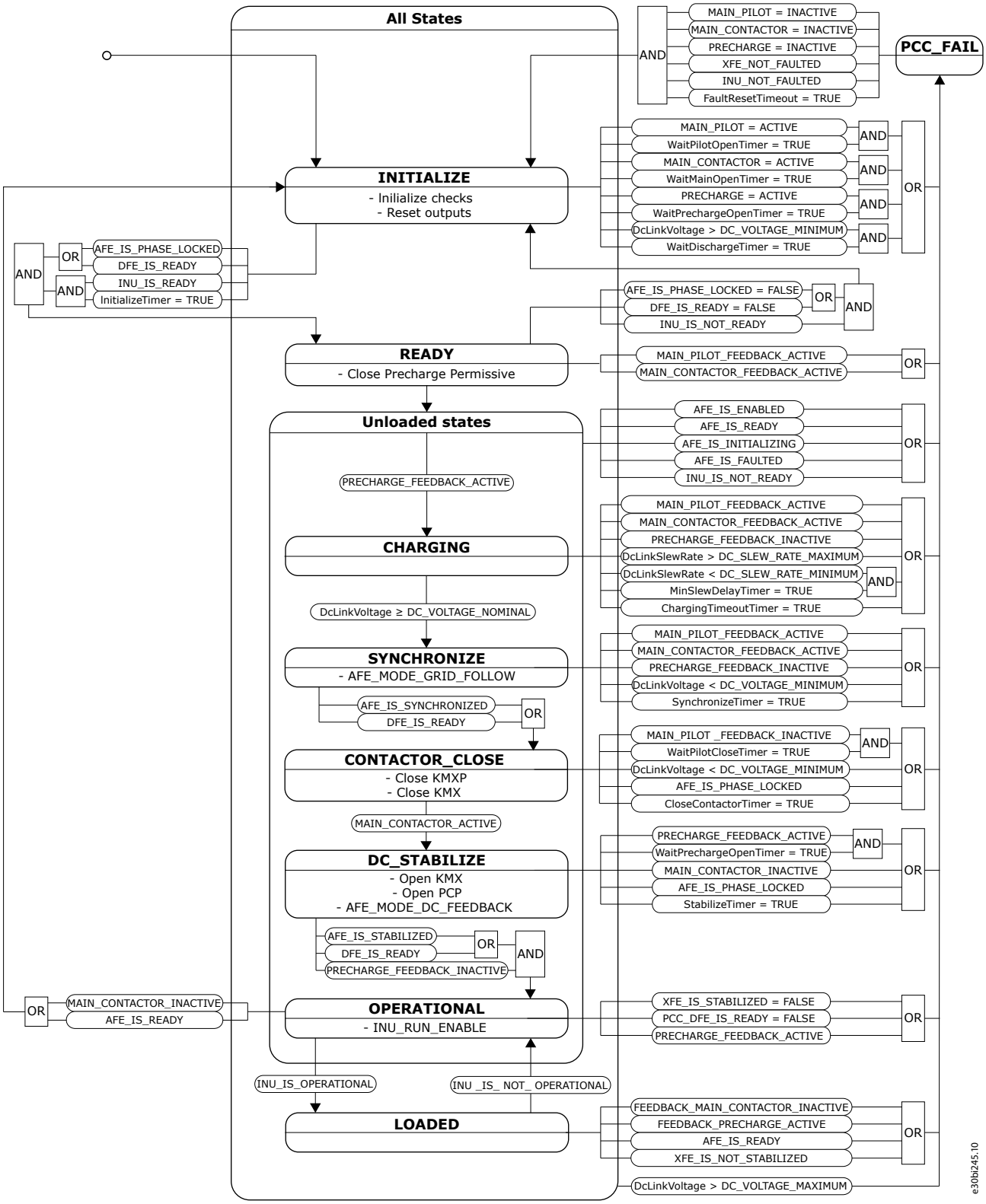


Illustration 54: Pre-charge State Diagram

9.2 Power On State Diagram

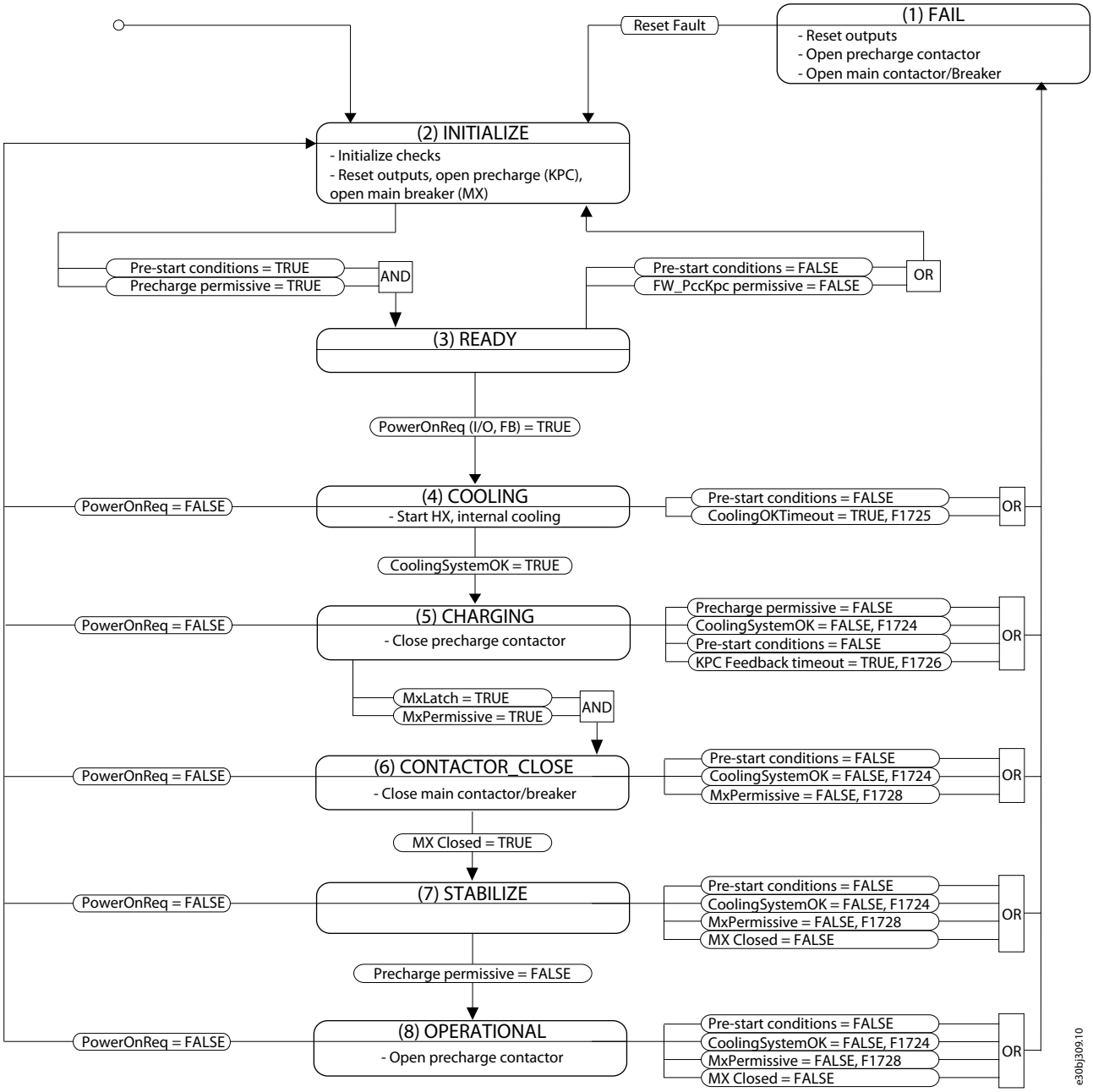


Illustration 55: Power On State Diagram

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