Application Guide

iC7 Series HVACR

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1 Introduction to the Application Guide

1.1 Version History

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

The original language of this guide is English.

Version	Remarks	Software Version
Document version 02	General release (release 26A)	2.0.0

1.2 Purpose of this Application Guide

This application guide is intended for qualified personnel such as:

- Automation engineers
- Commissioning engineers who have experience operating with parameters and basic knowledge of variable frequency drives

The application guide provides information on the initial configuration of the drive. The purpose of the guide is to provide information on parameters for configuring and controlling the drive, an overview and procedures of the various user interfaces in iC7, typical application examples, and troubleshooting of events in the drive.

1.3 Additional Resources

Additional resources are available to help understand the features, and safely install and operate the iC7 series products:

- Safety guides, which provide important safety information related to installing iC7 series drives and power converters.
- Installation guides, which cover the mechanical and electrical installation of drives, power converters, or functional extension options.
- Design guides, which provide technical information to understand the capabilities of the iC7 series drives or power converters for integration into motor control and monitoring systems.
- Operating guides, which include instructions for control options, and other components for the drive.
- Application guides, which provide instructions on setting up the drive or power converter for a specific end use. Application guides for application software packages also provide an overview of the parameters and value ranges for operating the drives or power converters, configuration examples with recommended parameter settings, and troubleshooting steps.
- *Facts Worth Knowing about AC Drives*, available for download on www.danfoss.com.
- Other supplemental publications, drawings, and guides are available at www.danfoss.com.

Latest versions of Danfoss product guides are available for download at https://www.danfoss.com/en/service-and-support/documentation/.

1.4 Safety Symbols

The following symbols are used in Danfoss documentation and products.

DANGER

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

WARNING

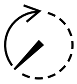
Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

Indicates information considered important, but not hazard-related (for example, messages relating to property damage).

	ISO warning symbol for general warnings
	ISO warning symbol for hot surfaces and burn hazard
	ISO warning symbol for high voltage and electric shock
	Symbol for indicating the required discharge time of the capacitors in the product.
	ISO action symbol for referring to the instructions

2 Software Tools and Security

2.1 iC7-HVACR Software Package

The iC7-HVACR application is designed to bring optimized control to all heating, ventilation, air conditioning, and refrigeration applications. Easy to use and with built-in intelligence, the drive is fast and cost-effective to commission. It features a wide range of functions specifically developed for use with, for example, pumps, fans, and compressors to save energy and meet environmental regulations.

2.2 Software Tools

2.2.1 Overview

Danfoss offers a suite of desktop software tools which have been designed to provide easy operation and the highest level of customization of variable frequency drives.

The MyDrive® tools support the entire lifecycle of the drive, from system design to service. Some of the tools are available free of charge, and some require a subscription.

For more information about the MyDrive® tools, see MyDrive® documentation.

2.2.2 MyDrive® Select

MyDrive® Select performs frequency converter sizing based on calculated motor load currents, ambient temperature, and current limitations. The sizing results are available in graphical and numerical format, and include calculations of efficiency, power losses, and inverter load currents. The resulting documentation is available in .pdf or .xls format, and can be imported to MyDrive® Harmonics for evaluation of the harmonic distortion, or validation of compliance towards most recognized harmonic norms and recommendations.

MyDrive® Select is available as a web-based tool at select.mydrive.danfoss.com and as a mobile device app that can be downloaded from app stores.

2.2.3 MyDrive® Harmonics

MyDrive® Harmonics estimates the benefits of adding harmonic mitigation solutions to an installation and calculates system harmonic distortion. The evaluation can be done both for new installations and when extending an existing installation.

The free version provides a fast overview of the expected general performance of the system. The expert version of MyDrive® Harmonics requires a subscription, which opens up more features, including the possibility to save and share harmonic projects, import projects from MyDrive® Select, and the possibility to add Danfoss harmonic mitigation products.

MyDrive® is available as a web-based tool at https://harmonics.mydrive.danfoss.com.

2.2.4 MyDrive® Energy

MyDrive® Energy combines drive system energy calculation and efficiency classification functionalities in 1 tool. It uses basic system parameters to generate efficiency metrics and estimate potential energy savings and CO_2 reduction for drive systems.

- The Efficiency Calculator (formerly MyDrive® ecoSmart) follows IEC 61800-9-2 standards for IE and IES class definitions, and calculates efficiency class and part load efficiency for Danfoss drives.
- The Energy Calculator enables system-level efficiency assessments, and analyzes energy consumption and savings. Additional parameters such as energy costs, CO_2 emissions, and system-specific load profiles can be added to obtain more precise results.

MyDrive® Energy is available as a web-based tool at https://energy.mydrive.danfoss.com/.

2.2.5 MyDrive® Insight

MyDrive® Insight is a software tool for commissioning, engineering, and monitoring drives. MyDrive® Insight can be used to configure parameters, upgrade software, and set up functional safety features and condition-based monitoring.

The Logic feature in MyDrive® Insight enables the customization and control of drives through a graphical user interface without the need for a separate programming tool. It allows for conditional controls, fault detection and diagnostics, and the creation of sequencing and interlocking logic. Programmable function blocks with inputs and outputs can be connected to control the digital or analog outputs of the drive. For more information, see MyDrive® Insight Logic Feature Application Guide.

MyDrive® Insight is available for download at https://suite.mydrive.danfoss.com.

2.3 Security

The iC7 series offers a secure and tamper-proof operational environment. It is designed for hardware-based security, which underpins every security feature of the iC7 series:

- **Network connectivity:** Communication between the drive and the MyDrive® Insight commissioning tool is end-to-end encrypted by using TLS/SSL cryptographic protocols as used by HTTPS in web browsers.
- **Tamper-proof hardware:** The drive hardware prevents unauthorized alteration and protection against physical and side-channel attacks.
- **Trusted firmware:** Firmware and applications are encrypted and only executed if they are genuine.

Drives must be installed by authorized and educated personnel, who are aware of the security risks in networks and can mitigate threats in the network.

3 User Interfaces

3.1 Types of User Interface

The following methods are used to interact with a Danfoss iC7 Series drive:

- The **control panel** provides a simple and direct interface. It can be mounted either directly onto the drive or in close proximity to the drive by using the control panel remote mounting kit.
- The **MyDrive® Insight software tool** provides a more advanced interface allowing for greater programming and configurability than what can be done on the control panel. This tool allows access to the drive from a remote location, providing proper infra-structure and network access rights.

3.2 Control Panel

3.2.1 iC7 Control Panel Options

The iC7 series offers a broad range of interfaces which suit different connectivity requirements to support wireless regulations.

The iC7 Series offers the following 2 different control panel options. Refer to the relevant Design Guide for information on which control panels are available to your product.

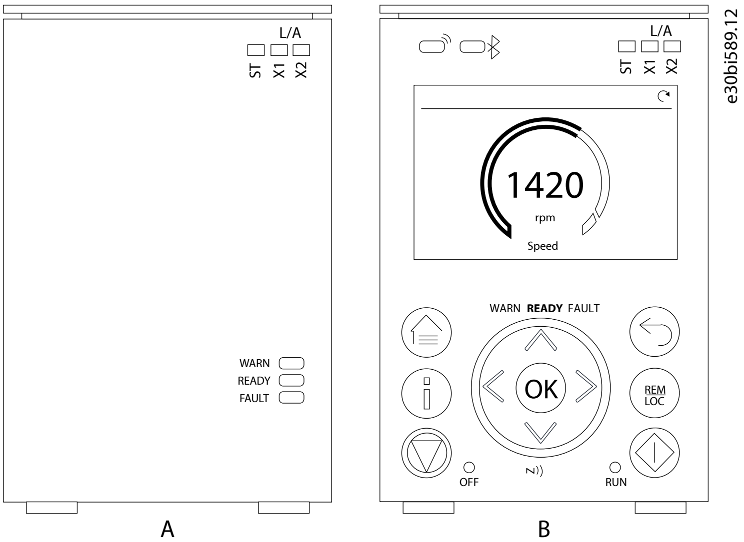


Figure 1: Control Panel Options

- **Blind Panel OPX00**: This panel shows the basic status of the drive and fieldbus indicators. The panel is typically used when only limited interaction with the drive is required after installation and commissioning, or when the drives are controlled by fieldbus.
- **Control Panel 2.8 OPX20**: This panel is the standard user interface, and used when frequent interaction with the drive is required. The panel enables easy setup of the drive via parameters, monitoring the drive status, and also shows event notifications.

Control Panel 2.8 0PX20 has the following features:

- 2.8" monochromatic user interface with a display resolution of 240 x 160 pixels.
- Visual LEDs to illustrate drive status and fieldbus communication.
- Halo indicator with 3 colors to illustrate drive status at a glance.
- A display which can be customized to show required or essential information.
- Buttons to control the drive locally, including a toggle button to easily switch between local and remote control.
- Parameter widgets which support alphanumeric and special characters, integers, floating points, date time formats, choice lists, and commands to configure application data.
- Help texts to support operation.

3.2.2 Control Panel Elements

The control panel provides an interface for configuring and controlling the converter easily. The section describes the elements for all control panel options.

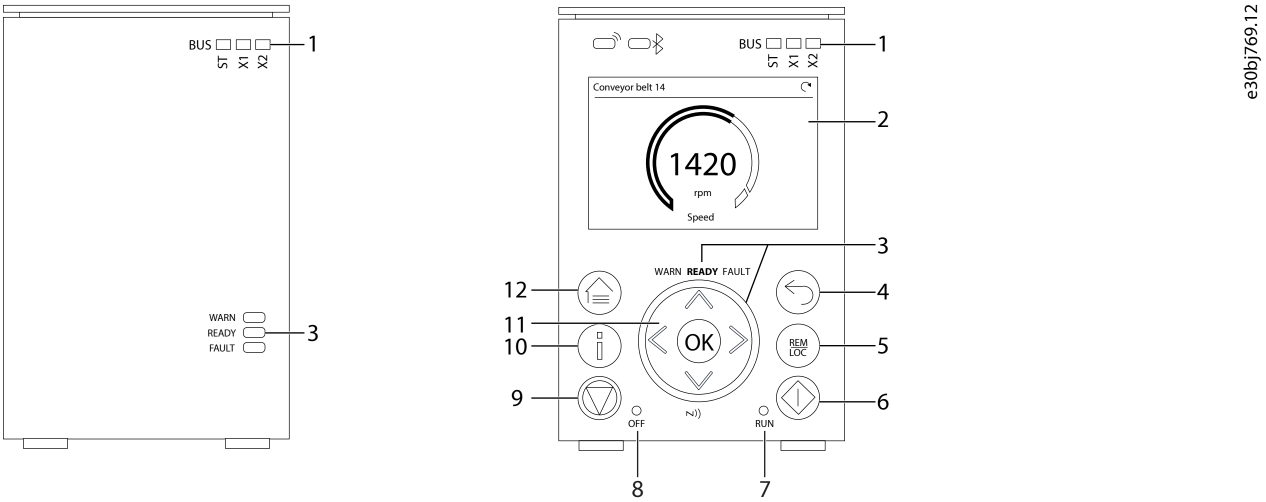


Figure 2: Control Panel Elements

The following table describes the control panel elements:

Table 1: Control Panel Elements Description

Legend	Name of Element	Description
1	Fieldbus Indicators	The LEDs indicate the status of the communication interface X1 and X2. • **[ST]** ◆ Green blinking LED indicates that the communication interfaces are in normal operating state. ◆ Red blinking LED indicates that an error has occurred and communication is not possible. • **[X1]** ◆ Green blinking LED indicates data exchange on communication interface X1. ◆ Red blinking LED indicates an error during data exchange on communication interface X1. • **[X2]** ◆ Green blinking LED indicates data exchange on communication interface X2. ◆ Red blinking LED indicates an error during data exchange on communication interface X2.
2	Display	Enables access to content and settings. The display provides detailed information about the status of the converter.

Table 1: Control Panel Elements Description - (continued)

Legend	Name of Element	Description

3	Converter Status Indicators	The LEDs indicate the status of the converter.
		• **[WARN]**
		  ◆ When this text is lit in yellow, it indicates a warning-level event.
		• **[READY]**
		  ◆ When this text is lit in white, it indicates that the converter is ready for operation.
		  ◆ When this text is blinking white (1 Hz), it indicates that the converter is powered on but is not ready.
		• **[FAULT]**
		  ◆ When this text is lit in red, it indicates a fault.
		The status of the converter is also indicated by the Halo, which has the same color indicators as the converter status texts on the control panel.

4	Back button	Navigates to the previously viewed screen or a menu level above the current menu.
5	REM/LOC	Toggles the converter between remote and local operation.
6	Run button	Starts the operation of the converter.
7	RUN LED	The indicator has the following states: • **On**: Start command is applied and the converter is modulating. • **Off**: The converter has stopped and the start command is not applied.

8	OFF LED	The indicator has the following states:
		• **Steadily on**: The indicator is in this state because of either of the following 2 reasons:
		  ◆ The converter is not modulating and is coasted.
		  ◆ The stop signal is applied, output is active, and the converter is ramping down until coast or restart. Ramp times, protections, and stopping functions prolong this state.
		• **Flashes for 3 s**: The start command is initiated, but the converter is not able to start.
		• **Off**: The converter is in operation, a start signal is applied, and the output is active. This also includes ramping, running on reference, and AMA.
		NOTE: When a fault has occurred in the converter, the LED is on though the start command is available. If there is a fault event, and the start command is disabled and reinitiated again, the Off LED blinks.

9	Stop button	Stops the operation of the converter.
10	Info button	Provides more detailed information about an event that has occurred in the converter. Pressing Info also shows a context sensitive help for parameters.
11	Arrow buttons and OK button	• **Arrow buttons**: Used to navigate within the different screens and menus. • *[OK]*: Primarily used to confirm selections and data in the control panel display.
12	Home/Menu button	Toggles between Home screen and the current parameter menu, to allow quick access to key status information during parameter setup.

3.2.3 Control Panel Basic Configurations

The basic configurations of the control panel include:

- A readout of the status of the motor and the drive, including warnings and faults.
- Navigable menus, where the parameter settings of the drive can be viewed and changed.

3.2.4 Starting the Drive and Control Panel Display

While the drive is powering up until it is ready to operate, the display of the control panel shows the iC7 logo.

NOTE: When the drive is started, it takes 25–30 s. for the drive to be in ready state and for the control panel display to change to the *Status* screen (default).

3.2.5 Understanding Status Screens

When the drive is in ready state, the control panel display shows the *Status* screen. The *Status* screen can be customized.

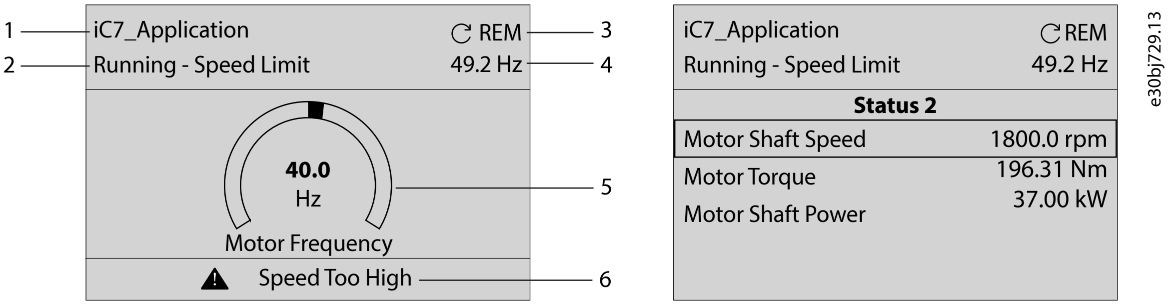


Figure 3: Status Screen (Donut View vs. Line View)

1	The name of the drive, which can be changed with parameter ***8.7.1 Asset Name***. Shows the name of the application software by default.	2	The status of the drive (see the following table).
3	The current control of the drive. REM indicates remote control and LOC indicates local control. The arrow shows the direction of the motor.	4	Shows the value selected with parameter ***8.3.2.2 Status Line Right***.
5	The status signal value as a donut infographic view. It is possible to show only a single signal in a donut view. When more than 1 signal is configured, the screen changes to a line view. A minimum of 2 and a maximum of 5 signals are shown in the line view.	6	A warning pops up in the bottom of the screen when it occurs, and disappears automatically when the triggering condition has been removed.

To navigate between *Status Screen 1* and *Status Screen 2*, press the left and right arrows on the control panel.

The status line of the control panel shows the status of the drive. The status line texts are dynamically generated, based on the configuration of the system. The following are some examples of basic operation:

Table 2: Drive Status Texts

Drive status in the panel	Description
Drive Ready	The drive is powered and ready to start.
Running at Reference	The drive is running at the selected reference.
Running at Standstill	The drive is running with 0 reference.
Stopping	The drive is running towards stop.
Stopped	The drive is stopped due to an active stop command.
Coasted	The drive is coasting due to an active coast command.
Quick Stop	The drive is stopped due to an active quick stop command.
Start Interlock	The drive is stopped while a start command is active. To restart after the block is removed, the start command must be removed and given again.

Table 2: Drive Status Texts - (continued)

Drive status in the panel	Description
Start Blocked	The drive is in a state that is preventing start. All start commands are ignored.
Disabled Reference	The drive setpoint has been disabled with the PROFIdrive Control Word.
Reversing	The drive is reversing due to an active reverse command.
Reversing at Reference	The drive is reversing at the selected reference.
Motor Disconnected	The drive has detected a disconnected motor (see parameter ***4.5.3 Disconnected Motor Response*** in 6.6.5 Protection (Menu Index 4.5)).
Fault !	The drive has detected a fault. The fault condition is no longer present, and the fault can be reset.
Fault Active !	The drive has detected an active fault. The fault cannot be reset while the fault condition remains present.
Protected Fault !	The drive has detected a fault that requires human interaction. Resetting the fault requires a power cycle before the drive is operational again.
Fault ! Stopping	The drive has detected a fault and is running towards stop.
Fault ! Derating	The drive is derating its output to thermally protect the Advanced Harmonic Filter (see parameter ***3.4.3 Thermal Switch Response*** in 6.5.3 Advanced Harmonic Filter (Menu Index 3.4)).
Safe Torque Off (STO)	The drive is coasting due to an active STO command.
Safe Stop (SS1/SS2)	The drive is stopping on a safe stop command.
Inching	The drive is inching or jogging.
Inching at Standstill	The drive is inching with 0 reference.
Inching at Reference	The drive is inching with the selected inching reference.
Running Frozen Reference	The drive is running at frozen reference due to an active frozen reference command.
Stopping Frozen Reference	The drive is running towards stop due to an active stop command with a frozen reference command.
Running/Stopping/Inching with: • Power Limit • Undervoltage Limit • Overvoltage Limit • Torque Limit • Current Limit • Speed Limit	The drive is running, stopping, or inching, and has exceeded the limit that is shown. For example, *Running - Power Limit*. Some possible limits are listed in the cell on the left.
AMA Ready	Advanced Motor Adaptation is activated and is waiting for the start command.
AMA in Progress	Advanced Motor Adaptation is running, measuring motor data.
AMA Finished	Advanced Motor Adaptation is finished. To restart the drive, remove and then reapply the start command.
Inertia Est. Ready	Inertia Estimation is activated and is waiting for the start command.
Inertia Est. in Progress	Inertia Estimation is running, measuring system inertia.
Inertia Est. Finished	Inertia Estimation is finished. To restart the drive, remove and them reapply the start command.
24V Backup Mode	The drive is powered with the 24 V backup supply. The power unit of the drive is disabled.

Table 2: Drive Status Texts - (continued)

Drive status in the panel	Description
Motor Feedback Test Ready	Motor Feedback Test is activated and is waiting for the start command.
Motor Feedback Test Running	Motor Feedback Test is running, checking feedback settings.
Auto Tuning in Progress	The Autotuning of the Process Controller is running, measuring the plant characteristics.

3.2.6 Adjusting Display Backlight and Contrast

When in *Status Screen 1* or *Status Screen 2*, it is possible to adjust the backlight intensity and contrast of the display.

To adjust the display backlight and contrast settings, press the *[Info]* button and any of the arrow buttons of the control panel. The settings are shown on the screen:

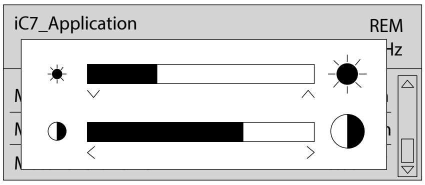


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Figure 4: Intensity Change in Backlight and Contrast

- To change the intensity of the backlight, keep pressing the *[Info]* button along with either the up or down arrow buttons of the control panel.
- To change the contrast, keep pressing the *[Info]*button along with either the left or right arrow buttons of the control panel.

3.2.7 Changing the Content of the Status Screens

The content of the status screens can be changed with parameters in the parameter groups ***8.3.3 Status Screen 1*** and ***8.3.4 Status Screen 2***. Up to 5 status signals can be selected for each screen. By default, *Status Screen 1* shows the actual value of the selected control mode, for example, speed, and *Status Screen 2* shows 3 signals:

- Motor shaft speed
- Motor torque
- Motor shaft power

If the screen shows only 1 signal, it is shown as a donut graph. If the screen shows more than 1 signal, they are shown as a line view.

3.2.8 Main Menu and Overall Navigation

Pressing the *[Home/Menu]* button toggles between the status screens and the main menu screen.

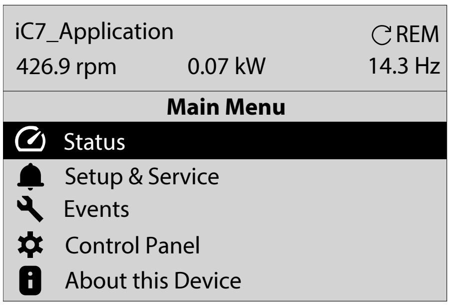

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Figure 5: Main Menu Screen

Basic navigation techniques

To navigate through and within the main menu, use the navigation buttons of the control panel.

- To navigate to different entries of the menu, press the up or down arrows of the control panel.

- To navigate to a lower level in the menu press the *[OK]* button, and to navigate to a higher level press the *[Back]* button.

Contents of the menu

The main menu has 4 selections

Table 3: Main Menu Contents

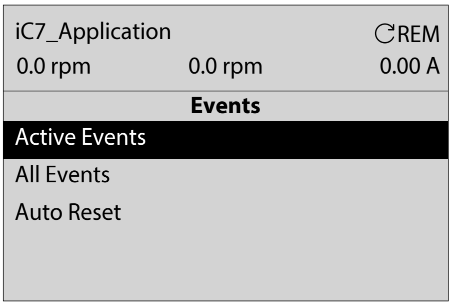
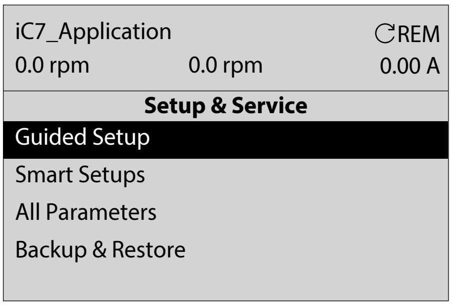
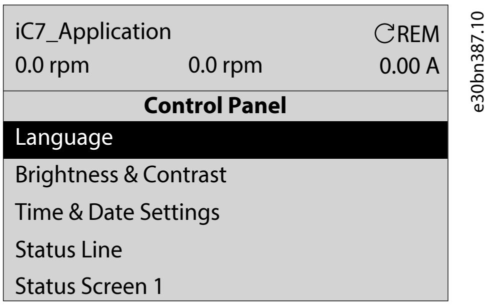
Selection	Function	
Status	Returns to *Status Screen 1*	
Events	Access event-related content.  **Figure 6: Events Screen**	
	Active Events	View active events and reset them.
	All Events	View all events, including the history of events.
	Auto Reset	Configure the automatic reset behavior (see parameter group ***6.4.4 Auto Reset***).
Setup & Service	Access parameters, backup and restore, and the motor setup wizard. Setup and Service Screen 	
	Guided Setup	Perform a guided setup of the drive.
	Smart Setups	Access the Smart Setups of the drive (see 5.1 Configuring the Drive with Smart Setups).
	All Parameters	Access all the parameters of the drive.
	Backup & Restore	Back up the system or restore a previous backup (see 3.2.13.1 Making a System Backup Using the Control Panel and 3.2.13.2 Restoring the System Configuration Using the Control Panel).

Table 3: Main Menu Contents - (continued)

Selection	Function	
Control Panel	 **Figure 7: Control Panel Screen**	
	Language	Select the language of the control panel
	Brightness & Contrast	Configure the brightness and contrast settings of the control panel screen.
	Time & Date Settings	Configure the time zone and the format in which the time and date are shown.
	Status Line	Configure the 3 status values on the status line.
	Status Screen 1	Configure status screen 1 with up to 5 status values.
	Status Screen 2	Configure status screen 2 with up to 5 status values.
About this Device	View the device information, including the control panel software version.	

3.2.9 Changing the Selections of a Parameter

When a parameter has selections, the parameter index and name are highlighted in black. The example parameter in this procedure is ***P 5.8.6.2.1 Ramp 1 Type***.

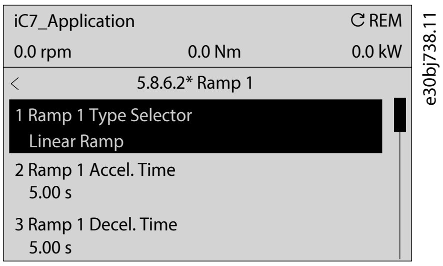


Figure 8: A Parameter with Selections

1. Press the *[Home/Menu]* button to enter the main menu.
2. Navigate to *Setup & Service* and press *[OK]*.
3. Navigate to *All Parameters* and press *[OK]*.
4. To view the selections of a parameter, navigate to the parameter in the parameter structure and press *[OK]* on the control panel. The selections available for the parameter are shown on the screen.

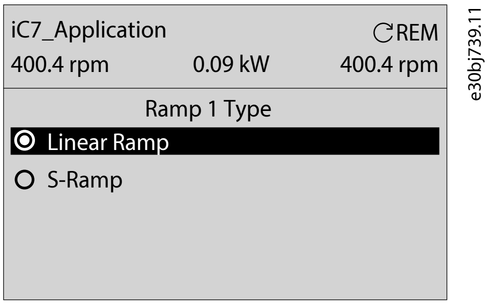


Figure 9: The Selections of a Parameter

5. To browse through the selections, press the up or down arrow buttons.
6. To select a selection, press *[OK]*.

3.2.10 Changing a Parameter Value

The example parameter in this procedure is ***P 5.8.6.2.2 Ramp 1 Accel. Time***.

1. Press the *[Home/Menu]* button to enter the main menu.
2. Navigate to *Setup & Service* and press *[OK]*.
3. Navigate to *All Parameters* and press *[OK]*.
4. Navigate to parameter ***5.8.6.2.2 Ramp 1 Accel. Time*** and press [OK].

   The range of the parameter (minimum to maximum values) is shown at the bottom of the control panel display.
5. To go to the values before or after the decimals, use the left and right arrow buttons. A black highlight on the digit indicates the location where the cursor is active.
6. To increase or decrease the value, press the up and down arrow buttons.
7. Confirm the changes by pressing *[OK]*.

   The following illustration shows the process of changing the value of the parameter.

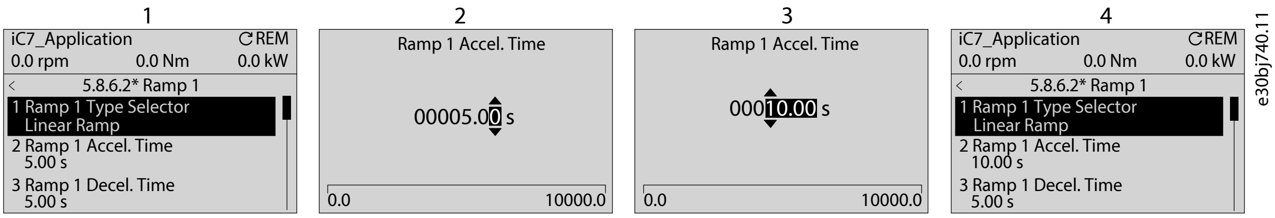


Figure 10: Changing the Value of a Parameter

3.2.11 Locking the Control Panel Display

To avoid unintended interaction via the control panel, the control panel display can be locked.

To lock the control panel, press the *[Back]* button for 3 s. After 3 s, the following screen is shown.

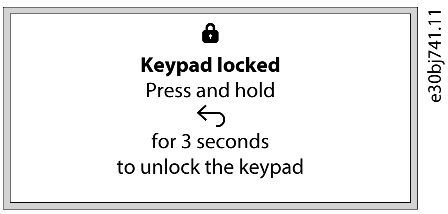


Figure 11: Control Panel Lock Screen

When the control panel is locked, pressing the control panel buttons has no effect.

To unlock the control panel, press the *[Back]* button for 3 s.

3.2.12 Control Panel Shortcuts

The following table lists the navigation shortcuts in the control panel.

Table 4: Control Panel Shortcuts

Action	Precondition	Buttons	Activation time
Fast scroll	When in a menu or list of choices	Up and down arrows	1 s to activate
Factory reset		*[Home]* + *[Back]* + down arrow	3 s to activate
Keypad lock		*[Back]*	3 s to activate or deactivate
Reference set point editing	• *Home* screen is active • LOC mode is active • Control is allowed	*[OK]*	Single press
Adjusting screen contrast and brightness	*Home* screen is active	*[Info]* + arrows	Continuous simultaneous press
Change the language of the control panel	*Home* screen is active	*[Info]+[Back]*	Single press

3.2.13 Backup and Restore

3.2.13.1 Making a System Backup Using the Control Panel

Back up the current system configuration using the control panel

1. Press the [Home/Menu] button to enter the main menu.
2. Navigate to *Setup & Service* > *Backup & Restore*.
3. Select *Backup*.

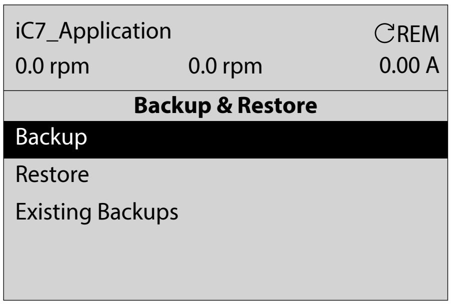


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Figure 12: Backup and Restore Menu

The backup wizard starts.

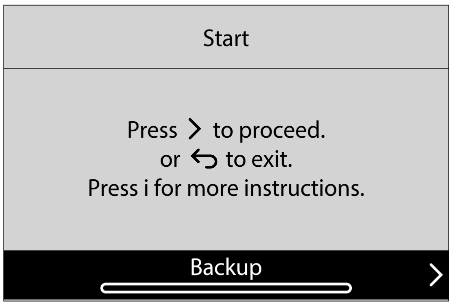

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Figure 13: Start Backup

4. Press [Right arrow] to start the backup process.

5. Select the storage place for the backup file.

   The available backup destinations depend on the hardware configuration.

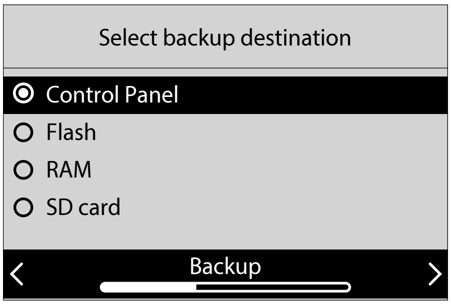


Figure 14: Select Backup Destination

> NOTE: The selections depend on the hardware configuration.

> NOTE: Storing a backup in RAM is intended for temporary use only.

6. Press [Right arrow] and wait until the operation is completed.

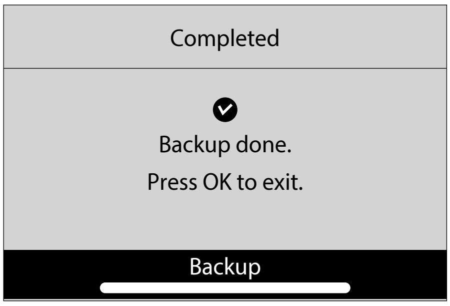


Figure 15: Backup Completed

7. To exit press [OK].

3.2.13.2 Restoring the System Configuration Using the Control Panel

Restore the system configuration from a backup file or to default factory settings using the control panel

1. Press the [Home/Menu] button to enter the main menu.
2. Navigate to *Setup & Service* > *Backup & Restore*.
3. Select *Restore*.

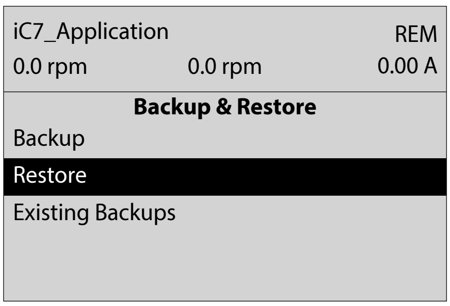


Figure 16: Backup and Restore Menu

   The backup wizard starts.

Figure 17: Start Restore

4. Press [Right arrow] to start the restore process.
5. Choose whether to restore the system configuration from a backup file or to return the system to default factory settings.

Figure 18: Select Restore Type

6. If *Restore from backup* is selected, select the backup file to restore.

Figure 19: Select File

7. If *Restore from backup* is selected, select the content to restore, and the details of the parameter settings to restore.

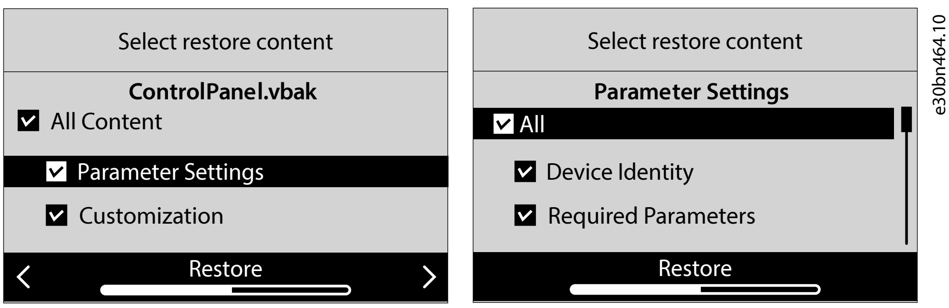
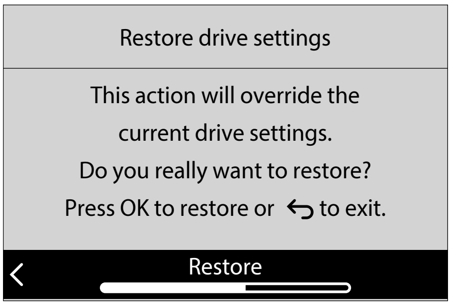


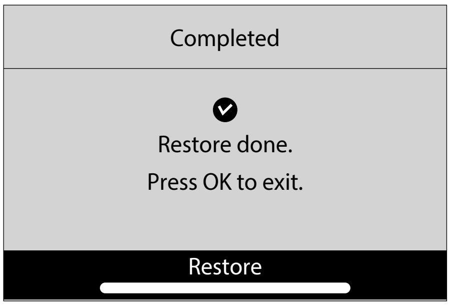
Figure 20: Select Content and Parameter Details to Restore

8. Press [OK] to acknowledge that the current settings will be overridden, and wait until the operation is completed.



e30bl747.10

Figure 21: Confirm the Restore Operation



e30bl749.11

Figure 22: Backup Completed

9. To exit press [OK].

3.3 MyDrive® Insight

3.3.1 Introduction to MyDrive® Insight

MyDrive® Insight is a platform-independent software tool that supports the commissioning, engineering, and monitoring of the iC7 series. Some of the key features include:

- Fast and easy configuration and commissioning
- Monitoring the drives as part of daily operations
- Collecting data and information for troubleshooting, maintenance, and service
- Discovering and accessing multiple drives in a network
- Intuitive user interface with notifications and visualizations on real-time converter information and events
- PC control to perform operations such as starting or stopping the drive, set references, set direction, reset, and coast of the drive
- Performing updates on single or multiple drives
- Backing up and restoring parameter settings
- Data logging and analyzing for troubleshooting

NOTE: The section MyDrive® Insight in the application guide covers basic information for getting started with MyDrive® Insight. For more comprehensive user instructions, see *MyDrive® Insight Application Guide*.

3.3.2 Getting Started with MyDrive® Insight

As a prerequisite, ensure that MyDrive® Insight is installed on the device (PC or laptop). MyDrive® Insight can be downloaded and installed from MyDrive® Suite, available here: https://suite.mydrive.danfoss.com/

1. To establish a point-to-point connection between the drive and the device, use the communication interface X0 and the RJ45 Ethernet port on the device by using a standard Ethernet cable.

If the device does not have an RJ45 Ethernet port or it is already in use, then a conventional adapter from USB to RJ45 can be used. To connect several drives at the same time, use an Ethernet switch between the PC and the control unit.

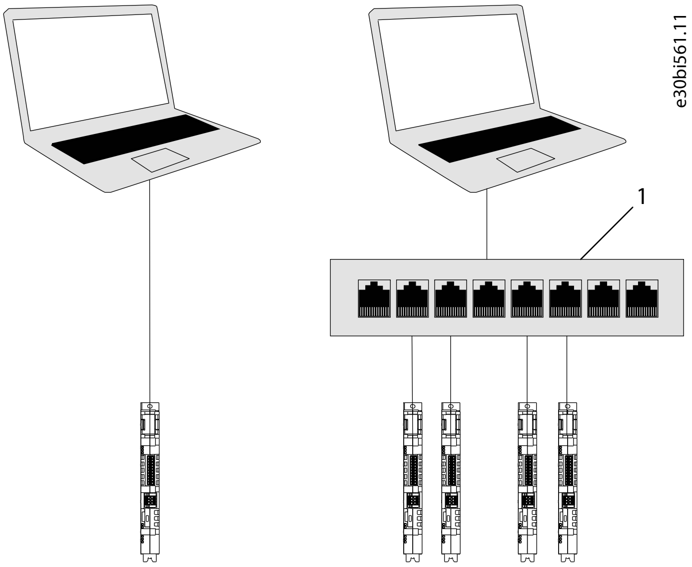


Figure 23: Connection to the PC

1	Ethernet switch

2. When the drive is powered up and in *Ready* state, open MyDrive® Insight on the device and the drive is recognized.
3. To establish or confirm the connection, click the arrow button.

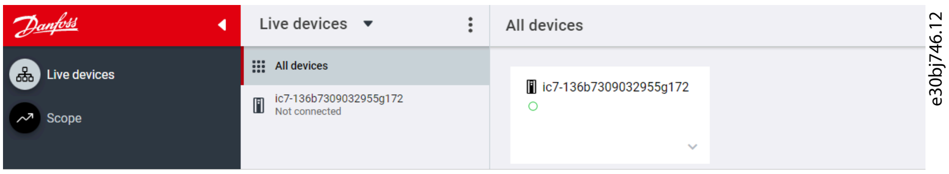


Figure 24: Confirm Connection

Once the connection is established, the drive is marked with a green connection symbol in MyDrive® Insight.

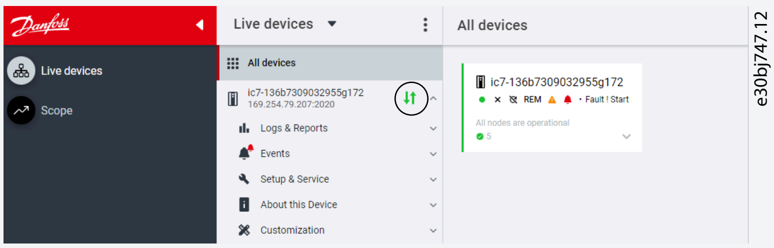
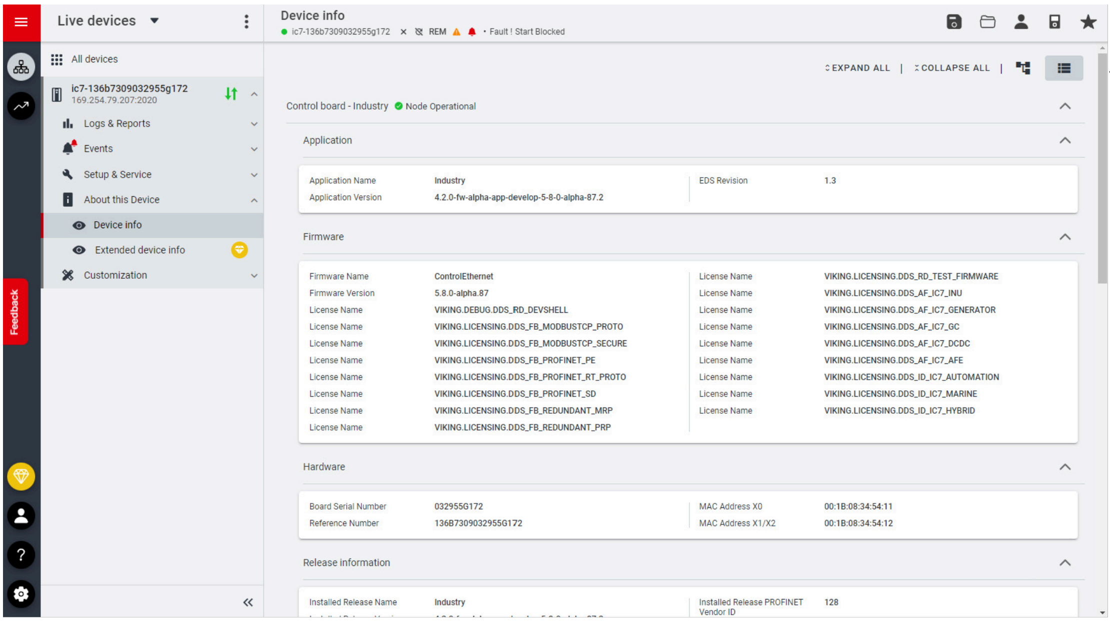


Figure 25: Connection Established

4. To interact with the drive, navigate to the required screen in MyDrive® Insight. The example picture shows the *Device Info* screen.



e30bj748.13

Figure 26: Device Info

NOTE: For more comprehensive MyDrive® Insight user instructions, see *MyDrive® Insight Application Guide*.

4 Logic

Introduction to Logic

Logic is a versatile feature that allows customization and control of the operation of the drive without the need for a separate programming tool or language. With Logic, the operation of the drive can be customized using a limited number of programmable function blocks and a limited number of states.

Logic in MyDrive® Insight extends the features of the drive and provides increased flexibility. Logic enables applying conditional controls, implementing fault detection and diagnostics, creating sequencing, modes, states, and interlocking logic.

Each function block has 3 inputs and 1 output, the functionality of these blocks can be selected from a comprehensive list. These function blocks are executed sequentially on every application cycle.

Any monitoring value or parameter can be connected to the block inputs. The output signal of each programmable function block can be used as an input to another function block or to control the digital or analog outputs of the drive. Moreover, the value of most parameters can be freely set with Logic. The drive can be directly controlled by the function block outputs through setting references and control signals.

Function blocks can initiate state changes; after entering a state, a user-defined list of actions (similar to function block outputs but with fixed values) executes. This allows flexible drive reconfiguration based on the selected state. Function blocks can be assigned to operate within specific states only.

Logic can be easily configured using the graphical configuration tool integrated into MyDrive® Insight.

Why use Logic?

Logic can be used for a wide range of applications and purposes, providing enhanced flexibility and customization options. Here are some common use cases for Logic:

- Conditional Controls: Logic allows for the implementation of conditional controls based on various inputs or parameters. Logic can adjust system behavior based on specific conditions, such as drive run-time, external events, or other defined criteria.
- Fault Detection and Diagnostics: Logic can be used to implement fault detection and diagnostics algorithms. By monitoring various parameters and inputs, logic can be created that detects abnormal conditions or faults in the system, enabling preventive maintenance and troubleshooting.
- Conditional control modes: Logic can change the motor configuration, enabling multi-motor functionality. Logic can provide a backup operation during service, fieldbus fault, and so on.

These are just a few examples of what Logic can be used for. The versatility and flexibility of Logic make it a powerful tool for implementing customized functionality and adapting the behavior of the system to meet specific requirements.

Configuration

Logic can be configured inside MyDrive Insight. However, the feature is only accessible if the drive supports Logic and a connection to the drive has been established.

Running mode

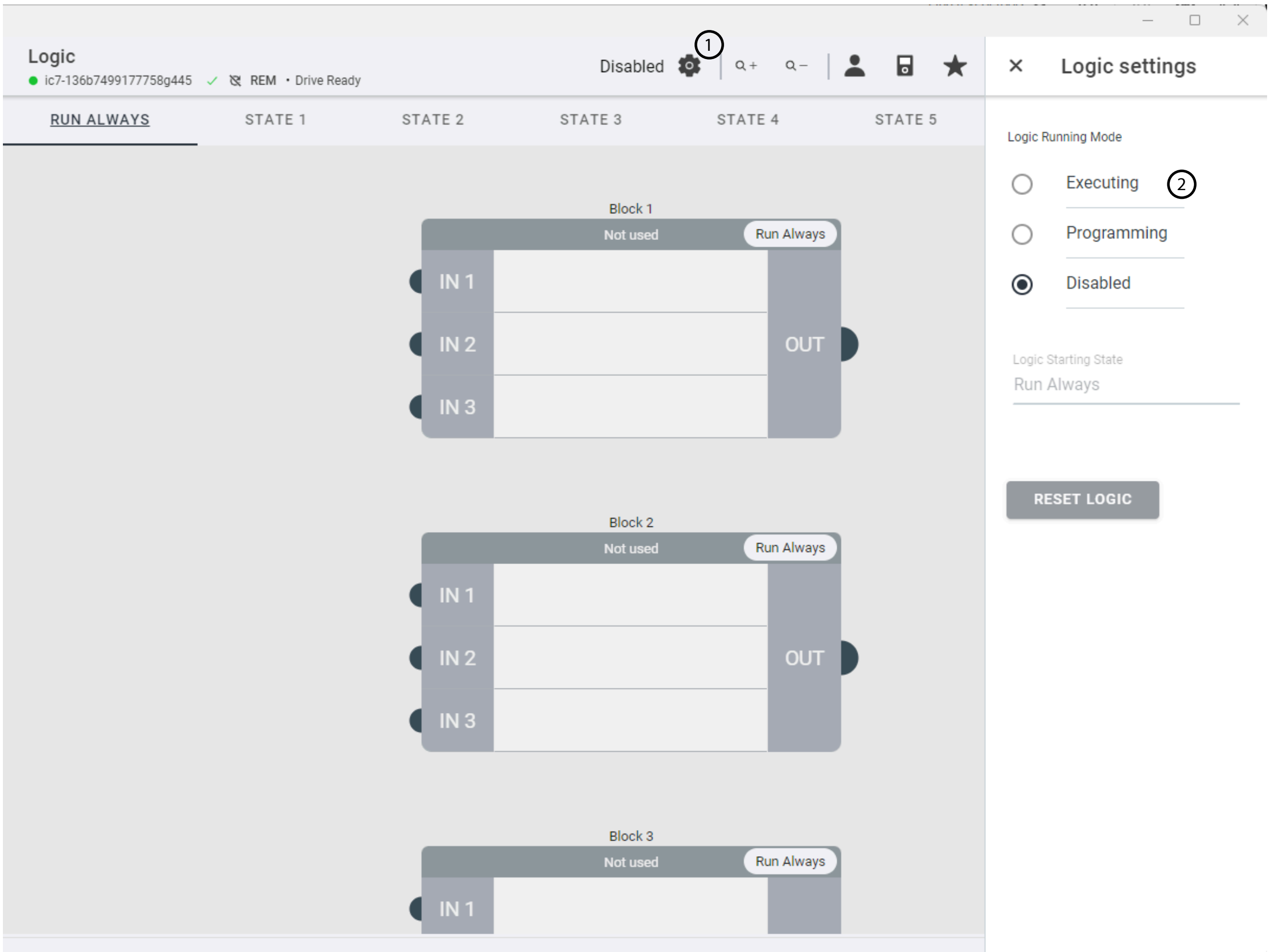
NOTE:

Before using Logic, it is important to evaluate whether the installation is in a suitable state for making changes to parameters, digital outputs, and analog outputs. Logic can be in the following modes:

- *Disabled*: Logic is not executed. Outputs and parameters are not affected by Logic.
- *Programming*: Logic is running in debug mode: function blocks and state handling is executed, but outputs and parameters are not changed by Logic.
- *Executing*: The outputs are actively driven and reflect the configured Logic behavior.

To configure Logic, click the *Logic settings* button and from the *Logic Running Mode* menu select *Programming* mode (stopping execution). To activate the configuration, select *Executing*. To reduce processing load when Logic is unnecessary, select *Disabled*.

Internal data resets to defaults on mode changes and is not retained across power cycles.



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Legend	Definition
1	Logic settings
2	Logic Running Mode

Figure 27: Running Mode Selection in MyDrive® Insight

For more information, see *MyDrive® Insight Logic Feature Application Guide*.

5 Configuring the Drive

5.1 Configuring the Drive with Smart Setups

Smart setups provide a guided parameterization of the drive in very few steps. It can be completed in seconds without the need to set parameters, when the motor configuration is not required and the drive is not used for controlling a process in closed loop.

Smart setups cover the following:

- Settings for the most widely used I/O configurations
- Settings concerning the embedded PID controller and the controlled process if applicable
- Motor configuration (optional)
- Motor filter settings if applicable
- Optimization of the motor settings
- Rotation check (optional)

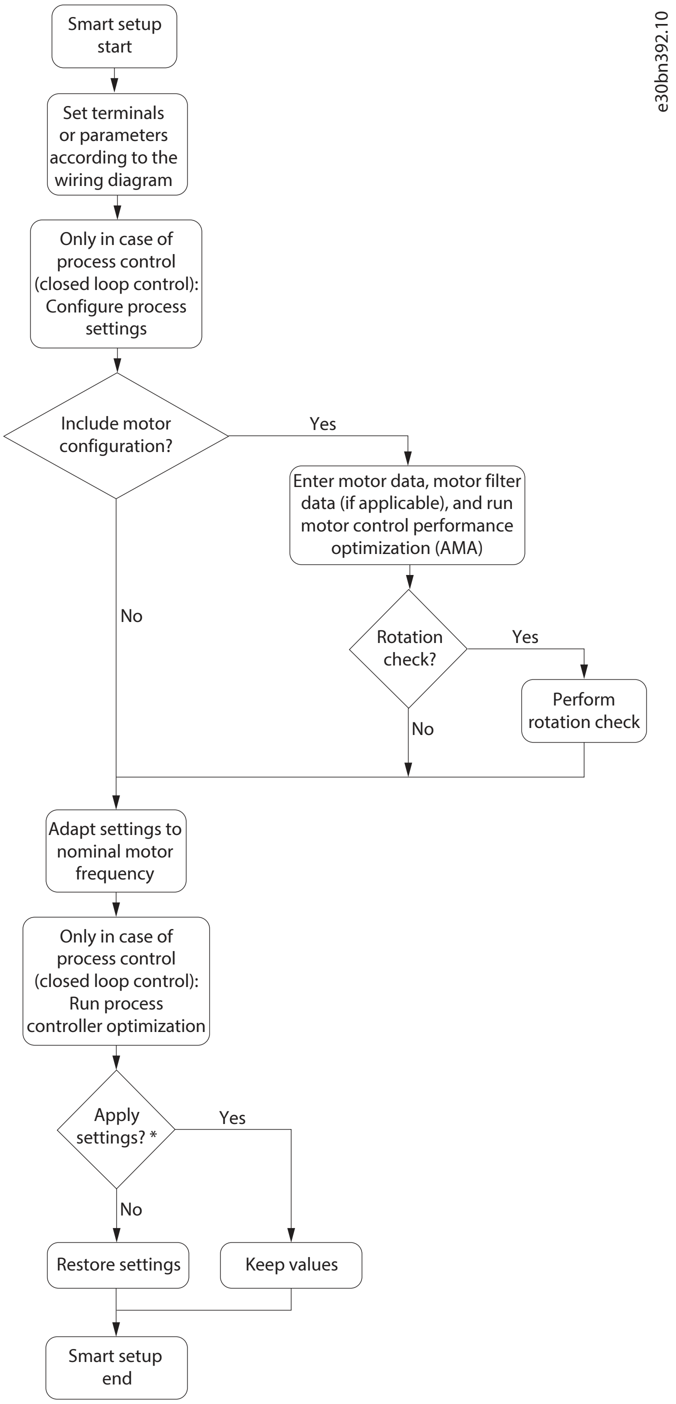
Three key applications are covered:

- Speed Control 1

  (see also the configuration example 5.3.2 Configuring Speed Control 1: Basic Speed Control with Analog Reference)
- Speed Control 2

  (see also the configuration example 5.3.3 Configuring Speed Control 2: Basic Speed Control with 4 Preset References)
- Process Control

  (see also the configuration example 5.3.4 Configuring Pressure Control (PID))



* The configuration flow can be interrupted, and the settings can also be restored during the configuration flow.

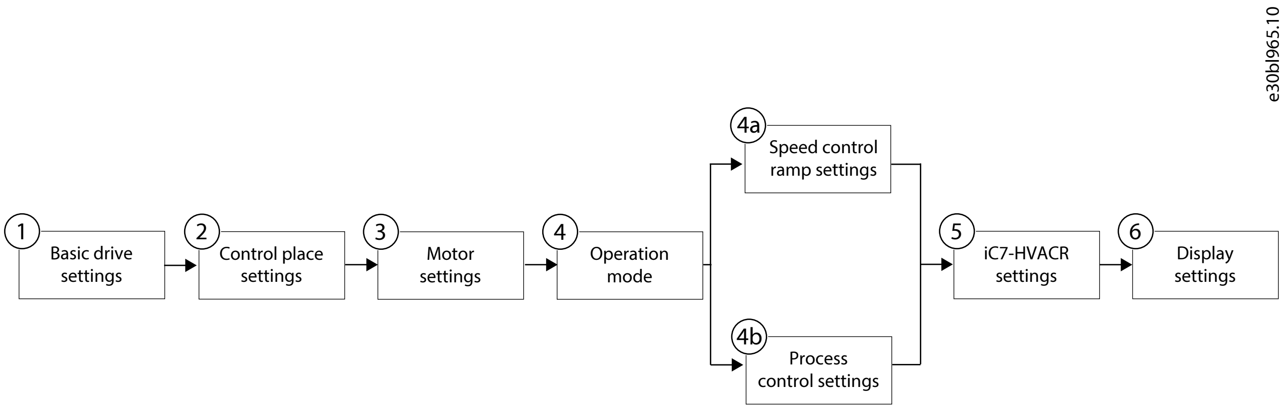
Figure 28: Configuration Flow of Smart Setups

5.2 Configuring the Drive Step by Step

5.2.1 Overview of the Configuration Steps

This section covers the basic steps to configure the iC7-HVACR drive. However, it is possible that a particular application requires more steps.

- For control panel related configurations, see 3.2.3 Control Panel Basic Configurations.
- For information on using MyDrive Insight, see 3.3.2 Getting Started with MyDrive® Insight.
- For detailed information about the parameters, see *Parameter Descriptions*.



Step 1	**Basic drive settings** The application-independent drive settings. Also settings concerning an optional filter for harmonic mitigation connected to the input of the drive, and/or an optional filter connected to the output of the drive for smoothing the operation of the motor and for protecting its windings.
Step 2	**Control place settings** Settings for selecting the signal sources of the control commands and the references.
Step 3	**Motor settings** Settings for configuring the connected motor, its control, and its protection.
Step 4	**Operation mode** Settings for configuring the operation mode. The operation mode decides whether the drive is used for controlling the speed of the connected motor or for controlling a process like pressure, flow, or temperature. Control is achieved with the built-in process controller and a feedback signal from the process.
Step 4a	**Speed control/ramp settings** Settings for controlling speed in an open loop as well as specifying acceleration and deceleration times.
Step 4b	**Process control settings** Settings for controlling processes based on a feedback sensor.
Step 5	**iC7-HVACR settings** Settings for configuring features specifically used in iC7-HVACR applications.
Step 6	**Display settings** Settings for which status values are monitored with the control panel and their position on the display.

Figure 29: Configuration Steps for iC7-HVACR Applications

5.2.2 Step 1: Basic Drive Settings

NOTICE

Ensure that the drive is mounted safely according to the installation and safety instructions shipped with the drive.

The first configuration step concerns application-independent settings.

Table 5: Basic Drive Settings

Parameter index	Name	Description
- Accessible by pressing the buttons *Info* and *Back* simultaneously	Language	Set the language of the control panel.
1.2.1	Grid type	Select the grid type of the supply system.
2.2.1.1	Unit voltage class	Set the unit voltage class (input voltage range). It is the focused voltage range within the input voltage rating of the power unit, for optimized drive control. • Low voltage range. For example, in 380–480 V (3N04) rated units, the range is 380–414 V AC. • Mid-voltage range. For example, in 380–480 V (3N04) rated units, the range is 415–440 V AC. • High voltage range. For example, in 380–480 V (3N04) rated units, the range is 441–480 V AC.
8.2.2	Unit selection	Set the system of units: • SI (metric units) • USCS (United States customary units)
8.3.1.2 (with control panel)	Time zone	Set the time zone. For example: (UTC-12:00) International Date Line West.
	Date format	Set the date format. For example: YYYY-MM-DD.
	Time format	Set the time format, either 24 h or 12 h.
8.4.2	Date and time	Set the actual date and time.

5.2.3 Step 2: Control Place Settings

Parameter group 5.5 Control Places is used to define the source from where the drive receives its commands and which types of references are used. The application software supports the following control places:

- Local control (control through the control panel)
- Fieldbus control
- I/O control
- Advanced control

The control place is selected using ***parameter group 5.5.2 Control Place Settings***. Additional parameters in this group are used for configuring an alternative if, for example, switching between two control places is needed, and for defining the reset signal to be independent of the control place. After the control place has been defined, references are then selected for each control place.

NOTICE

CONTROL PLACE SETTINGS

- The control place settings are overwritten when the drive is controlled via the virtual control panel in MyDrive Insight.

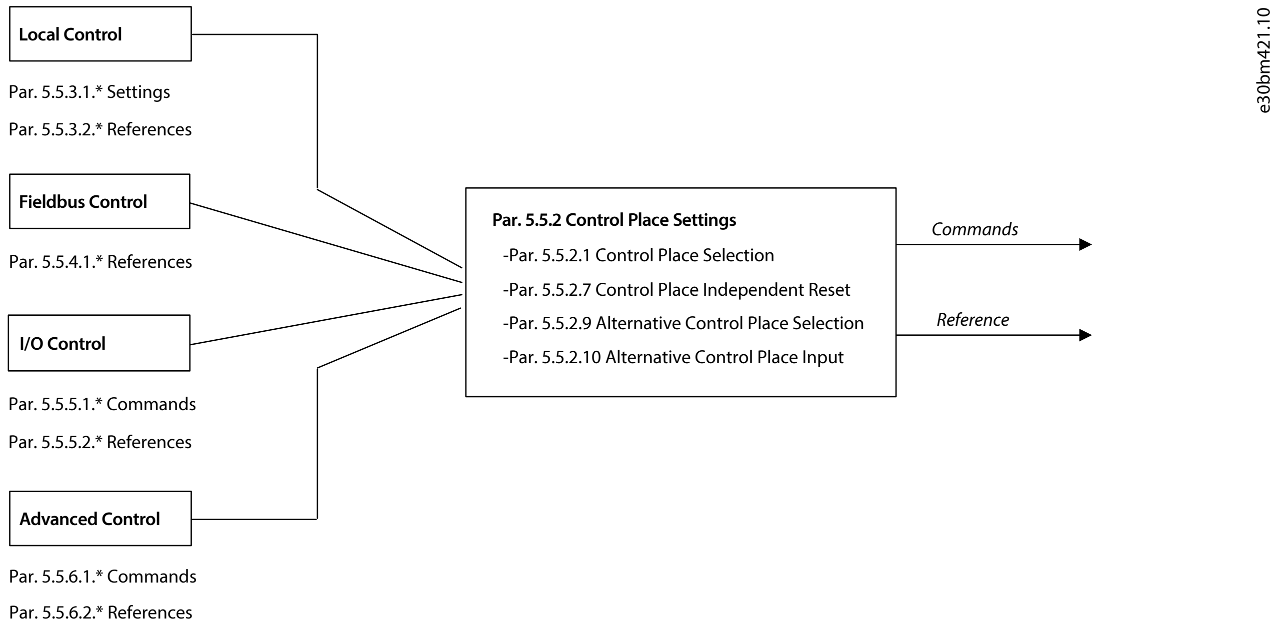


Figure 30: Control Place Overview

5.2.3.1 Local Control

- The drive gets its control commands from the control panel.
- One reference source can be selected per operation mode (speed control or process control).
- Additionally, the specific behavior of local control can be configured. For example, the drive can switch automatically to speed control when running in local control.

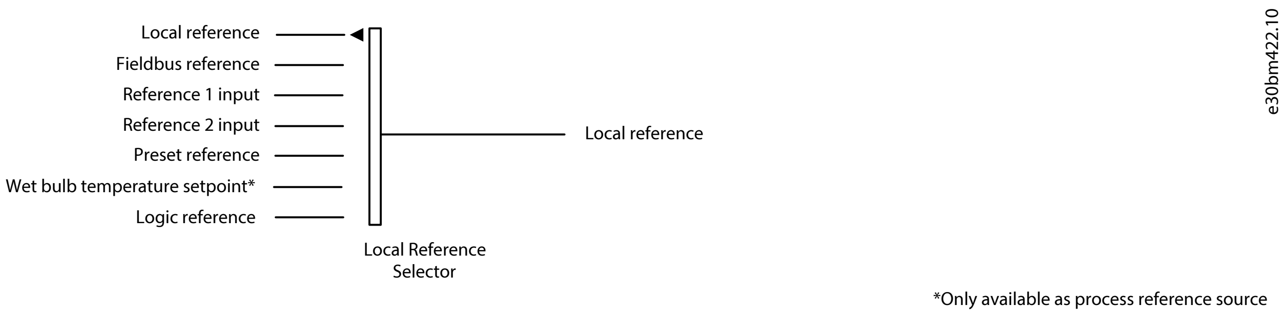


Figure 31: Local Control

5.2.3.2 Fieldbus Control

- The drive gets its control commands via a fieldbus.
- Up to 2 reference sources can be defined per operation mode. The sources can be combined by logic.
- Toggling between the 2 sources, for example by a digital input, is supported for speed control.

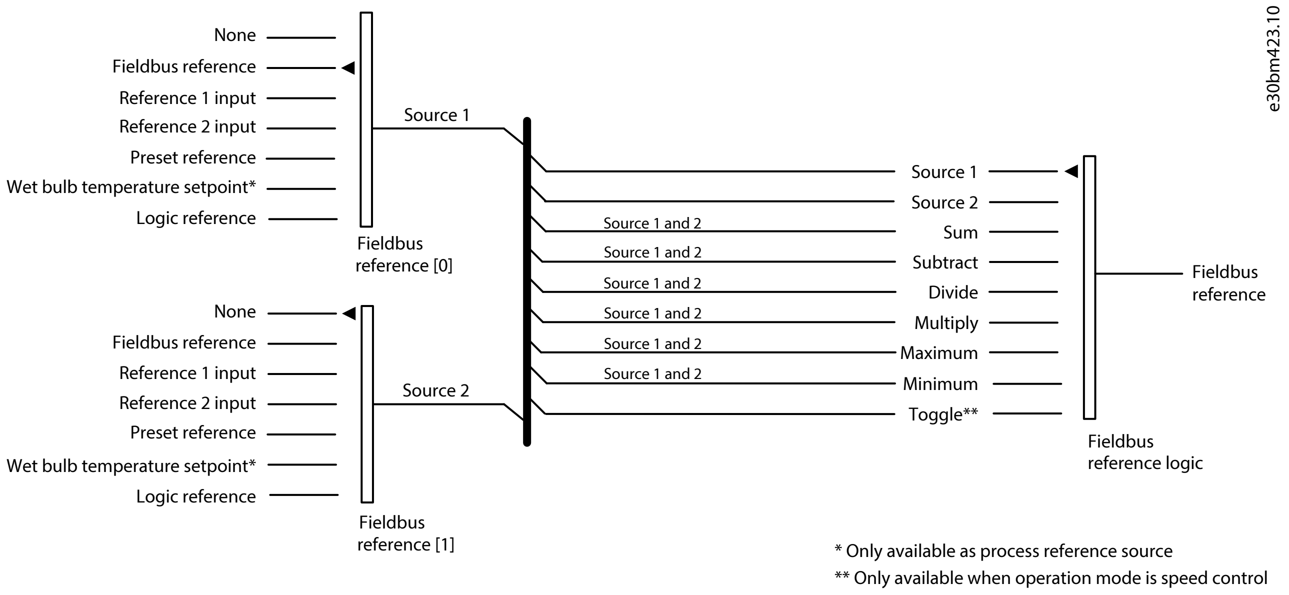


Figure 32: Fieldbus Control

5.2.3.3 I/O Control

Depending on the hardware configuration of the drive, digital and analog inputs as well as digital, analog, and relay outputs are available. The I/Os can be configured and used to control the application from the drive. If functional extension options are installed in the drive, the relevant parameters and I/O selections are automatically visible in the parameter structure.

- The drive gets its control commands via physical I/Os or virtual I/Os defined by the built-in logic.
- Up to 2 reference sources can be defined per operation mode. The sources can be combined by logic.
- Toggling between the 2 sources, for example by a digital input, is supported for speed control.

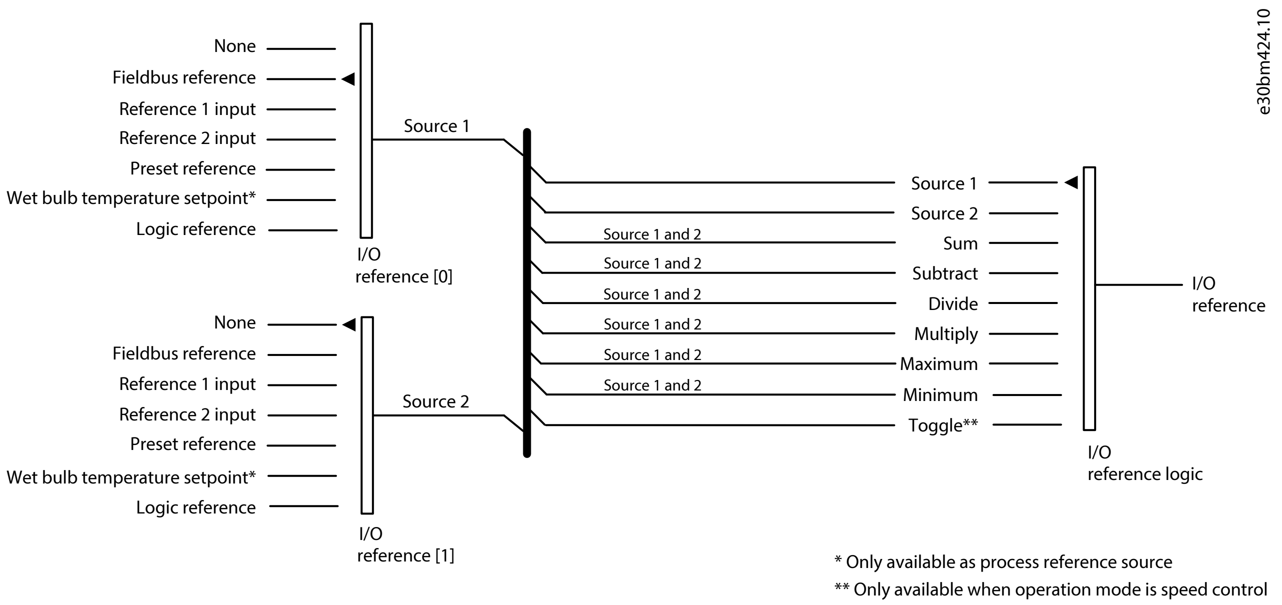


Figure 33: I/O Control

5.2.3.4 Advanced Control

- The advanced control supports 2 physical or logical inputs per command. A typical use case is when the drive receives its commands from digital I/Os and from the fieldbus, it can be configured to select only 1 source or to combine the 2 command sources using logic operators like AND or OR.
- Up to 2 reference sources can be defined per operation mode. The sources can be combined by logic.
- Toggling between the 2 sources, for example by a digital input, is supported for speed control.

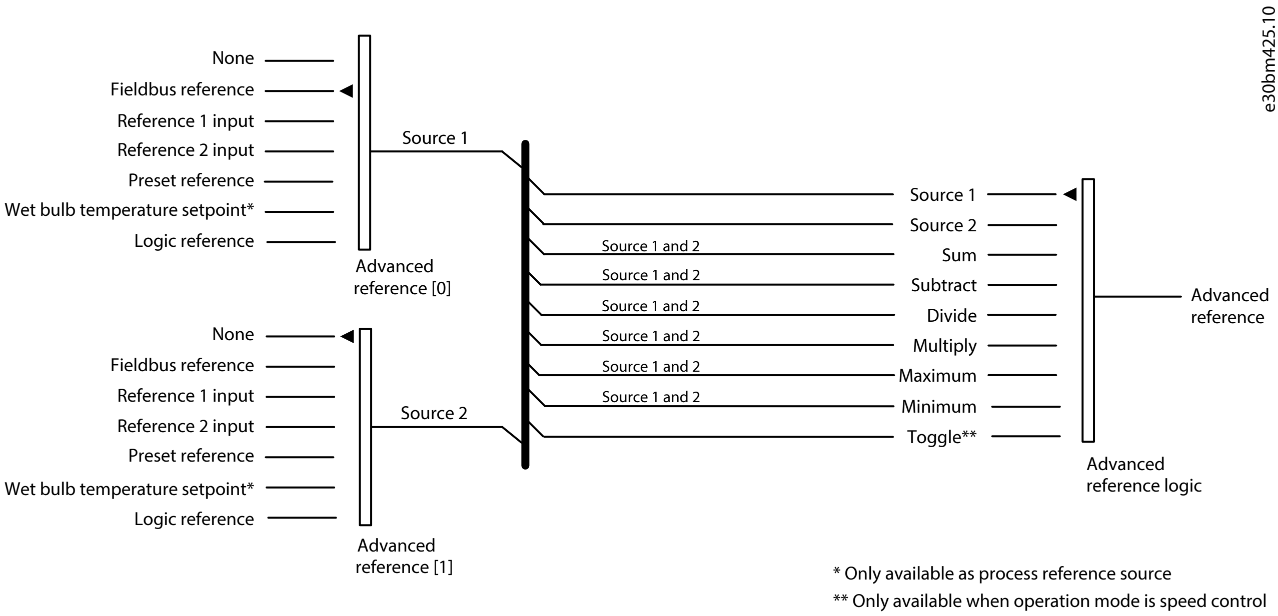


Figure 34: Advanced Control

5.2.4 Step 3: Motor Settings

Parameter group 4 Motor is used to specify the motor type and nameplate data, motor control settings, and methods to protect the motor. The required configuration steps depend on the motor type selected. The drive supports these motor types:

- Asynchronous motors
- Permanent magnet (PM) motors

NOTICE

The parameters specified in the motor configuration cannot be adjusted when the motor is running.

1. Configure basic motor data. Go to ***parameter group 4.2 Motor Data*** and specify the following:

Index	Parameter name	Parameter setting	Parameter number
4.2.1.1	Motor Type	Induction motor or permanent magnet motor.	407
4.2.2.1	Nominal Power	See motor nameplate.	405
4.2.2.2	Nominal Current	See motor nameplate.	400
4.2.2.3	Nominal Speed	See motor nameplate.	402

Index	Parameter name	Parameter setting	Parameter number
4.2.2.4	Nominal Frequency	See motor nameplate.	403
4.2.2.5	Nominal Voltage	See motor nameplate.	401

NOTE: Changing the product label data causes a reset of the advanced motor data to default values, and the loss of AMA results.

2. Perform Automatic Motor Adaptation (AMA).

   The advanced motor data, which are needed for optimal motor control performance and which are described in step 3, can be entered manually or measured and calculated based on AMA. The data measurement must be conducted in standstill with the following parameter:

Index	Parameter name	Parameter setting	Parameter number
4.2.1.3	AMA Mode	Motor data	420

NOTE: AMA requires an active start signal for execution. After AMA is performed, the setting of AMA Mode automatically switches to Off, and a notification must be confirmed. A new start signal is required for starting the motor. This is to avoid an unintended start caused by the active start signal. Consult the iC7 Series Frequency Converters Installation Safety Guide for safety information on unintended start.

NOTE: If a sine-wave filter is connected to the output of the drive, set parameter ***4.2.1.3 AMA Mode*** to ***Reduced Motor Data (Rs)***.

3. Configure the advanced motor data if AMA is not performed. Setting these parameters is recommended for optimal motor control performance.

Table 6: Asynchronous Induction Motors

Index	Parameter name	Parameter setting	Parameter number
4.2.3.1	Stator Resistance Rs	AMA result or as on motor nameplate.	408
4.2.3.2	Rotor Resistance Rr	AMA result or as on motor nameplate.	409
4.2.3.3	Iron Loss Resistance Rfe	AMA result or as on motor nameplate.	413
4.2.3.4	Stator Leakage Reactance Xls	AMA result or as on motor nameplate.	440
4.2.3.5	Rotor Leakage Resistance Xlr	AMA result or as on motor nameplate.	441
4.2.3.6	Magnetizing Reactance Xm	AMA result or as on motor nameplate.	442

Table 7: Permanent Magnet Motors

Index	Parameter name	Parameter setting	Parameter number
4.2.4.2	Stator Resistance Rs	AMA result or as on motor nameplate.	408
4.2.4.3	d-axis Inductance Ld	AMA result or as on motor nameplate.	417

Table 7: Permanent Magnet Motors - (continued)

Index	Parameter name	Parameter setting	Parameter number
4.2.4.4	d-axis Inductance LdSat	AMA result or as on motor nameplate.	418
4.2.4.5	Ld Saturation Point	AMA result or as on motor nameplate.	426
4.2.4.6	q-axis Inductance Lq	AMA result or as on motor nameplate.	427
4.2.4.7	q-axis Inductance LqSat	AMA result or as on motor nameplate.	422
4.2.4.8	Lq Saturation Point	AMA result or as on motor nameplate.	424
4.2.4.1	Back EMF	Only for Permanent Magnet Motors. as on motor data sheet, as specified at 1000 RPM.	415

4. Configure motor control.

Index	Parameter name	Parameter setting	Parameter number
4.3.1.1	Motor Control Principle	VVC+ Control	2503
4.3.3.1	Continuous Rs Estimation	Enabled	428

Note: For motor control principles VVC+ and U/f, the following applies:

- Configure compensations for slip and different application conditions in ***parameter group 4.3.4 VVC+ & U/f Settings***.
- Enable and configure Automatic Energy Optimization (AEO) in ***parameter group 5.3.3 Torque & AEO***.
- For U/f, define the voltage and frequency points in ***parameter group 4.3.2 U/f Settings*** as required for the application.

5. Configure motor thermal protection and other protections.

The Electronic Thermal Relay (ETR) function protects the motor from thermal overload without connecting an external device, by estimating the motor temperature based on present load and time. The ETR function meets the relevant requirements of UL 61800-5-1, including the Thermal Memory Retention requirement, and ensures a class 20 protection level. ETR can be configured and the motor thermal load can be viewed using the following parameters:

Index	Parameter name	Parameter setting	Parameter number
4.5.4	ETR Overtemperature Response	Fault, ramp to coast	2825
4.1.16	Motor Thermal Load (ETR)	Varies (Readout)	2951

The fault ***0x7120-4177 Motor Thermal Overload*** is issued when the motor thermal load reaches 100%.

6. Check motor rotation and perform a test run.

The purpose of the rotation check is to run the motor with a low frequency (5 Hz) and visually inspect the rotation direction.

Perform the check:

a. Switch the operation of the drive to local mode by pressing the *REM/LOC* button of the control panel or by controlling the drive with MyDrive® Insight, in the view *Open device control*.

b. Set ***parameter 4.2.1.7 Motor Rotation Check*** to ***On***.

The check begins. Messages appearing on the control panel or MyDrive® Insight provide instructions through the process.

The motor keeps rotating until stopped by the *Stop* button on the control panel or *STOP* button in MyDrive® Insight. Once the motor is stopped, the drive asks if the rotation direction must be changed. If necessary, the rotation direction is changed in the background by swapping the output phase sequence in ***parameter 4.2.1.6 Output Phase Sequence***.

5.2.5 Step 4: Operation Mode

The iC7-HVACR application supports 2 different operation modes: speed control and process control.

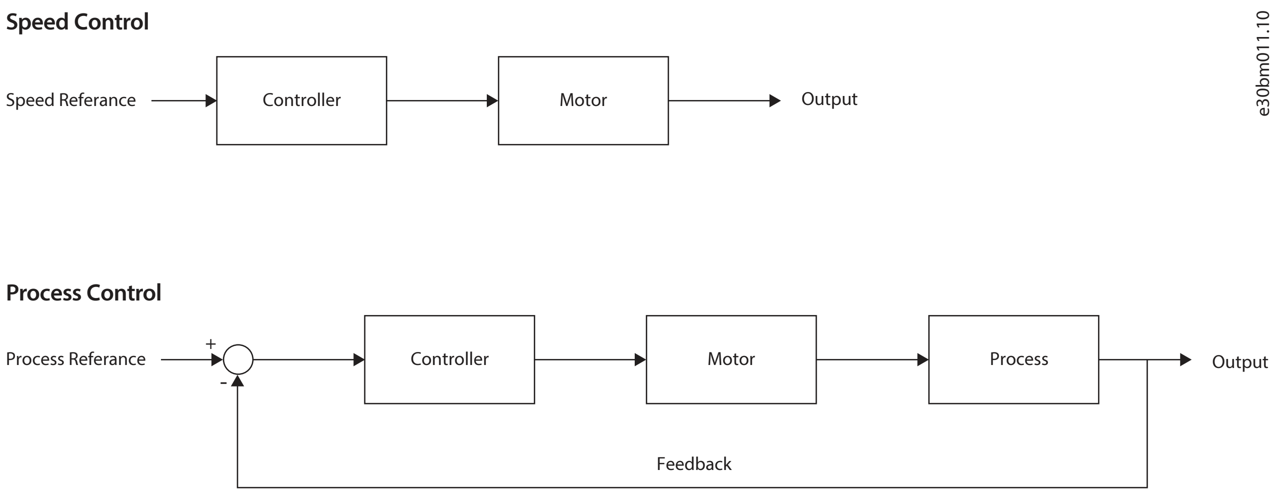


Figure 35: Speed Control vs. Process Control

Speed Control (open loop)

A built-in speed controller provides accurate control of the rotational speed of the motor without requiring a feedback signal. Motor speed is determined by applying a speed reference or by setting the speed when in local mode. Open loop is also used if the frequency converter is part of a closed-loop control system based on an external PID controller providing a speed reference signal for the drive.

The operation mode Speed Control is used in applications when the drive is used for controlling the speed of the motor according to a given reference. The operation mode Speed Control is also used if the frequency converter is part of a closed-loop control system based on an external controller providing the speed reference signal as output.

Process Control (closed loop)

The process controller controls a process in a system where a constant pressure, flow, or temperature is needed, for example. A feedback signal from the application is connected to the drive, providing the actual process value. By controlling the motor speed, the controller ensures that the output matches the reference provided. The reference source and the feedback signals are converted and scaled to the actual values controlled.

The operation mode of the drive is selected with parameter ***5.4.2.16 Operation Mode***.

5.2.5.1 Step 4a: Speed Control/Ramp Settings

Prerequisites:
Configuration steps 1 through 3 have been performed.

The basic configuration for speed control in open loop is shown here. See *Configuration Examples* for more configurations.

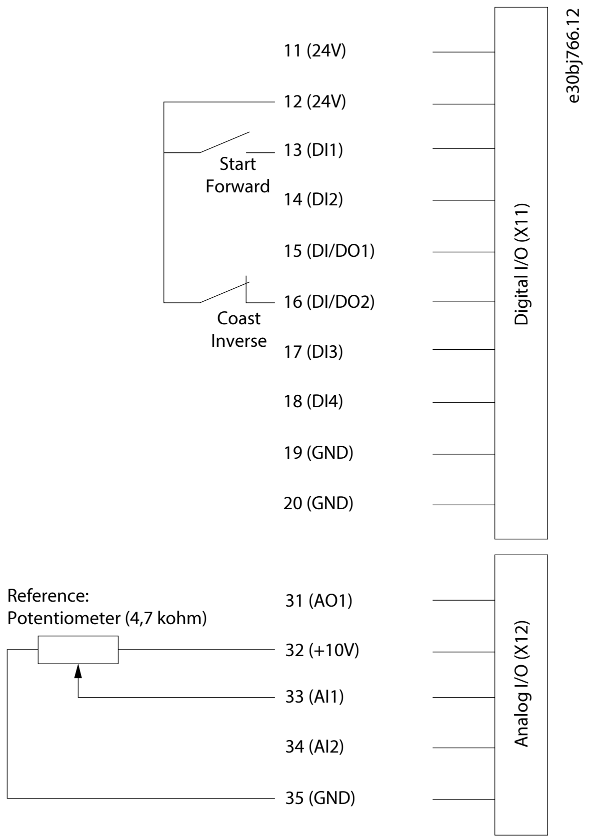


Figure 36: Wiring Diagram Example - Speed Control with Integrated I/O

1. Configure the operation mode for speed control.

Index	Parameter name	Example setting	Parameter num-ber
5.4.2.16	Operation Mode	Speed control	2500

2. Configure speed limit settings.

Index	Parameter name	Example setting	Parameter num-ber
5.8.3.1	Positive Speed Limit	50 Hz	1729
5.8.3.3	Minimum Speed Limit	0 Hz	1722

3. Configure the type and source of the speed reference.

   This example assumes that advanced control place is selected in ***parameter 5.5.2.1 Control Place Selection***(see also configuration step 2: 5.2.3 Step 2: Control Place Settings).

Index	Parameter name	Example setting	Parameter num-ber
5.5.6.2.1	Adv. Speed Reference	Fieldbus reference, Reference 1 input	1915
5.5.6.2.2	Adv. Speed Reference Logic	Sum	1916

Index	Parameter name	Example setting	Parameter number
5.8.4.1	Speed Reference 1 Input	Integrated I/O T33	501
5.8.4.3	Speed Reference 1 Maximum	50.0 Hz	1724
5.8.4.4	Speed Reference 1 Minimum	0.0 Hz	1725

Index	Parameter name	Example setting	Parameter number
9.5.2.1	T33 Terminal Mode	Analog input	2020
9.5.2.2	T33 Terminal Type	Voltage	2273
9.5.2.3	T33 Minimum Value	0 V	2272
9.5.2.4	T33 Maximum Value	10 V	2271

4. Configure digital inputs for commands Coast and Start.

   This example assumes that advanced control place is selected in ***parameter 5.5.2.1 Control Place Selection***(see also configuration step 2: 5.2.3 Step 2: Control Place Settings).

Index	Parameter name	Example setting	Parameter number
5.5.6.1.1	Advanced Start Input	Fieldbus start, Integrated I/O T13 digital input	4722
5.5.6.1.7	Advanced Coast Inverse Input	Fieldbus coast, Integrated I/O T16 digital input	4724

5. Configure the ramp settings (acceleration and deceleration)
   a. Configure linear ramps and ramp selection, see 5.2.5.1.1 Linear Ramps and Ramp Selection.
   b. Configure initial, final, and check valve ramps, see 5.2.5.1.2 Initial, Final, and Check Valve Ramps.
6. Perform a rotation check.

   It is recommended to perform a rotation check to verify the direction of motor rotation and to change it when needed.

Index	Parameter name	Example setting	Parameter number
4.2.1.7	Motor Rotation Check	ON	7050

5.2.5.1.1 Linear Ramps and Ramp Selection

Ramps specify the acceleration and deceleration times of the drive. Reaching the desired speed references in a controlled manner is key for application protection and performance.

The ramp acceleration and deceleration times can be programmed separately. All ramps are linear, providing constant acceleration at the specified intervals.

This diagram illustrates the basic normal ramp behavior:

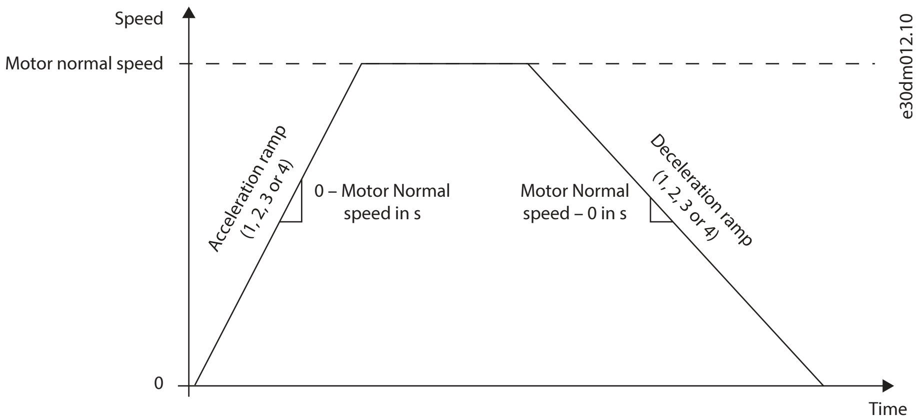


Figure 37: Acceleration and Deceleration Ramps

Prerequisites:

Motor data is programmed, in particular ***parameter 4.2.2.3 Motor Nominal Speed***.

Linear ramp configuring steps:

1. For simple acceleration and deceleration ramps, configure the following parameters:

Index	Name	Number	Impact
5.8.6.2.2	Ramp 1 Accel. Time	1101	Specifies the acceleration time from 0 to motor nominal speed, configured with ***parameter 4.2.2.3 Motor Nominal Speed***.
5.8.6.2.3	Ramp 1 Decel. Time	1105	Specifies the acceleration time from motor nominal speed, configured with ***parameter 4.2.2.3 Motor Nominal Speed***, to 0.

Example:

Index	Parameter name	Example setting	Parameter number
5.8.6.1.1	Ramp Selector	Ramp 1	1100
5.8.6.2.2	Ramp 1 Accel. Time	5 s.	1101
5.8.6.2.3	Ramp 1 Decel. Time	5 s.	1105

2. It is possible to configure up to 4 different sets of acceleration and deceleration ramps. This can be useful if the application needs to have different acceleration and deceleration times depending on conditions.

   The active ramp can be set directly or be set through a 2 bit pattern in the form of digital inputs or CTW bits (fieldbus).

   Configure the logic that decides how to select between ramps 1, 2, 3, and 4.

Index	Name	Number	Impact
5.8.6.1.1	Ramp Selector	1100	Select which ramp to use (1, 2, 3, or 4) or select ***Bit Selection*** to use a 2 bit pattern.
5.8.6.1.2	Ramp Selection Bit 0 Input	1130	Only relevant if ***parameter 5.8.6.1.1 Ramp Selector*** is set to ***Bit Selection***. Select the source that represents bit 0 in the 2 bit pattern.
5.8.6.1.3	Ramp Selection Bit 1 Input	1131	Only relevant if ***parameter 5.8.6.1.1 Ramp Selector*** is set to ***Bit Selection***. Select the source that represents bit 1 in the 2 bit pattern.

Specify additional ramp times (2, 3 and 4) as per application needs.

Index	Name	Impact
5.8.6.*.2	Ramp * Accel. Time	Specifies the acceleration time from 0 to motor nominal speed, configured with ***parameter 4.2.2.3 Motor Nominal Speed***.
5.8.6.*.3	Ramp * Decel. Time	Specifies the acceleration time from motor nominal speed, configured with ***parameter 4.2.2.3 Motor Nominal Speed***, to 0.

5.2.5.1.2 Initial, Final, and Check Valve Ramps

Beside normal ramps, the drive supports special ramps that can be useful in pump or compressor applications for example. These ramps are all optional. They can be illustrated as per the following image

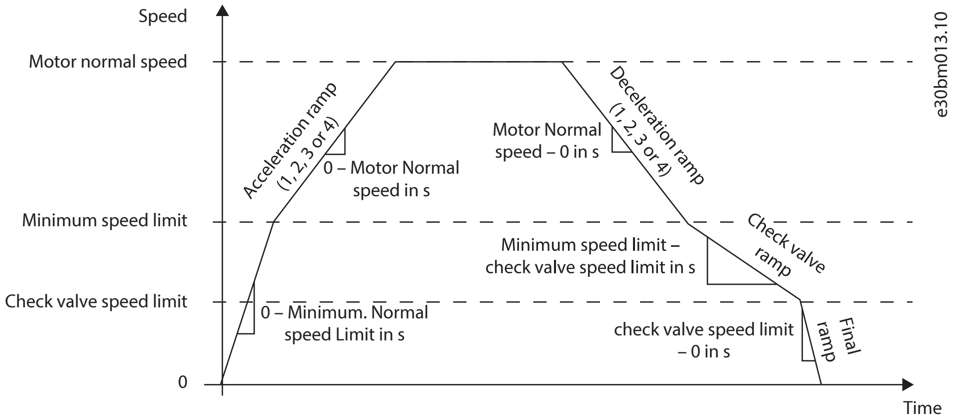


Figure 38: Special Ramps

- Initial ramp: Useful in applications where a separate (fast) acceleration is needed to avoid running below a minimum speed for too long.
- Check valve ramp: Useful in pumping applications that require a specific (slow, soft) closure of the check valve.
- Final ramp: Useful in applications where a separate (fast) deceleration is needed to avoid running below a minimum speed for too long.

Prerequisites:

Normal ramps have been configured.

Special ramp configuring steps:

1. Configure the following parameters to enable the ramps desired.

Index	Name	Number	Impact
5.8.6.7.1	Initial Ramp Time	1460	Specifies the ramp time from 0 to the minimum speed limit, configured with ***parameter 5.8.3.3 Minimum Speed Limit***. 0 means that the initial ramp is disabled.
5.8.6.7.2	Final Ramp Time	1461	Specifies the ramp time from the check valve speed limit, configured with ***parameter 5.8.6.7.4 Check Valve Speed Limit***, to 0. NOTE: If a check valve ramp is not configured, the final ramp defines the ramp time from the minimum speed limit, configured with ***5.8.3.3 Minimum Speed Limit***, to 0.
5.8.3.3	Minimum Speed Limit	1722	Defines the minimum speed limit of the application. The application must not run slower than this limit under normal circumstances.
5.8.6.7.3	Check Valve Ramp Time	1462	Specifies the ramp time from the minimum speed limit, configured with ***parameter 5.8.3.3 Minimum Speed Limit***, to a specific check valve speed, configured with ***parameter 5.8.6.7.4 Check Valve Speed Limit***. 0 means that the final ramp is disabled.
5.8.6.7.4	Check Valve Speed Limit	1463	The speed limit at which the check valve ramp is de-activated.

5.2.5.2 Step 4b: Process Control Settings

The built-in process controller is used to control processes based on the feedback sensor signal. Examples of controlled process variables are flow, pressure, and temperature.

The auto-tuning feature ensures accurate PID control adjustment. In addition, the built-in controller supports inverse control for applications such as level control or the control of a vacuum pump. In such applications, increasing the drive speed decreases the feedback value.

The example in this section describes the extra configurations required to set up a pressure control loop with a single feedback signal, according to the following illustration and wiring diagram.

NOTE: The HVACR software supports up to 3 independent feedback signals for calculating one resulting feedback value to be used for the process control, or as individual feedback signals for multi-zone control. The required parameters are in ***parameter group 5.10.4 Feedback*** and ***parameter group 5.10.8 Multi Zone***.

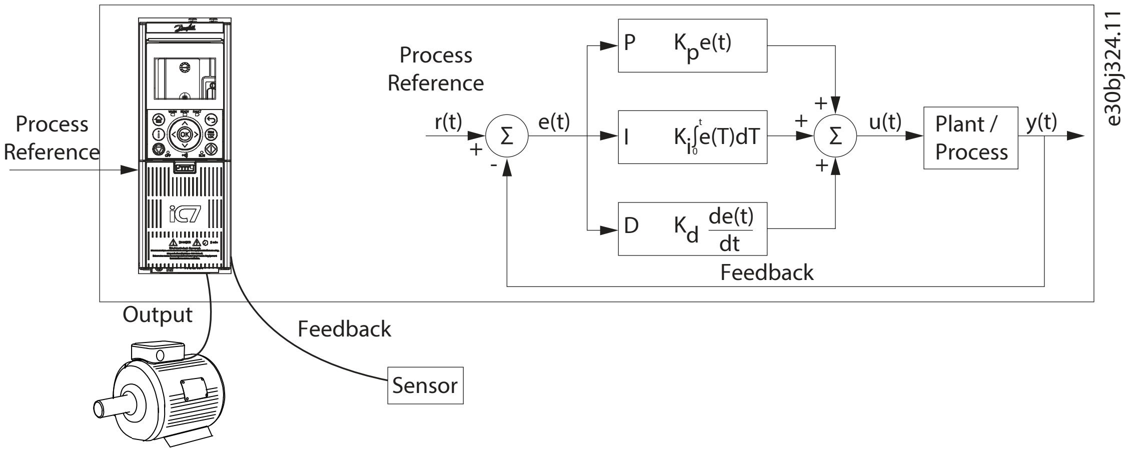


Figure 39: Process Controller

This configuration setup contains the following features:

- A pressure transducer to measure the pressure of the system. This data is used as feedback. The sensor is supplied power by the 24 V supply of the drive.
- A potentiometer to adjust the setpoint, and a switch for the start signal which is connected to digital input 1 (terminal 13) on the Integrated I/O. See the following wiring drawing example.

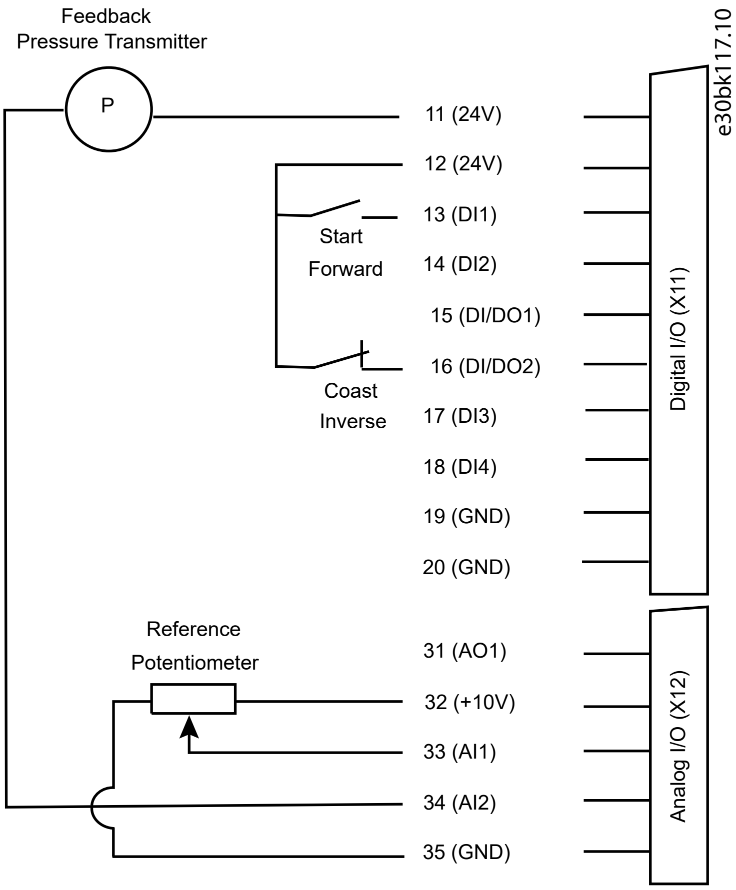


Figure 40: Wiring diagram example - Process Control with Integrated I/O

To set up the drive for process control according to the preceding illustration, perform the following steps:

1. Perform the configuration steps 1–3.
2. Configure the speed limits and the ramp as described in 5.2.5.1 Step 4a: Speed Control/Ramp Settings.

3. Set the operation mode to process control and select the process unit.

Index	Parameter name	Recommended settings	Parameter number
5.4.2.16	Operation Mode	Process Control	2500
5.10.2.3	Process Unit	Bar	6628

4. Configure the reference in the settings for the control place. See 5.2.3 Step 2: Control Place Settings.

Index	Parameter name	Recommended settings	Parameter number
5.5.6.2.6	Adv. Process Reference	Fieldbus reference/Reference 1 input	6054
5.5.6.2.7	Adv. Process Reference Logic	Source 2	6045

5. Adjust settings for the process reference and for the feedback according to the application. In this example, the operating range is 0–4 bar.

Index	Parameter name	Example setting	Parameter number
5.10.3.1	Process Reference Max Limit.	4 bar	6013
5.10.3.2	Process Reference Min Limit.	0 bar	6014
5.10.3.3	Process Reference 1 Input	Integrated I/O T33 Analog Input	6025
5.10.4.1	Feedback Mode	Feedback 1	6008
5.10.4.2	Feedback 1 Type	Analog Feedback Terminal	6021
5.10.4.3	Feedback 1 Maximum Scaling	4 bar	6015
5.10.4.4	Feedback 1 Minimum Scaling	0 bar	6016
5.10.4.5	Analog Input Feedback 1	Integrated I/O T34 Analog Input	6027

6. Configure the electrical characteristics of the analog input terminals 33 and 34 for reference and feedback.

Table 8: Terminal 33 Settings

Index	Parameter name	Example setting	Parameter number
9.5.2.2	T33 Terminal Type	Voltage	2273
9.5.2.3	T33 Minimum Value	0 V	2272
9.5.2.4	T33 Maximum Value	10 V	2271

Table 9: Terminal 34 Settings

Index	Parameter name	Example setting	Parameter number
9.5.3.2	T34 Terminal Type	Current	2279
9.5.3.3	T34 Minimum Value	4 mA	2278
9.5.3.4	T34 Maximum Value	20 mA	2277

7. To ensure optimum control performance for the system, perform auto-tuning of the process controller. The optimization of the settings is for the reference or a typical reference of the system.

Index	Parameter name	Example setting	Parameter num-ber
5.10.7.2	Auto Tuning Reference	2.3 bar	6902
	Process Controller Auto Tuning	Enabled	6901

NOTE: Default settings do not require modification before performing auto tuning.

NOTE: ***Parameter 5.10.7.1 Process Controller Auto Tuning*** is disabled automatically after auto tuning is completed.

8. To start auto-tuning, apply a start signal to terminal 13 of the Integrated I/O.

NOTE: To start the application a start signal is required, if the signal has been removed after completing auto-tuning.

9. In applications like pressure control with centrifugal fans or pumps, additional energy savings can be achieved by using the Automatic Energy Optimization (AEO) function. To use this feature, configure the following parameters:

Index	Parameter name	Example setting	Parameter num-ber
5.3.3.1	Torque Characteristic	Automatic Energy Optimization (AEO)	2809
5.3.3.2	AEO Minimum Speed	10 Hz	2810
5.3.3.3	AEO Minimum Magnetization	40%	2811

5.2.6 Step 5: iC7-HVACR Settings

5.2.6.1 Run Permissive

Run Permissive is a protection function that can trigger an external action upon a start, and it protects the motor from spinning until an additional condition is met. This feature can also be used for any actuated devices with a feedback signal. When Run Permissive is active, a message is shown on the status line on the control panel. The message indicates why the motor is not running.

A common use case is a fan application with a shutter, where run permissive helps ensure that a fan does not run against a closed shutter. Only upon feedback from the shutter - confirming that it is open - the drive is allowed to ramp up the speed. As an option, the drive can open and close the shutter using digital outputs or a relay. To control the shutter, run permissive must be enabled.

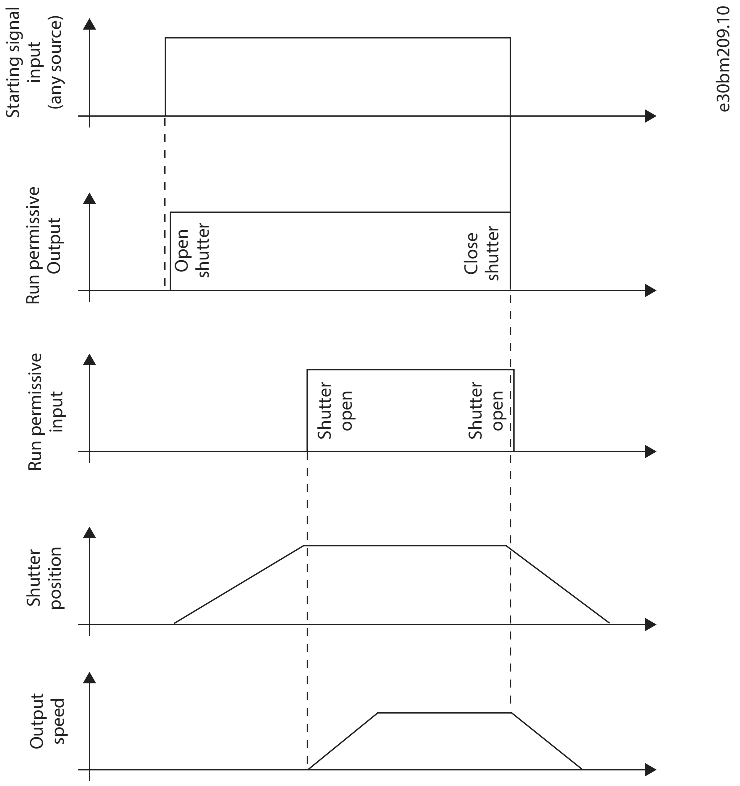


Figure 41: Run Permissive

Prerequisites:

Digital input/output terminals are configured (see parameter group ***9.5 Analog Inputs/Outputs***).

Configuration steps:

1. Configure Run Permissive with the following parameters.

Index	Name	Default value	Impact
5.2.11.1	Run Permissive Enable	Disabled	Enables Run Permissive.
5.2.11.2	Run Permissive Input	False	Run Permissive Digital Input Terminal, hosting the feedback signal.
5.2.11.3	Run Permissive Output	None	Run Permissive Digital Output Terminal Selector, controlling the actuator (optional).

5.2.6.2 Low Reference Monitor

The low reference monitor is an energy saving feature, which can prevent energizing the motor if the speed reference is 0 Hz or RPM. This feature detects if the drive is running at a speed lower than the specified limit. When a low reference is detected, the drive stops energizing the motor terminals.

There are several features that are affected by the low reference monitor. The following features are set as conditions to deactivate the low reference monitor when they are active:

- No flow
- Power curve generation
- AMA
- Process controller auto tuning

- Inching
- Reference freeze
- Fieldbus command reference freeze

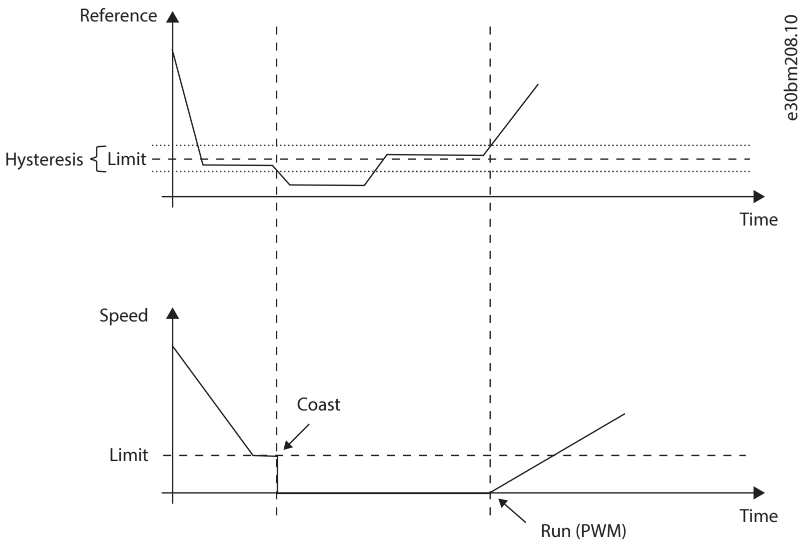


Figure 42: Low Reference Monitor

Configuration steps:

1. Configure the following parameter.

Index	Name	Impact
5.8.4.20	Low Reference Limit	References below this limit are considered to be 0 and result in the drive coasting.

5.2.6.3 No-Flow Monitor

Spinning a pump while in a no-flow situation is a waste of energy and can damage the pump from excessive friction and heat. The drive uses 2 methods to detect a no-flow situation:

1. Boost with low-speed detection.
2. Low-power detection.

5.2.6.3.1 Boost with Low-Speed Detection

The boost with low-speed detection function requires the drive to operate in process closed loop mode. This function boosts the setpoint for a short time, and the overpressure provokes a slowdown of the speed of the drive, which helps in determining if there is flow in the system or not. By requiring only the configuration of the aggressiveness and frequency of the setpoint boost, this function works independently of pump and drive characteristics.

Prerequisites:

- The system is configured in closed loop.
- Feedback, setpoint, and PID are configured.

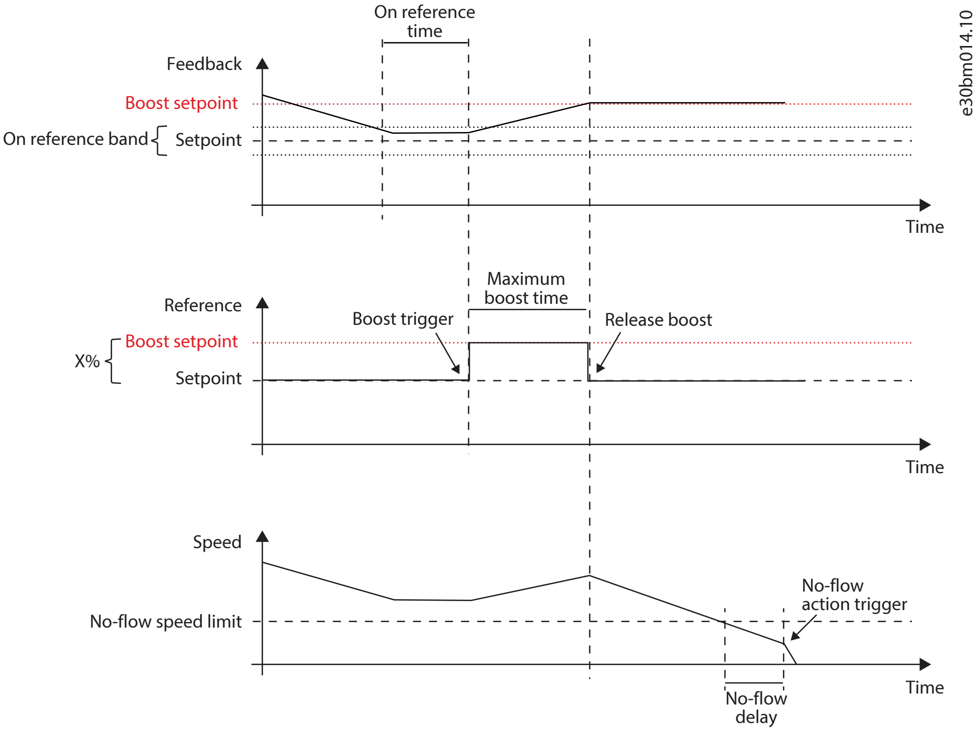


Figure 43: Boost with Low-Speed Detection Method

Configuration steps:

1. Configure the following parameters.

Index	Name	Number	Default value	Impact
5.31.1.4.1	No Flow Speed Limit	6002	0.0 RPM/Hz	Specifies the minimum speed at which a No Flow Response is triggered. **Should be minimum Pump Speed Level**. Also see ***5.31.1.4.1 No Flow Delay***.
5.31.1.4.2	Detection Time	6003	60 s.	Sets the time that the speed must be stable before a boost is issued. Reduce the value to have more frequent boosts, increase the value to have less frequent boosts. More frequent boosts mean more disturbances in the pressure.
5.31.1.4.3	No Flow Delay	6004	5 s.	Specifies the time that the speed must stay below ***5.21.1.4.1 No Flow Speed Limit*** to trigger a No Flow Response.
5.31.1.4.4	Setpoint Percent Boost Value	6007	5%	Set the level of boost that is applied to the reference or setpoint. A too low value does not trigger a sufficient slowdown in speed. A too high value causes a noticeable overpressure in the system.
5.31.1.4.5	No Flow Boost Timeout	6020	60 s.	This value is the maximum time that a boost can last. This setting is needed to handle cases where conditions change while boosting, and the conditions to end the boost cannot be met.

5.2.6.3.2 No-Flow Curve

The no-flow curve represents the borderline between having flow and not having flow, defined by speed and power. By looking at the power consumption, the system determines if the pump uses energy in physically moving water. The pump curve is unique for each drive-motor-pump combination. To calculate the no-flow curve, the drive requires speed and power input on 2 points while the flow in the system is blocked. The 2 points must be measured at 50% and 85% of maximum speed in the system. Obtaining these two points is a manual process.

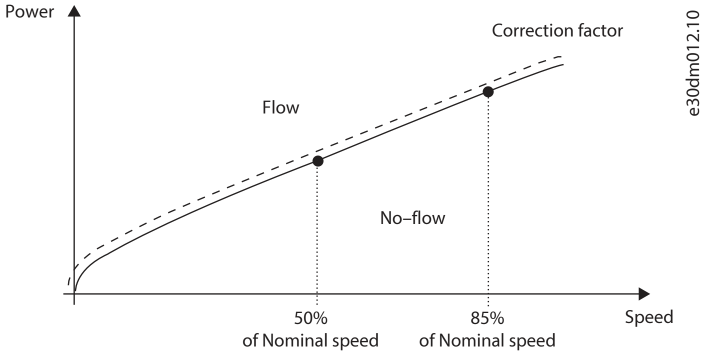


Figure 44: No-Flow Curve

Configuration steps:

1. The No-flow curve can be configured either manually or automatically.
   - Manual configuration:

     2 speed and power points are required: A low point (~50% of nominal speed) and a high point (~85% of nominal speed). The 2 power readings must be obtained by reading the power from MyDrive® Insight or the control panel while the drive is running at the low and high speed point respectively. While reading the power, the flow in the system must be blocked. Read the power from parameter ***4.1.25 Motor Shaft Power Filtered***. Program the speed points into parameters ***5.31.1.3.5 No Flow Curve Low Speed Point***and ***5.31.1.3.6 No Flow Curve High Speed Point***.

     To make the detection of No flow easier, increase the ***No Flow Power Curve Correction Factor***slightly.

Index	Name	Number	Default value	Impact
5.31.1.3.2	No Flow Power Curve Correction Factor	6623	0.0 RPM/Hz	Adds a correction factor to the No Flow Power Curve. An increased power curve makes detection of No-flow easier.
5.31.1.3.3	No Flow Power Low	6620	0 kW	Defines the power of the first speed/power point.
5.31.1.3.4	No Flow Power High	6621	0 kW	Defines the power of the first speed/power point.
5.31.1.3.5	No Flow Curve Low Speed Point	6622	750 RPM	Defines the speed of the first speed/power point. This speed must be around 50% of the nominal speed of the pump.
5.31.1.3.6	No Flow Curve High Speed Point	6226	1500 RPM	Defines the speed of the second speed/power point. This speed must be around 85% of the nominal speed of the pump.

   - Automatic configuration:

     Alternatively, engage an automatic and guided process to acquire the No-flow curve. The process is engaged with parameter ***5.31.1.3.1 Power Curve Generation***.

The required steps are prompted by messages in MyDrive Insight and the control panel, such as instructions to open and close the output valve to block or unblock the flow. The pump spins during this process.

The 2 speed/power points are automatically recorded in their respective parameters.

To make the detection of No-flow easier, increase the ***No Flow Power Curve Correction Factor*** slightly.

Index	Name	Number	Default value	Impact
5.31.1.3.1	Power Curve Generation	6077	0	Enables a guided process to automatically acquire the needed data for a No-flow curve.
5.31.1.3.2	No Flow Power Curve Correction Factor	6623	0.0 RPM/Hz	Adds a correction factor to the No Flow Power Curve. An increased power curve makes detection of No-flow easier.

5.2.6.3.3 Low Power Detection

This feature works both in process closed loop and in open loop if an external controller controls the process. This principle relies on a no-flow curve.

Prerequisites:

A no-flow curve must be configured, see 5.2.6.3.2 No-Flow Curve.

Configuration steps:

1. Apply a delay to the detection to determine how sensitive the detection must be. Configure the following parameter:

Index	Name	Number	Default value	Impact
5.31.1.4.3	No Flow Delay	6004	5 s.	Specifies the time that the speed must stay below ***5.21.1.4.1 No Flow Speed Limit*** to trigger a No Flow Response.

5.2.6.3.4 No-Flow Detection Consequences

This setting determines the response if a no-flow situation is detected. If no-flow is a desired situation, sleep mode is typically used. If it is not a desired situation, warnings or faults are used.

- Sleep Mode: Enter an energy saving mode.
- Warning: The application keeps running but the drive issues a warning.
- Fault: The drive issues a fault and ramps to stop.

Prerequisites:

A no-flow detection method is configured.

Configuration steps:

1. Configure the following parameter.

Index	Name	Number	Default value	Impact
5.31.1.2.2	No Flow Response	6031	Sleep Mode	Select the response to a No-flow situation.

5.2.6.3.5 Sleep Mode

Sleep mode is a standby state of the drive, and is typically used together with no-flow detection. In sleep mode, the drive does not energize the motor. The drive is still in a running state, but it enters an energy saving mode. The drive is still fulfilling its obligations, for example keeping a pressure within the programmed margins.

The condition for exiting sleep mode to normal running state is defined by the ***Wake Up Margin***, when there is a drop in feedback in %. To prevent systems from starting and stopping too frequently, a ***Minimum Run Time*** and ***Minimum Sleep Time*** can be configured.

Prerequisites:

The drive is configured to enter sleep mode as a consequence of no-flow detection.

Configuration steps:

1. These parameters are optional. Configure the required parameters.

Index	Name	Number	Default value	Impact
5.31.1.6.2	Minimum Run Time	5041	5 s.	Specifies the minimum time that must pass from a wake-up until Sleep Mode can be triggered.
5.31.1.6.3	Minimum Sleep Time	5042	5 s.	Specifies the minimum time that must pass from entering Sleep Mode until a wake-up can be triggered.
5.31.1.6.4	Wake Up Margin	5043	10%	Specifies the deviation in feedback to the current reference or setpoint to trigger a wake-up.

5.2.6.4 Dry Run Monitor

The dry run monitor detects if the pump runs dry on the suction side, meaning that air enters the pump. When a pump runs dry, the pump loses its ability to move water, and the pressure and flow drop. This feature is recommended in applications where there is risk of a pump running dry. The dry run monitor works both in closed loop and in open loop with an external controller, though pressure feedback and pressure control are needed.

The dry run monitor relies on the no-flow curve (see 5.2.6.3.2 No-Flow Curve, also known as no-flow monitor). In addition to the no-flow curve actions, the drive speeds up in an attempt to maintain pressure. If no-flow is detected when speed is at maximum, the drive reports it as a dry run condition.

Prerequisites:

The no-flow curve is configured.

Configuration steps:

1. Configure the following parameters.

Index	Name	Number	Default value	Impact
5.31.1.5.1	Dry Run	6625	Disable	Enable or disable the monitor.
5.31.1.5.2	Dry Run Response	6626	Warning	Set the desired response when the Dry Run conditions are met.
5.31.1.5.3	Dry Run Delay	6627	5 s.	Set the time for which the physical Dry Run conditions must be present before the response is triggered.

5.2.6.5 End of Curve Monitor

When a pump is operating far outside the highest efficiency point of the pump (at the far right of the pump curve) there is a risk of cavitation followed by increased wear or damage to the pump.

The end of curve monitor looks for instances when the pump is running at maximum speed while still not being able to fulfill the set-point or reference given. The monitoring tolerance can be programmed. The tolerance also enables the feature to monitor for pipe bursts that make the drive unable to fulfill the set-point or reference. This monitor relies on pressure feedback, and so it works in process closed loop only.

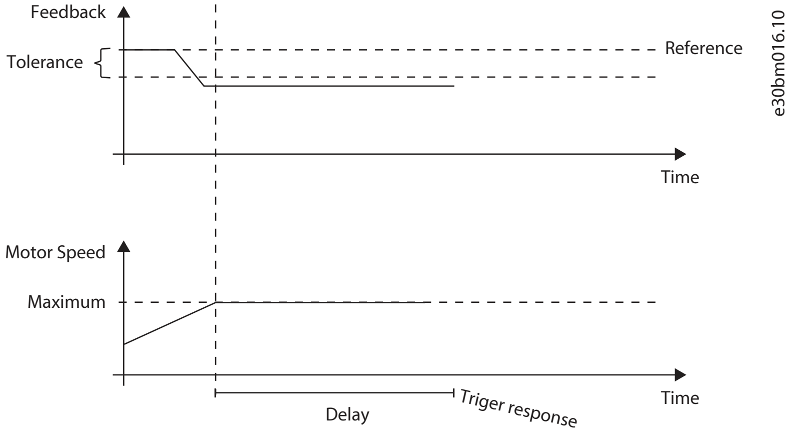


Figure 45: End of Curve Monitor

Prerequisites:

- The system is configured in closed loop.
- Feedback, setpoint, and PID are configured.

Configuration steps:

1. Enable the End of Curve Monitor with the parameter ***5.31.1.7.1 End of Curve***. The remaining steps are optional.

Index	Name	Number	Default value	Impact
5.31.1.7.1	End of Curve	6109	0	Enable or disable the monitor. 0 = disable, 1 = enable.
5.31.1.7.2	End of Curve Response	6107	Warning	Set the desired response when the end of curve conditions are met.
5.31.1.7.3	End of Curve Delay	6099	10 s.	Set the time for which the physical conditions of end of curve must be present before the response is triggered.
5.31.1.7.4	End of Curve Tolerance	6108	2%	The tolerance is a deviation in % of the feed-back, compared to the reference or setpoint. The tolerance is used to determine if the drive reaches the setpoint or not.

5.2.6.6 Signal Converter

This feature converts an input signal of a sensor of one type to another. The converted signal can then be used as an input to the process controller feedback signal, or as a readout. This feature has 3 configurable converters that can run at the same time.

These are the available conversion methods:

- Pressure to flow via K-factor. Used to convert air pressure to flow in fan applications.

- Pressure to temperature via refrigeration tables. Used to convert pressure to temperature in compressor applications.

The output of each converter is available as readouts in parameter ***5.35.1 Signal Converter Status***.

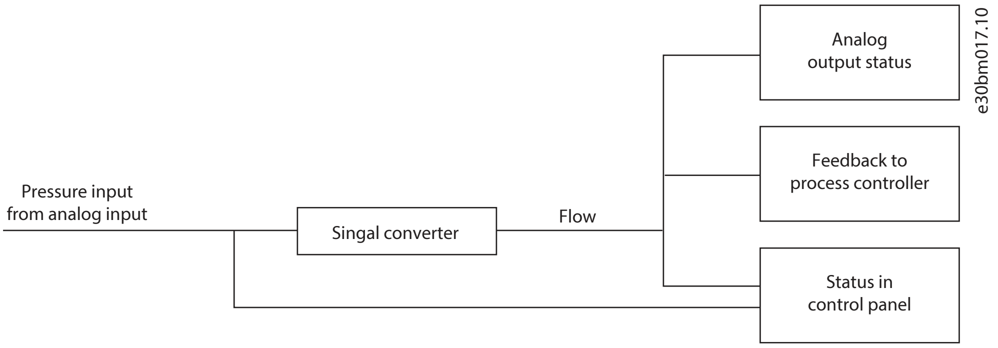


Figure 46: Signal Converter

Prerequisites:

The input terminals are configured to fit the physical characteristics of the connected sensor. See the parameters in ***menu index 9 I/O***, for example 4–20 mA.

Configuration steps:

1. Configure the following parameters for each signal converter.

Index	Name	Impact
5.35.*.1	Signal * Input Terminal	Set the input for the signal conversion.
5.35.*.2	Signal Converter * Min. Scaling	Set the minimum scaling value of the connected sensor, meaning the minimum value of the sensor.
5.35.*.3	Signal Converter Max. Scaling	Set the maximum scaling value of the connected sensor, meaning the maximum value of the sensor.
5.35.*.4	Signal Converter * Method	Select the conversion method for the signal converter.

5.2.6.6.1 K-factor Pressure to Flow

The converter is used in fan applications to convert the measured differential pressure over a fan into an airflow using a K-factor. The K-factor is provided as a datasheet or product label value from the fan manufacturer. Fan manufacturers have different ways to calculate the K-factor, and since the signal converter supports a wide range of fan manufacturers, the calculation formula is programmable.

Number	Manufacturer	Formula depending on the manufacturer	Input unit	Formula unit
1	Ebm-Pabst, Ziehl-Abbeg, Ziehl, Nicotra	$q = k \times \sqrt{\Delta\rho}$	pa	m^3/h
2	Ziehl-Abbeg	$q = \sqrt{\frac{\rho_{20}}{\rho \times k \times \sqrt{\Delta\rho}}}$	pa	m^3/h
3	Danfoss, Gebhardt, Rosenberg, Comefri, Nicotra-Gebhardt	$q = k \times \sqrt{\frac{2}{\rho}\Delta\rho}$	pa	m^3/h
4	Fläkt Woods	$q = \frac{1}{k} \times \sqrt{\Delta\rho}$	pa	m^3/s
5	NOVENCO	$q = k \times \sqrt{\Delta\rho}$	pa	m^3/s
6	Greenheck	$\mathrm{CFM} = k \times \sqrt{\frac{\Delta\rho}{\rho}}$	cfm (ft^3/min)	in.w.g

Prerequisites:

K-factor Pressure to Flow is selected as the conversion method in one of the available signal converters.

Configuration steps:

1. Locate the K-factor of the fan from the datasheet or product label, and configure the following parameters.

Index	Name	Number	Impact
5.35.5.1	Fan K-factor	6715	Specify the K-factor value to use for pressure to flow conversions.
5.35.5.2	Fan K-factor Manufacturer	6719	Set the K-factor from the fan manufacturer datasheet.
5.35.5.3	Air Density	6716	Set air density for pressure to flow conversions.
5.35.5.4	Signal Unit	6717	Specify the unit of the signal provided to the conversion.
5.35.5.5	Flow Unit	6718	Specify the output unit of the flow conversion.

Status signals are available for the control panel and Fieldbus readouts in the signal converter, see parameter group ***5.13***.

5.2.6.6.2 Refrigeration Tables

Converting pressure to temperature is recommended rather than measuring the temperature directly. The signal converter offers a method to do the conversion using the characteristics of the used refrigerant. The signal converter database contains many predefined refrigerants. In addition, the signal converter can use custom refrigerants, represented in the following equation. A1, A2, and A3 are constants of the custom refrigeration.

$$\text{Temperature} = \frac{A_2}{\ln(\text{Pe}+1) - A_1} - A_3$$

Prerequisites:

Pressure to Temperature via Refrigerant Table is selected as a conversion method in one of the available signal converters.

Configuration steps:

1. Locate the refrigerant type of the compressor system, and configure the following parameters.

Index	Name	Number	Impact
5.35.6.1	Refrigerant	6351	Select the type of refrigerant, input desired values, or select ***Custom***.
5.35.6.2	Temperature Unit	6350	Select the unit of temperature.
5.35.6.3	Signal Unit	6320	Specify the unit of the signal provided to the conversion.

2. If a custom refrigerant is desired, set ***5.35.6.1 Refrigerant*** to ***Custom*** and also configure these parameters.

Index	Name	Number	Impact
5.35.6.4	Refrigerant Const. A1	6352	Define a custom refrigeration constant.
5.35.6.5	Refrigerant Const. A2	6353	Define a custom refrigeration constant.

5.2.6.7 Auxiliary PID

5.2.6.7.1 Configuring an Auxiliary PID

The drive offers 3 auxiliary PIDs. The PIDs can be configured to control external actuators, like valves, dampers, and so on. For example, in an air handling unit, an auxiliary PID could control the inflow of hot water into a radiator, and a temperature sensor could send feedback on the water or air temperature back to the PID.

A reference can be set through a fieldbus, a preset value, or via an analog input available in the drive, including options. Feedback can be provided through any analog input in the drive, including options, or alternatively via a fieldbus. A PID can be configured and tuned to match the responses of the system. The response time of the system can be limited by the speed of the external actuator.

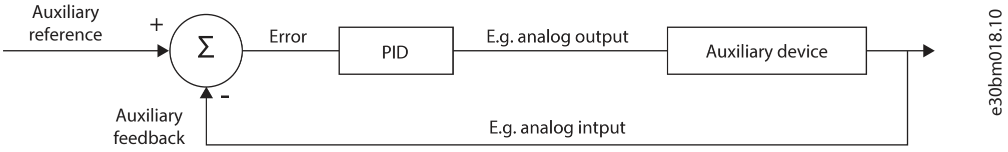


Figure 47: Auxiliary PID Configuration

Prerequisites:

Analog input and output terminals have been configured (see parameter group ***9 I/O***), and/or a general configuration of the fieldbus in question has been configured.

Configuration steps:

1. Define and configure how the reference is set: Fieldbus, analog input, or preset. Minimum and maximum values can also be set. Follow the following diagram to decide the source of reference, and configure the parameters accordingly.

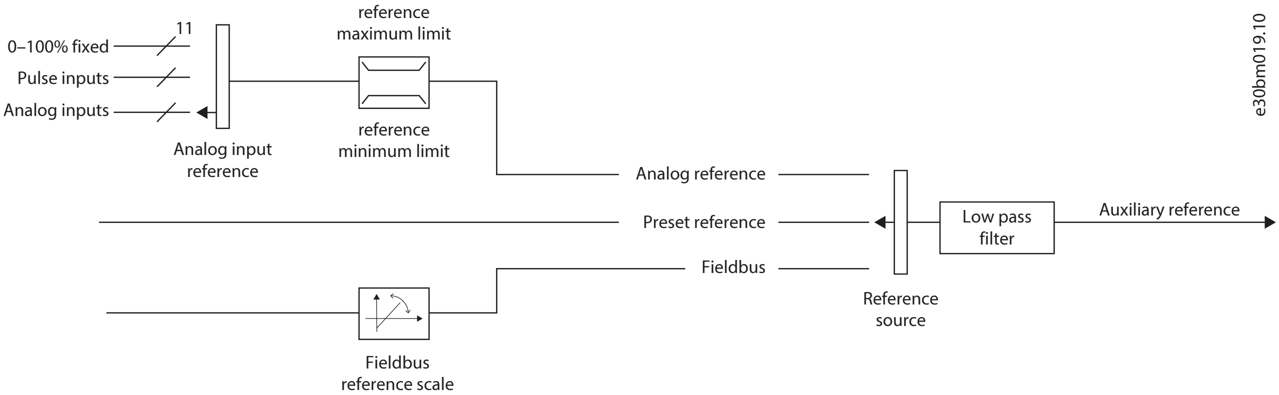


Figure 48: Possible PID References

Index	Name	Number	Impact
5.34.3.1	Reference Max. Limit	6183	Set the maximum value of the reference. It defines the upper limit of the reference input.
5.34.3.2	Reference Min. Limit	6184	Set the minimum value of the reference. It defines the lower limit of the reference input.
5.34.3.3	Reference Source	6169	Select the source of the reference.
5.34.3.4	Auxiliary PID Ctrl. Preset Ref.	6170	Set the value of the preset reference.
5.34.3.5	Analog Input Reference	6165	Select the input or a predefined fixed value for the setpoint.
5.34.3.6	Analog Input Max. Reference	6167	Set the maximum reference for the analog input.
5.34.3.7	Analog Input Min. Reference	6168	Set the minimum reference for the analog input.

Index	Name	Number	Impact
5.10.3.26	Fieldbus Process Reference Scale	6030	Set the fieldbus reference scale equal to 100% reference.
5.34.3.9	Aux PID Ref. Lowpass Filter Tc	6171	Set the time constant of the reference filter. Setting it to 0 disables the filter. This parameter is useful in the case of unstable or fluctuating signals.

2. Follow the following diagram to decide the type of the feedback, and configure the parameters accordingly.

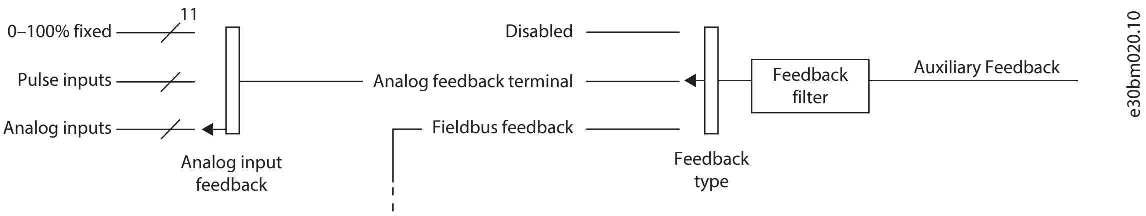


Figure 49: Possible Feedback Routes

Index	Name	Number	Impact
5.34.4.1	Feedback Type	6174	Select the type of feedback.
5.34.4.2	Analog Input Feedback	6173	Select the input or a predefined fixed value for the feedback.
5.34.4.3	Feedback Maximum Scaling	6175	Set the maximum scaling value of the feedback. Must match the characteristics of the attached sensor.
5.34.4.4	Feedback Minimum Scaling	6176	Set the minimum scaling value of the feedback. Must match the characteristics of the attached sensor.
5.34.4.6	Feedback Filter Time Constant	6178	Set the time constant of the feedback filter.

3. Configure the following parameters to tune the individual contribution of P, I, and D.

Index	Name	Number	Impact
5.34.5.1	Proportional Gain	6190	Set the proportional gain of the PID controller.
5.34.5.2	Integral Time	6192	Set the integral time of the PID controller (in seconds).
5.34.5.3	Antiwindup Enabled	6193	Enable antiwindup. Antiwindup stops the regulation of an error when the minimum or maximum speed is reached.
5.34.5.4	Derivative Time	6188	Set the derivative time of the PID controller (in seconds). The differentiator provides gain only when the error changes. When set to 0, the derivative part is disabled.
5.34.5.5	Derivative Gain	6189	Set a limit for the differentiator gain. Limiting the gain ensures a constant differentiator gain for fast changes.
5.34.5.6	PID Inverted	6191	Invert the output of the PID controller (boolean).

5.2.6.7.2 PID Auto-tuning

The auxiliary PID controller can be auto-tuned by the system. When auto-tuning is started successfully, a progress bar appears. The progress bar can be hidden by pressing the OK button. The auto-tuning continues to run in the background and sends a response when it is finished. The auto-tuning reference must match a realistic reference that the system runs at in normal operating conditions. When the auto-tuning is finished, it is disabled automatically.

Prerequisites:

The feedback signal must be configured and the auxiliary PID controller must be enabled.

Configuration steps:

1. Configure the following parameters.

Index	Name	Number	Impact
5.34.6.1	Auxiliary PID Controller Auto Tuning	6194	Enable the auto-tuning procedure of the Auxiliary PID Controller.
5.34.6.2	Auto Tuning Reference	6195	Set the reference point where the auto tuning is executed. Values are entered in process units.
5.34.6.3	Closed Loop Type	6196	Select the time constant "tau" of the system. Set this parameter like this: • <10 s. - FAST PRESSURE • 10–30 s. - SLOW PRESSURE • 30–600 s. - FAST TEMPERATURE • >600 s. - SLOW TEMPERATURE

5.2.6.8 Wet Bulb Temperature Reference

The wet bulb temperature reference is a function to help control the performance of a cooling tower application, ensuring an optimal cooling versus efficiency performance. The performance of the cooling tower is controlled by feedback and a reference:

- The feedback is the temperature of the coolant on the output side of the cooling tower.
- The reference is dynamic, and must be set from the wet bulb temperature reference, taking into account the outside weather (temperature and humidity), and an approach setpoint (an offset).

The drive receives data on temperature and humidity from an external weather station using analog or pulse inputs.

Prerequisites:

The drive is programmed in closed loop. Feedback from the coolant is configured.

Configuration steps:

1. Configure the humidity and temperature sensor: source and scaling.

Index	Name	Default value	Impact
5.10.9.1	Relative Humidity Analog Input	Off	The terminal of the humidity sensor.
5.10.9.2	Relative Humidity Max. Scaling	100.0	The maximum scaling value of the humidity sensor at the maximum input value.
5.10.9.3	Relative Humidity Min. Scaling	0.0	The minimum scaling value of the humidity sensor at the minimum input value.
5.10.9.4	Temperature Analog Input	Off	The terminal of the humidity sensor.

Index	Name	Default value	Impact
5.10.9.5	Temperature Input Max. Scaling	10.0	The maximum scaling value of the temperature measurement.
5.10.9.6	Temperature Input Min. Scaling	0.0	The minimum scaling value of the temperature measurement.
5.10.9.7	Approach Setpoint	0.0	An offset to the calculated wet bulb temperature, computing the final web bulb temperature reference.

NOTE: The physical properties of the analog inputs must be configured with parameter group ***9.5 Analog Inputs/ Outputs***.

2. Configure the resulting wet bulb temperature reference as a reference input in the process reference. Assign it to the correct control place. For example, configure the following parameter:

Index	Name	Impact
5.5.6.2.6	Adv. Process Reference Source	Assign the wet bulb temperature reference to the advanced control place.

5.2.6.9 Multi-pump Control

5.2.6.9.1 Multi-Pump Control Overview

Multi-pump control enables the efficient operation of pump systems with variable demand. The drive acts as a master controller in a multi-pump system, maintaining constant pressure while optimizing flow. The system consists of:

- One variable-speed pump (VSP), controlled by the frequency output of the drive
- 1–5 fixed-speed pumps (FSPs), controlled by relay or digital output terminals connected to contactors or softstarters

The system maintains constant pressure at the setpoint by first adjusting the VSP speed via the process controller. When the VSP reaches its operational limits, FSPs are staged or destaged to meet the demand while minimizing pressure surges and maintaining comfort.

Multi-pump control requires pressure feedback, and only works in a closed loop system.

The main benefits of multi-pump control are:

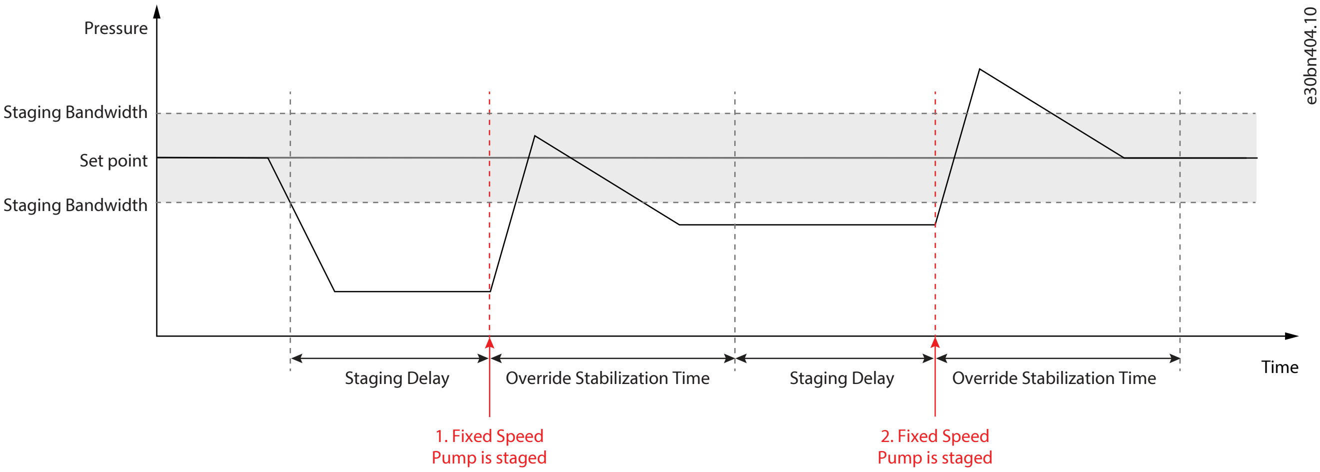
- It maintains constant pressure with changing flow demands.
- It optimizes energy consumption.
- It equalizes wear across all pumps through intelligent prioritization.
- It minimizes pressure surges and dips in the system.

Staging Control

The drive monitors pressure feedback continuously. When pressure drops below the setpoint minus the staging bandwidth for a configured delay time, an additional fixed-speed pump starts. When pressure rises above the setpoint plus the staging bandwidth, a fixed-speed pump stops.

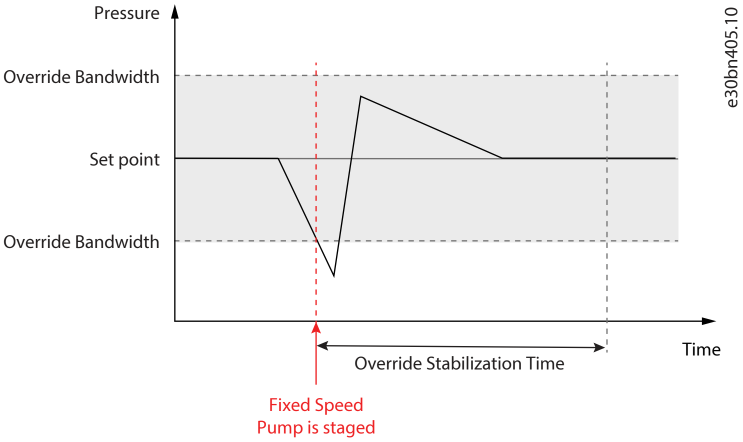
Two staging modes are available:

- **Normal Mode:** Provides optimal pressure stability by monitoring feedback settling before resuming automatic control.



The VSP ramps down, 1 FSP starts, feedback monitoring, 2 FSP starts, and process control resumes after stabilization.

- **Rapid Staging Mode:** Offers a faster response by immediately resuming automatic control after the pump switch.



VSP ramps down, FSP starts, and process control resumes immediately at the threshold speed.

The drive pre-adjusts the variable-speed pump speed during transitions to minimize pressure disturbances.

During startup, the drive does not stage pumps until the variable-speed pump reaches 90% of maximum speed. This prevents over-staging during initial system pressurization.

When a stop command is issued, fixed-speed pumps destage sequentially with stabilization delays between each, then the variable-speed pump ramps down. This provides a controlled shutdown with minimal pressure disturbance. A coast command stops all pumps immediately for emergency situations.

Pump Prioritization and Load Distribution

The drive tracks running hours for each fixed-speed pump. When staging, the pump with the least running hours starts first. When destaging, the pump with the most running hours stops first. This automatic rotation equalizes wear across all pumps and extends system lifetime.

Feature Interaction

Multi-pump control coordinates with other pump protection features:

- **No-Flow Detection:** No-flow detection is disabled when fixed-speed pumps are running, because they alter flow characteristics. Staging is blocked during boost operations.
- **End Of Curve:** The end of curve feature only activates when all configured fixed-speed pumps are running, as the variable-speed pump can only reach its true limit at maximum system capacity.

- **Power Curve Generation:** Power curve generation cannot run while fixed-speed pumps operate. All pumps must be stopped before initiating power curve generation.
- **Auto Tuning:** Staging is disabled during tuning processes to ensure accurate measurements.

5.2.6.9.2 Configuring Multi-Pump Control

Prerequisites:

-
  - The parameter ***5.4.2.16 Operation Mode*** must be set to ***Multi-Pump Control***
  - The process controller must be operating in closed-loop mode
  - At least one digital output terminal must be configured for FSP control

Configuration steps:

1. Configure the following parameters.

Index	Name	Number	Default value	Impact
5.31.2.2.1	Maximum Number Of Fixed-Speed Pumps	5325	5	Set the number of available pumps (1–5).
5.31.2.3.1 - 5.31.2.3.5	Fixed Speed Pump 1–5 Terminal	5320–5324	-	Assign each FSP to a digital output terminal.
5.31.2.4.2	Staging Bandwidth	5326	0.2	Configure the pressure deviation threshold.
5.31.2.4.4	Staging Delay	5327	15	Configure the time delay before staging an FSP.
5.31.2.4.5	Destaging Delay	5328	15	Configure the time delay before destaging an FSP.
5.31.2.4.9	Override Stabilization Time	5330	10	Configure the system stabilization period.
5.31.2.4.1	Staging Mode	5334	0	Select normal or rapid staging.
5.31.2.4.6	Staging Threshold	5333	0.9	Set the speed at which a fixed-speed pump is staged.
5.31.2.4.7	Destaging Threshold	5332	0.5	Set the speed at which a fixed-speed pump is destaged.

2. If necessary, configure the following optional parameters.

Index	Name	Number	Default value	Impact
5.31.2.4.3	Fault Staging Bandwidth	5355	0.4	Optional: Configure the behavior of the drive in fault conditions.
5.31.2.2.2	General Fault Response	5356	0 (Turn Off Variable-Speed Pump)	Optional: Define the fault handling strategy.

5.2.7 Step 6: Display Settings

The control panel supports the monitoring of the status and performance of the application in multiple ways. The visibility of values depends on the displayed screen.

This section will focus on the configurable elements. For more information about the control panel and its usage see chapter *3.2 Control Panel*.

The Home screen and the navigation screens show a status line in the upper screen area with up to three status values.

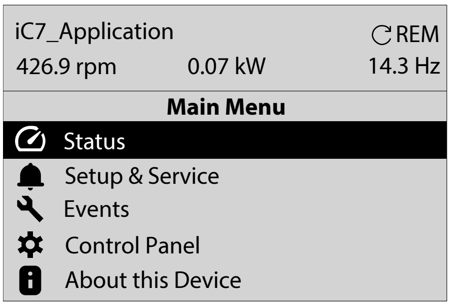


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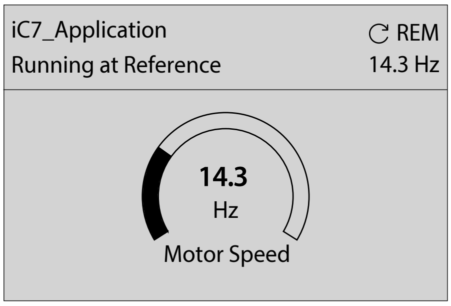
Figure 50: The Status Line

The status line can be configured with parameter group ***8.3.2 Status Line***.

Table 10: Example configuration

Index	Name	Value/Setting
8.3.2.1	Status Line Left	Actual Output Value
8.3.2.2	Status Line Right	Actual Reference Value
8.3.2.3	Status Line Center	Motor Shaft Power

The control panel supports two status screens. Each of them can display up to five status values. The layout of the status screens depends on the number of status values. If only the first status value is configured, it is shown as a donut. Otherwise, the values are shown as a list.



e30bm507.10

Figure 51: Donut View Example

Table 11: Donut View Example Settings

Index	Name	Value/Setting
8.3.3.1	Status Value 1.1	Actual Output Value
8.3.3.2	Status Value 1.2	None
8.3.3.3	Status Value 1.3	None
8.3.3.4	Status Value 1.4	None
8.3.3.5	Status Value 1.5	None

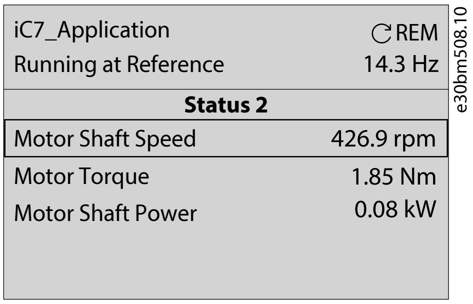


Figure 52: List View Example

Table 12: List View Example Settings

Index	Name	Value/Setting
8.3.4.1	Status Value 2.1	Motor Shaft Speed
8.3.4.2	Status Value 2.2	Motor Torque
8.3.4.3	Status Value 2.3	Motor Shaft Power
8.3.4.4	Status Value 2.4	None
8.3.4.5	Status Value 2.5	None

NOTE: The right value of the status line is also shown on the status screens (see the preceding two examples).

5.3 Application Examples

5.3.1 Overview

This section describes the common connection diagrams and the required parameter settings for configuring the example applications. The required settings for the connected motors are not covered. To simplify any necessary adjustments, the parameter lists in the following chapters also contain many parameters whose settings do not have to be changed from their default values for the described application. The parameters whose settings differ from the default settings are bolded in the parameter tables. The examples are using the Advanced Control Place for configuring the sources for commands and the reference (see ***parameter 5.5.2.1*** and ***parameter group 5.5.6***). This makes it easier to add alternative sources and combine them by applying logic.

iC7 has four different control board variants, the standard control board with serial or Ethernet connections, and the advanced control board with serial or Ethernet connections. The variants are depicted in the following two pictures.

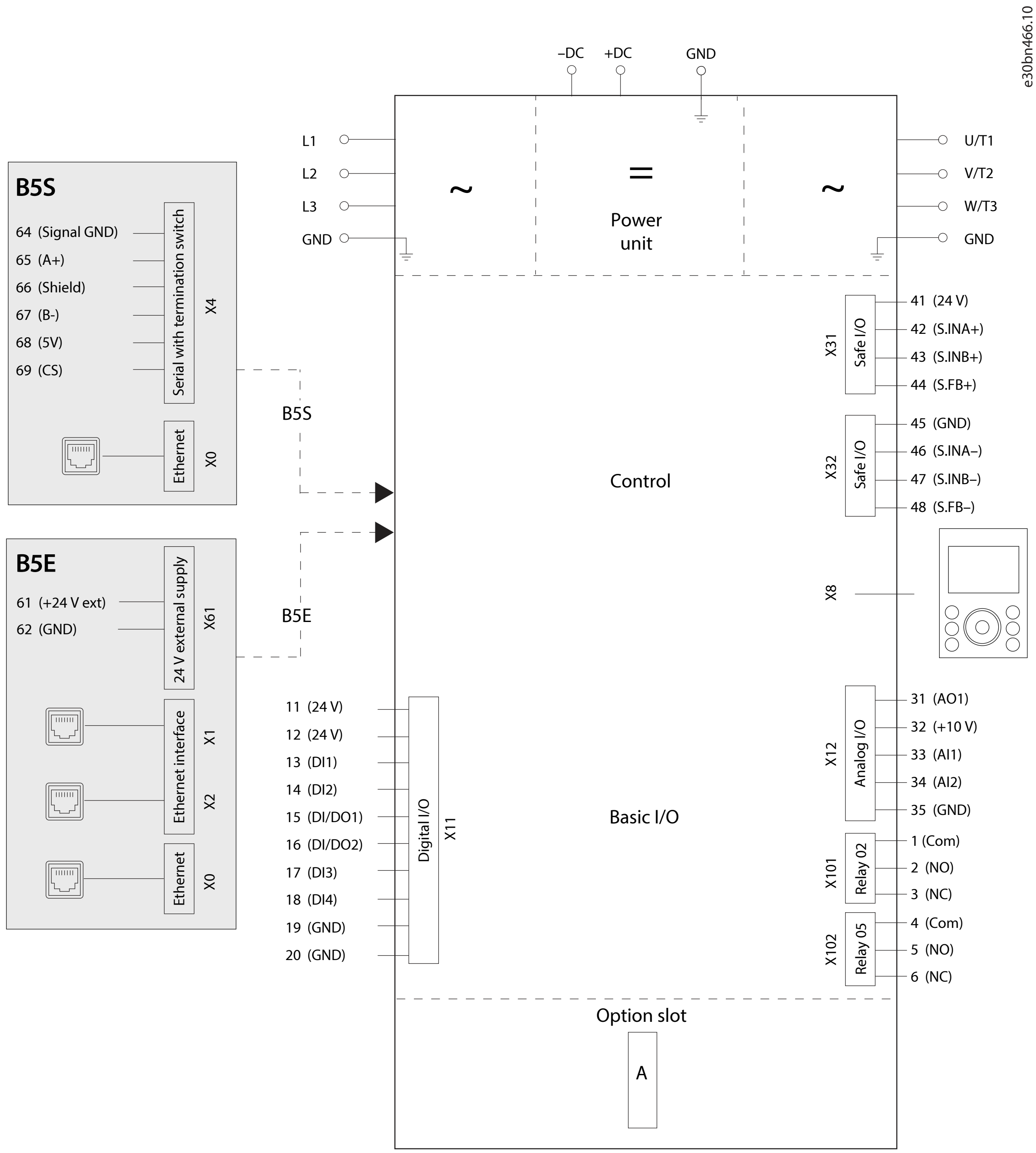


Figure 53: Standard Control Board and Wiring

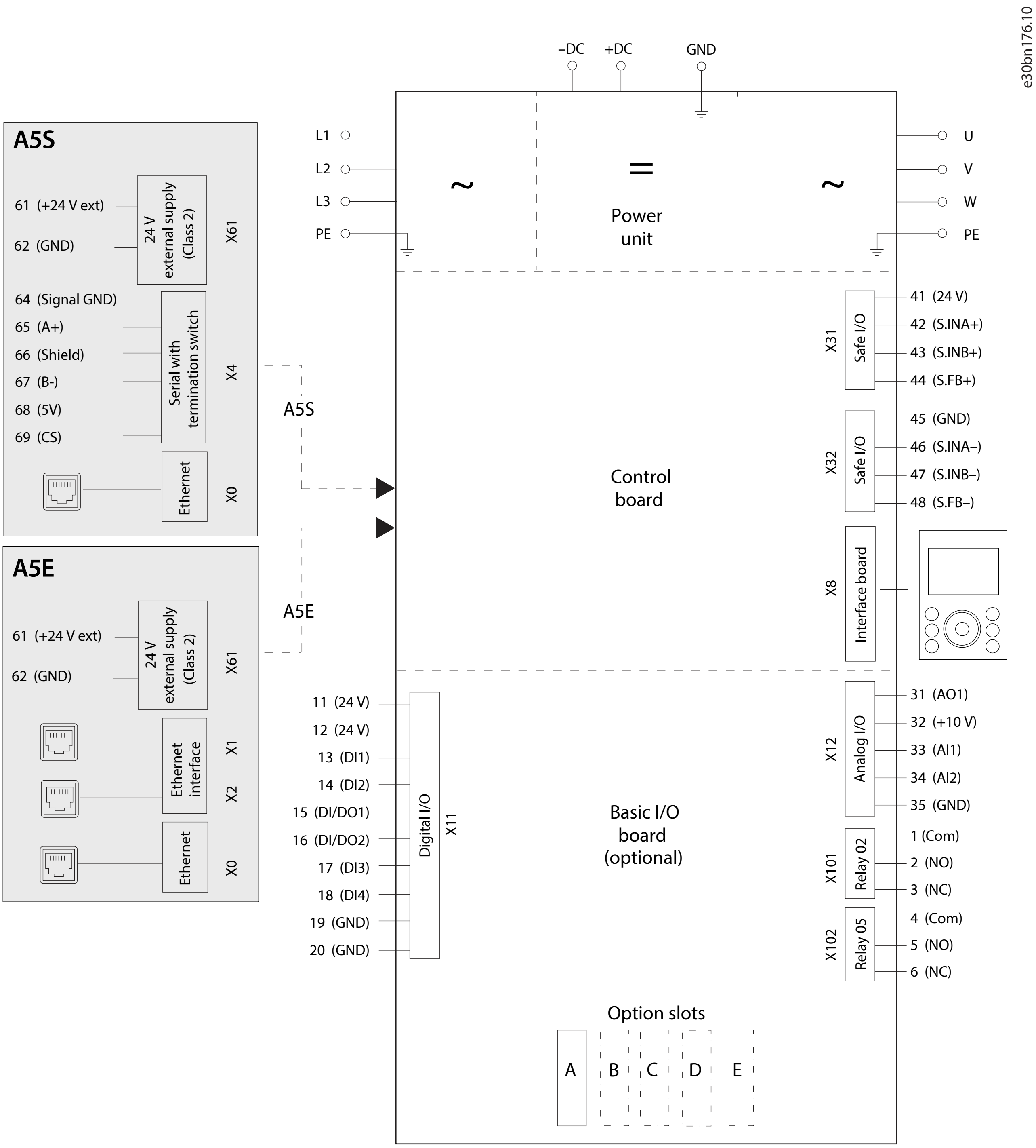


Figure 54: Advanced Control Board and Wiring

NOTE: Selection lists with inputs and/or outputs consist of the name of the hardware option and the numbers of the terminals. For example, terminal number 13 of the Integrated I/O is called ***Integrated I/O T13*** in the selection list.

5.3.2 Configuring Speed Control 1: Basic Speed Control with Analog Reference

Basic speed control with a digital input for the ***START/STOP*** signal, an analog reference signal (0–10 V, 15–50 Hz), and relays for the signals ***Drive Ready*** and ***Fault***.

The parameters whose settings differ from the default settings are bolded in the parameter table.

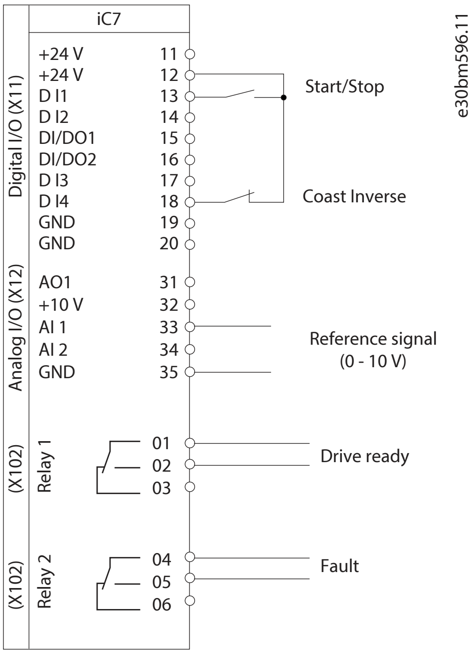


Figure 55: Wiring Diagram for Basic Speed Control with Analog Reference

Table 13: Settings for Basic Speed Control with Analog Reference

Index	Parameter	Setting	Unit	Parameter number
Operation mode settings and digital inputs for commands				
5.5.6.1.7	Advanced Coast Inverse Input	**Fieldbus coast, Integrated I/O T18 Digital Input**		4724
5.5.6.1.8	Advanced Coast Inverse Logic	Source 2		1936
5.4.2.16	Operation Mode	Speed control		2500
5.5.2.1	Control Place Selection	Advanced control		114
5.5.6.1.1	Advanced Start Input	Fieldbus Start, Integrated I/O T13 Digital Input		4722
5.5.6.1.2	Advanced Start Logic	**Source 2**		1933
8.2.3	Speed Unit	Hz		2813
5.8.3.1	Maximum Speed Limit	50	Hz	1729
5.8.3.3	Minimum Speed Limit	**15**	Hz	1722
Source, range, and terminal settings for the reference signal				
5.5.6.2.1	Adv. Speed Reference Source	Fieldbus reference, Reference 1 input		1915
5.5.6.2.2	Adv. Speed Reference Logic	**Source 2**		1916
5.8.4.1	Speed Reference 1 Input	Integrated I/O T33 Analog Input		501
5.8.4.3	Speed Reference 1 Max.	50	Hz	1724
5.8.4.4	Speed Reference 1 Min.	**15**	Hz	1725
9.5.2.1	T33 Terminal Mode	Analog Input		2020
9.5.2.2	T33 Terminal Type	Voltage		2273
9.5.2.3	T33 Minimum Value	0		2272

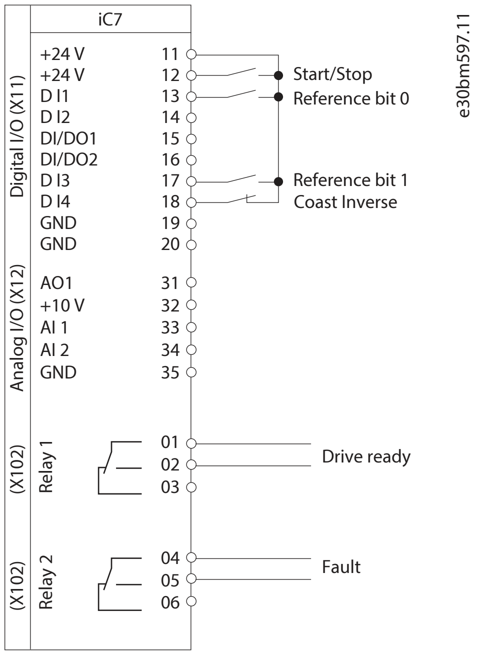
Table 13: Settings for Basic Speed Control with Analog Reference - (continued)

Index	Parameter	Setting	Unit	Parameter number
9.5.2.4	T33 Maximum Value	10		2271
Outputs for status signals				
5.26.1.1	Ready Output	**Integrated I/O Relay T2**		205
5.26.1.2	Run Output	None		206
5.26.1.3	On Reference Output	None		207
5.26.1.4	Fault Event Output	**Integrated I/O Relay T5**		208
5.26.1.5	Warning Event Output	None		209
5.26.1.26	Motor Disconnected Output	None		216
Operation with the control panel (local mode settings)				
5.5.3.1.1	Allow Local Control Force Stop	Enabled		106
5.5.3.1.2	Local Control Mode	Allow Local Control		107
5.5.3.1.3	Continue Operation in Local Control	Enabled		108
5.5.3.1.4	Local Control Stop Button Action	Stop, Hold to Coast		110
5.5.3.1.5	Operation Mode in Local Control	Switch to Speed Control		5422
5.5.3.2.1	Local Speed Reference Source	Local reference		1912
Shown status values				
8.3.2.1	Status Line Left	Actual Output Value		4332
8.3.2.2	Status Line Right	Actual Reference Value		4331
8.3.2.3	Status Line Center	Motor Shaft Power		4333
8.3.3.1	Status Value 1.1	Actual Output Value		300
8.3.3.2	Status Value 1.2	None		301
8.3.3.3	Status Value 1.3	None		302
8.3.3.4	Status Value 1.4	None		303
8.3.3.5	Status Value 1.5	None		304
8.3.4.1	Status Value 2.1	Motor Shaft Speed		310
8.3.4.2	Status Value 2.2	Motor Torque		311
8.3.4.3	Status Value 2.3	Motor Shaft Power		312
8.3.4.4	Status Value 2.4	None		313
8.3.4.5	Status Value 2.5	None		314
Bolded values different from default.				

5.3.3 Configuring Speed Control 2: Basic Speed Control with 4 Preset References

Basic speed control with a digital input for the ***START/STOP*** signal, 4 preset references (25%, 12.5 Hz / 50%, 25 Hz / 75%, 37.5 Hz / 100%, 50 Hz), and relays for the signals ***Drive Ready*** and ***Fault***.

The parameters whose settings differ from the default settings are bolded in the parameter table.



	T14 (Reference bit 0)	T15 (Reference bit 1)	Resulting reference
Preset Speed 1	0	0	12.5 Hz
Preset Speed 2	0	1	25 Hz
Preset Speed 3	1	0	37.5 Hz
Preset Speed 4	1	1	50 Hz

Figure 56: Wiring Diagram for Basic Speed Control with 4 Preset References

The parameters whose settings differ from the default settings are bolded in the following table.

Table 14: Settings for Basic Speed Control with 4 Preset References

Index	Parameter	Setting	Unit	Parameter number
Operation mode settings and digital inputs for commands				
5.5.6.1.7	Advanced Coast Inverse Input	**Fieldus coast, Integrated I/O T18 Digital Input**		4724
5.5.6.1.8	Advanced Coast Inverse Logic	Source 2		1936
5.4.2.16	Operation Mode	Speed control		2500
5.5.2.1	Control Place Selection	Advanced control		114
5.5.6.1.1	Advanced Start Input	Fieldbus Start, Integrated I/O T13 Digital Input		4722
5.5.6.1.2	Advanced Start Logic	**Source 2**		1933
8.2.3	Speed Unit	Hz		2813
5.8.3.1	Maximum Speed Limit	50	Hz	1729
5.8.3.3	Minimum Speed Limit	0	Hz	1722
Source, range, and terminal settings for the reference signal				
5.5.6.2.1	Adv. Speed Reference Source	**Fieldbus reference, Preset reference**		1915
5.5.6.2.2	Adv. Speed Reference Logic	**Source 2**		1916
5.8.4.7	Preset Speed Reference Selector	**Bit Selection**		702
5.8.4.8	Preset Speed 1	**12.5**	Hz	703
5.8.4.9	Preset Speed 2	**25**	Hz	704
5.8.4.10	Preset Speed 3	**37.5**	Hz	705

Table 14: Settings for Basic Speed Control with 4 Preset References - (continued)

Index	Parameter	Setting	Unit	Parameter number
5.8.4.11	Preset Speed 4	**50**	Hz	706
5.8.4.16	Preset Speed Reference Bit 0 Input	**Integrated I/O T14 Digital Input**		711
5.8.4.17	Preset Speed Reference Bit 1 Input	**Integrated I/O T17 Digital Input**		712
Outputs for status signals				
5.26.1.1	Ready Output	**Integrated I/O Relay T2**		205
5.26.1.2	Run Output	None		206
5.26.1.3	On Reference Output	None		207
5.26.1.4	Fault Event Output	**Integrated I/O Relay T5**		208
5.26.1.5	Warning Event Output	None		209
5.26.1.26	Motor Disconnected Output	None		216
Operation with the control panel (local mode settings)				
5.5.3.1.1	Allow Local Control Force Stop	Enabled		106
5.5.3.1.2	Local Control Mode	Allow Local Control		107
5.5.3.1.3	Continue Operation in Local Control	Enabled		108
5.5.3.1.4	Local Control Stop Button Action	Stop, Hold to Coast		110
5.5.3.1.5	Operation Mode in Local Control	Switch to Speed Control		5422
5.5.3.2.1	Local Speed Reference Source	Local reference		1912
Shown status values				
8.3.2.1	Status Line Left	Actual Output Value		4332
8.3.2.2	Status Line Right	Actual Reference Value		4331
8.3.2.3	Status Line Center	Motor Shaft Power		4333
8.3.3.1	Status Value 1.1	Actual Output Value		300
8.3.3.2	Status Value 1.2	None		301
8.3.3.3	Status Value 1.3	None		302
8.3.3.4	Status Value 1.4	None		303
8.3.3.5	Status Value 1.5	None		304
8.3.4.1	Status Value 2.1	Motor Shaft Speed		310
8.3.4.2	Status Value 2.2	Motor Torque		311
8.3.4.3	Status Value 2.3	Motor Shaft Power		312
8.3.4.4	Status Value 2.4	None		313
8.3.4.5	Status Value 2.5	None		314
Bolded values different from default.				

5.3.4 Configuring Pressure Control (PID)

Pressure control with a digital input for the ***START/STOP*** signal, a fixed setpoint, a pressure sensor (0–5000 Pa / 0–10 V), and relays for the signals ***Drive Ready*** and ***Fault***.

The parameters whose settings differ from the default settings are bolded in the parameter table.

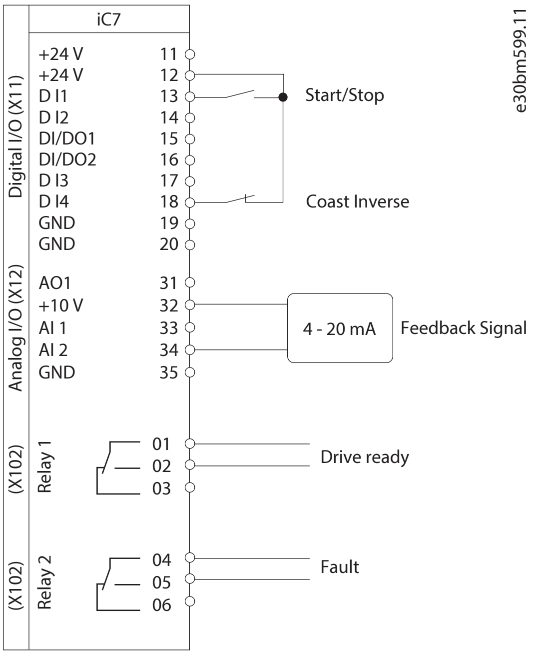


Figure 57: Wiring Diagram for Pressure Control

Table 15: Settings for Pressure Control

Index	Parameter	Setting	Unit	Parameter number
Operation mode settings and digital inputs for commands				
5.5.6.1.7	**Advanced Coast Inverse Input**	**Fieldbus coast, Integrated I/O T18 Digital Input**		**4724**
5.5.6.1.8	Advanced Coast Inverse Logic	Source 2		1936
5.4.2.16	**Operation Mode**	**Process control**		**2500**
5.5.2.1	Control Place Selection	Advanced control		114
5.5.6.1.1	Advanced Start Input	Fieldbus Start, Integrated I/O T13 Digital Input		4722
5.5.6.1.2	**Advanced Start Logic**	**Source 2**		**1933**
8.2.3	Speed Unit	Hz		2813
5.8.3.1	Maximum Speed Limit	50	Hz	1729
5.8.3.3	Minimum Speed Limit	0	Hz	1722
5.10.2.3	**Process Unit**	**Pa**		**6628**
Source, range, and terminal settings for the reference signal				
5.5.6.2.6	**Adv. Process Reference Source**	**Fieldbus reference, Preset reference**		**6054**
5.5.6.2.7	**Adv. Process Reference Logic**	**Source 2**		**6045**
5.10.3.1	**Process Reference Max. Limit**	**5000**	**Pa**	**6013**
5.10.3.2	Process Reference Min. Limit	0	Pa	6014
5.10.3.9	Preset Process Reference Selector	Preset 1		6032
5.10.3.13	**Preset Process Ref. 1**	**Entered value**	**Pa**	**6037**

Table 15: Settings for Pressure Control - (continued)

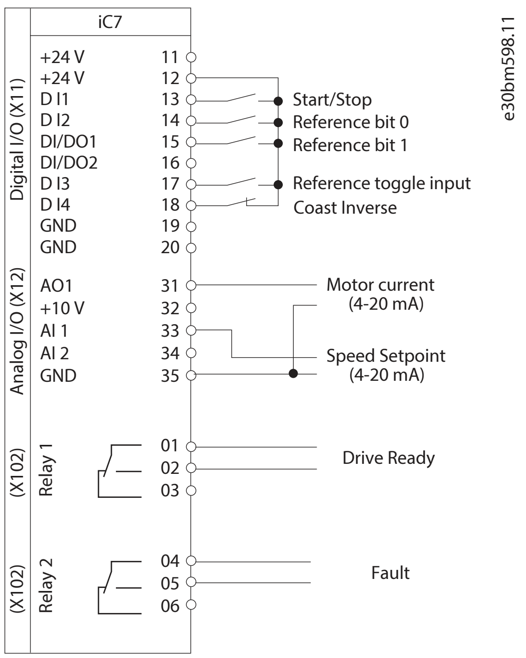
Index	Parameter	Setting	Unit	Parameter number
Range and terminal settings for the feedback signal				
5.10.4.1	Feedback Mode	Feedback 1		6106
5.10.4.2	Feedback 1 Type	Analog Feedback Terminal		6021
5.10.4.3	**Feedback 1 Maximum Scaling**	**5000**	**Pa**	**6015**
5.10.4.4	Feedback 1 Minimum Scaling	0	Pa	6016
5.10.4.5	Analog Input Feedback 1	Integrated I/O T34 Analog Input		6027
9.5.3.1	T34 Terminal Mode	Analog Input		2021
9.5.3.2	T34 Terminal Type	Voltage		2279
9.5.3.3	T34 Minimum Value	0		2278
9.5.3.4	T34 Maximum Value	10		2277
Outputs for status signals				
5.26.1.1	**Ready Output**	**Integrated I/O Relay T2**		**205**
5.26.1.2	Run Output	None		206
5.26.1.3	On Reference Output	None		207
5.26.1.4	**Fault Event Output**	**Integrated I/O Relay T5**		**208**
5.26.1.5	Warning Event Output	None		209
5.26.1.26	Motor Disconnected Output	None		216
Operation with the control panel (local mode settings)				
5.5.3.1.1	Allow Local Control Force Stop	Enabled		106
5.5.3.1.2	Local Control Mode	Allow Local Control		107
5.5.3.1.3	Continue Operation in Local Control	Enabled		108
5.5.3.1.4	Local Control Stop Button Action	Stop, Hold to Coast		110
5.5.3.1.5	**Operation Mode in Local Control**	**Keep Operation Mode**		**5422**
5.5.3.2.1	Local Speed Reference Source	Local reference		1912
Shown status values				
8.3.2.1	Status Line Left	Actual Output Value		4332
8.3.2.2	Status Line Right	Actual Reference Value		4331
8.3.2.3	Status Line Center	Motor Shaft Power		4333
8.3.3.1	Status Value 1.1	Actual Output Value		300
8.3.3.2	Status Value 1.2	None		301
8.3.3.3	Status Value 1.3	None		302
8.3.3.4	Status Value 1.4	None		303
8.3.3.5	Status Value 1.5	None		304
8.3.4.1	Status Value 2.1	Motor Shaft Speed		310
8.3.4.2	Status Value 2.2	Motor Torque		311

Table 15: Settings for Pressure Control - (continued)

Index	Parameter	Setting	Unit	Parameter number
8.3.4.3	Status Value 2.3	Motor Shaft Power		312
8.3.4.4	Status Value 2.4	None		313
8.3.4.5	Status Value 2.5	None		314
Bolded values are different from default.				

5.3.5 Configuring Compressor Speed Control

Compressor speed control with a digital input for the ***START/STOP*** signal, toggling between an external reference and 4 preset references, motor current as an output signal, and relays for the signals ***Drive Ready*** and ***Fault***.



	T14 (Reference bit 0)	T15 (Reference bit 1)	Resulting reference
Preset Speed 1	0	0	12.5 Hz
Preset Speed 2	0	1	25 Hz
Preset Speed 3	1	0	37.5 Hz
Preset Speed 4	1	1	50 Hz

Figure 58: Wiring Diagram for Compressor Speed Control

The parameters whose settings differ from the default settings are bolded in the following table.

Table 16: Settings for Compressor Speed Control

Index	Parameter	Setting	Unit	Parameter number
Operation mode settings and digital inputs for commands				
5.5.6.1.7	**Advanced Coast Inverse Input**	**Fieldbus coast, Integrated I/O T18 Digital Input**		**4724**
5.5.6.1.8	Advanced Coast Inverse Logic	Source 2		1936
5.3.3.1	**Torque Characteristic**	**Constant torque (CT)**		**2809**
5.4.2.16	Operation Mode	Speed control		2500
5.5.2.1	Control Place Selection	Advanced control		114
5.5.6.1.1	Advanced Start Input	Fieldbus Start, Integrated I/O T13 Digital Input		4722

Table 16: Settings for Compressor Speed Control - (continued)

Index	Parameter	Setting	Unit	Parameter number
5.5.6.1.2	**Advanced Start Logic**	**Source 2**		**1933**
8.2.3	Speed Unit	Hz		2813
5.8.3.1	Maximum Speed Limit	50	Hz	1729
5.8.3.3	Minimum Speed Limit	0	Hz	1722
Source, range, and terminal settings for the reference signal				
5.5.6.2.1	**Adv. Speed Reference Source**	**Reference 1 input, Preset reference**		**1915**
5.5.6.2.2	**Adv. Speed Reference Logic**	**Toggle**		**1916**
5.5.6.2.3	**Adv. Speed Reference Toggle Input**	**Integrated I/O T17 Digital Input**		**1941**
5.8.4.7	**Preset Speed Reference Selector**	**Bit Selection**		**702**
5.8.4.8	**Preset Speed 1**	**12.5**	**Hz**	**703**
5.8.4.9	**Preset Speed 2**	**25**	**Hz**	**704**
5.8.4.10	**Preset Speed 3**	**37.5**	**Hz**	**705**
5.8.4.11	**Preset Speed 4**	**50**	**Hz**	**706**
5.8.4.16	**Preset Speed Reference Bit 0 Input**	**Integrated I/O T14 Digital Input**		**711**
5.8.4.17	**Preset Speed Reference Bit 1 Input**	**Integrated I/O T15 Digital Input**		**712**
9.4.4.1	T15 Terminal Mode	Digital input		2022
5.8.4.1	Speed Reference 1 Input	Integrated I/O T33 Analog Input		501
5.8.4.3	Speed Reference 1 Max.	50	Hz	1724
5.8.4.4	Speed Reference 1 Min.	0	Hz	1725
9.5.2.1	T33 Terminal Mode	Analog Input		2020
9.5.2.2	**T33 Terminal Type**	**Current**		**2273**
9.5.2.3	T33 Minimum Value	4	mA	2272
9.5.2.4	T33 Maximum Value	20	mA	2271
Settings for current as the analog output signal				
4.1.17	**Motor Current Output**	**Integrated I/O T31 Analog Output**		**2302**
9.5.1.1	T31 Terminal Mode	Analog Output		2019
9.5.1.2	**T31 Terminal Type**	**Current**		**2284**
9.5.1.3	**T31 Minimum Value**	**4**	**mA**	**2283**
9.5.1.4	**T31 Maximum Value**	**20**	**mA**	**2282**
Outputs for status signals				
5.26.1.1	**Ready Output**	**Integrated I/O Relay T2**		**205**
5.26.1.2	Run Output	None		206
5.26.1.3	On Reference Output	None		207
5.26.1.4	**Fault Event Output**	**Integrated I/O Relay T5**		**208**
5.26.1.5	Warning Event Output	None		209

Table 16: Settings for Compressor Speed Control - (continued)

Index	Parameter	Setting	Unit	Parameter number
5.26.1.26	Motor Disconnected Output	None		216
Operation with the control panel (local mode settings)				
5.5.3.1.1	Allow Local Control Force Stop	Enabled		106
5.5.3.1.2	Local Control Mode	Allow Local Control		107
5.5.3.1.3	Continue Operation in Local Control	Enabled		108
5.5.3.1.4	Local Control Stop Button Action	Stop, Hold to Coast		110
5.5.3.1.5	Operation Mode in Local Control	Switch to Speed Control		5422
5.5.3.2.1	Local Speed Reference Source	Local reference		1912
Shown status values				
8.3.2.1	Status Line Left	Actual Output Value		4332
8.3.2.2	Status Line Right	Actual Reference Value		4331
8.3.2.3	Status Line Center	Motor Shaft Power		4333
8.3.3.1	Status Value 1.1	Actual Output Value		300
8.3.3.2	Status Value 1.2	None		301
8.3.3.3	Status Value 1.3	None		302
8.3.3.4	Status Value 1.4	None		303
8.3.3.5	Status Value 1.5	None		304
8.3.4.1	Status Value 2.1	Motor Shaft Speed		310
8.3.4.2	Status Value 2.2	Motor Torque		311
8.3.4.3	Status Value 2.3	Motor Shaft Power		312
8.3.4.4	Status Value 2.4	None		313
8.3.4.5	Status Value 2.5	None		314
Bolded values different from default.				

6 Parameters

6.1 Parameter Structure

6.1.1 Understanding Parameter Structure Principles

The basic design principle of the parameter structure and the related hierarchy in the application software refers to a typical motor drive system with an iC7 drive.

A similar parameter structure is reused across all products within the iC7 series. This means that some of the parameter groups or dedicated parameters may not be visible for all applications. Therefore, the indexes of parameters may not be sequential. This design principle is followed to maintain consistency across all the different application software in the iC7 series. The application software is designed in this manner to have the same look and feel across different iC7 series products, and to enable easier and faster troubleshooting. The presentation here is of the general principle, and does not necessarily reflect all features of the drive.

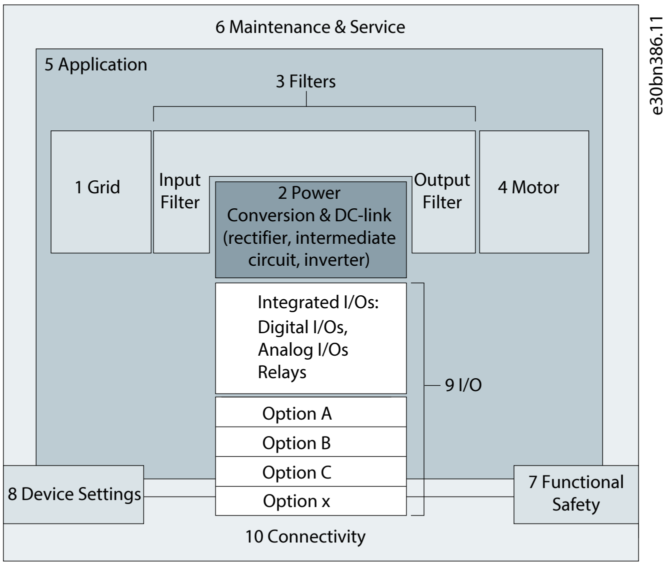


Figure 59: Application Software Parameter Structure Overview

6.1.2 Parameter Groups and their Content

The detailed structure and hierarchy within the parameter groups can vary, depending on the purpose of the parameter group and the total number of parameters. However, the design principle of the structure is to keep the overall sequence while commissioning or setting up the drive, within a logical structure. One example is the Status parameter group which is embedded into each main group (if applicable) to provide quick and easy access to view real time status information of relevant data of parameters within this group.

Table 17: Parameter Groups (first two levels)

Index	Parameter group name	Description
1	Grid	Contains parameters for configuring and monitoring the energy source of the drive system. Typically, the energy source is the grid. The menu also lets you configure grid protection settings and view the condition of the grid.
2	Power Conversion and DC Link	Contains parameters to configure, monitor, and control the power conversion of the drive. The menu lets you configure protection settings of the power unit and settings for the rectifier, DC link, and inverter.
3	Filters	Contains parameters to configure, monitor, and control the input filters and output filters.

Table 17: Parameter Groups (first two levels) - (continued)

Index	Parameter group name	Description
4	Motor	Contains parameters to configure motor, motor control, and motor protection.
5	Application	Contains parameters for application specific features such as process control, speed control, water features, and many more.
6	Maintenance and Service	Contains parameters exclusively related to status, events, and back up and restore.
7	Functional Safety	Contains non-safety-related parameters for configuring Safe Torque Off and other safety features.
8	Customization	Contains parameters to customize and adapt the behavior of the drive and user interface design.
9	I/O	Contains hardware-related parameters to configure I/Os and their options.
10	Connectivity	Contains parameters to configure the built-in and optional communications of the drive system.

Parameter group 1st level	Parameter group 2nd level
1 Grid	1.1 Grid Status
	1.2 Grid Settings
	1.3 Grid Protection
2 Power Conversion & DC-link	2.1 Power Conversion & DC-link Status
	2.2 Power Unit Settings
	2.3 Protection
	2.4 Modulation
3 Filters & Brake Chopper	3.1 Filters & Brake Chopper Status
	3.2 Brake Chopper
	3.3 Brake Resistor
	3.4 Advanced Harmonic Filter
	3.5 Output Filter
4 Motor	4.1 Motor Status
	4.2 Motor Data
	4.3 Motor Control
	4.5 Protection
5 Application	5.1 Application Status
	5.2 Protection
	5.3 Load
	5.4 Operation Mode
	5.5 Control Places
	5.6 Start Settings
	5.7 Stop Settings
	5.8 Speed Control
	5.10 Process Control
	5.11 Inching
	5.26 Additional Status Outputs
	5.27 Fieldbus Process Data
	5.31 Pump Features
	5.33 Auxiliary Device Control
	5.34 Auxiliary PID Controller
	5.35 Signal Converter
	5.36 Bypass Panel
	5.40 Logic
6 Maintenance & Service	6.1 Status
	6.2 Software Information
	6.4 Events
	6.5 Operational Counters
	6.7 Backup & Restore
	6.8 Preventive Maintenance
7 Functional Safety	7.1 Status
	7.3 STO
8 Customization	8.1 Status
	8.2 Basic Settings
	8.3 Control Panel
	8.4 Date & Time
	8.7 Asset Management
9 I/O*	Integrated I/O
	9.3 Integrated I/O Status
	9.4 Digital Inputs/Outputs
	9.5 Analog Inputs/Outputs
	9.6 Relay Delays
10 Connectivity*	10.2 Communication Interfaces
	10.3 Protocols

e30bl834.11

*Depending on the hardware configuration

Figure 60: Parameter Groups

6.2 Parameter Descriptions

6.2.1 Reading the Parameter Table

The application guide includes parameter overview tables. The following descriptions explain how to read the parameters.

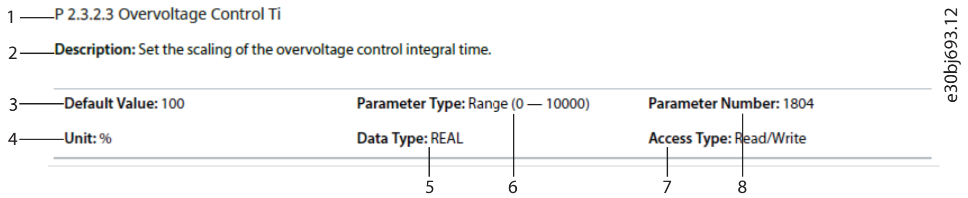


Figure 61: Reading the Parameter Table

1	The parameter index and name. Parameter indices start with a P. Screen indices start with an S.	2	The parameter help text which is visible in the control panel and MyDrive® Insight.
3	The default setting from the factory. If the parameter is a status readout parameter, the default is NA.	4	The unit of the parameter.
5	The data type of the parameter. See 6.2.2 Understanding Data Types.	6	The type of parameter. Parameters have either defined ranges of values or selections. See 6.2.3 Understanding Parameter Types.
7	The access type of the parameter. See 6.2.4 Understanding Access Types.	8	The unique parameter number, which is relevant for PLC programming.

6.2.2 Understanding Data Types

The following table is an overview of the data types used in the iC7 application software.

Table 18: Overview of data types

Data type	Description	Size (Bits)	Range
BOOL	Boolean	1	0–1
INT	Integer	16	-32,768 … 32,767
DINT	Double integer	32	-2,147,483,648 … 2,147,483,647
USINT	Unsigned short integer	8	0–255
UINT	Unsigned integer	16	0–65,535
UDINT	Unsigned double integer	32	0–4,294,967,295
REAL	Real numbers	32	-3.402823466 E+38 (approximately 7 digits) … -1.175494351 E-38 (approximately 7 digits) and +1.175494351 E-38 (approximately 7 digits) … +3.402823466 E+38 (approximately 7 digits)
WORD	Bit string of length 16	16	0–65,535 (16#00–16#FFFF)
STRING	Sequence of characters	N/A	1 byte per character
ULINT	Unsigned long integer	64	0–18,446,744,073,709,551,615
DATE_AND_TIME	Date and time information	64	N/A

6.2.3 Understanding Parameter Types

The following table lists the different types of parameters.

Table 19: Parameter Types and Descriptions

Parameter Type	Description
Selection	The parameter provides of a list of value selections. For some parameters, the contents of the list depend on the hardware configuration. In such cases, the selections cannot be shown in the application guide.
Range (0–255)	The value of the parameter is within the specified range. In this example, the parameter can have any value between 0 and 255.
Range (*–*)	The value of the parameter can be set within the full range of the data type REAL. See 6.2.2 Understanding Data Types.
Range (0–*)	The value of the parameter can be set within the upper range of the data type REAL. See 6.2.2 Understanding Data Types.
Range (Unit dependent)	The range depends on the selected unit, and is visible in MyDrive Insight and the control panel.

6.2.4 Understanding Access Types

The following table lists the different parameter access types.

Table 20: Parameter Types and Descriptions

Access Type	Description
Read/Write	The parameter information can be read or changed.
Read only	The parameter information can only be read.
Read/Conditional Write	The parameter information can be read and changed. The parameter settings cannot be modified when the drive is running. The drive must be coasted to modify parameter values.

6.3 Grid (Menu Index 1)

6.3.1 Grid Overview

This parameter group contains parameters for configuring and monitoring the energy source of the drive system. Typically, the energy source is the grid. The menu also lets the user configure grid protection settings and view the condition of the grid.

6.3.2 Grid Status (Menu Index 1.1)

P 1.1.1 Grid Frequency

Shows the actual grid frequency.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	9041	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read Only

P 1.1.2 Line-To-Line Voltage (RMS)

Shows the average line-to-line voltage (RMS).

Default Value:	NA	**Parameter Type:**	Range (0 — *)
Parameter Number:	9040	**Unit:**	V

Data Type:	REAL	**Access Type:**	Read Only

P 1.1.3 L1-L2 Line Voltage (RMS)

Shows the L1-L2 line voltage (RMS).

Default Value:	NA	**Parameter Type:**	Range (0 — *)
Parameter Number:	9048	**Unit:**	V
Data Type:	REAL	**Access Type:**	Read Only

P 1.1.4 L2-L3 Line Voltage (RMS)

Shows the L2-L3 line voltage (RMS).

Default Value:	NA	**Parameter Type:**	Range (0 — *)
Parameter Number:	9049	**Unit:**	V
Data Type:	REAL	**Access Type:**	Read Only

P 1.1.5 L3-L1 Line Voltage (RMS)

Shows the L3-L1 line voltage (RMS).

Default Value:	NA	**Parameter Type:**	Range (0 — *)
Parameter Number:	9050	**Unit:**	V
Data Type:	REAL	**Access Type:**	Read Only

P 1.1.6 Grid Voltage Imbalance

Shows the grid voltage imbalance in %. A value greater than 3% may indicate grid problems.

Default Value:	NA	**Parameter Type:**	Range (0 — 100)
Parameter Number:	9047	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read Only

P 1.1.7 Total Harmonic Distortion Voltage (THDv)

Shows the total harmonic distortion of the grid voltage in %.

Default Value:	NA	**Parameter Type:**	Range (0 — 100)
Parameter Number:	9046	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read Only

P 1.1.8 Grid Current

Shows the current at the point of common coupling.

Default Value:	NA	**Parameter Type:**	Range (0 — *)
Parameter Number:	9060	**Unit:**	A
Data Type:	REAL	**Access Type:**	Read Only

P 1.1.9 Grid Current %

Shows the current at the point of common coupling in % of grid nominal current. The grid nominal current is defined in Grid Settings.

Default Value:	NA	**Parameter Type:**	Range (-1000 — 1000)
Parameter Number:	9061	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read Only

P 1.1.10 Grid Active Current %

Shows the active current in % of grid nominal current.

Default Value:	NA	**Parameter Type:**	Range (-1000 — 1000)
Parameter Number:	9062	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read Only

P 1.1.11 Grid Reactive Current %

Shows the reactive current in % of grid nominal current.

Default Value:	NA	**Parameter Type:**	Range (-300 — 300)
Parameter Number:	9063	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read Only

P 1.1.12 Grid Active Power

Shows the active power at the point of grid connection.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	9064	**Unit:**	kW
Data Type:	REAL	**Access Type:**	Read Only

P 1.1.13 Grid Active Power %

Shows the grid active power in % of grid nominal power.

Default Value:	NA	**Parameter Type:**	Range (-1000 — 1000)
Parameter Number:	9065	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read Only

P 1.1.14 Grid Reactive Power

Shows the grid reactive power.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	9051	**Unit:**	kVA
Data Type:	REAL	**Access Type:**	Read Only

P 1.1.15 Grid Reactive Power %

Shows the grid reactive power in % of grid nominal power.

Default Value:	NA	**Parameter Type:**	Range (-1000 — 1000)

Parameter Number:	9052	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read Only

P 1.1.16 Grid Power Factor

Shows the grid power factor.

Default Value:	NA	**Parameter Type:**	Range (-1 — 1)
Parameter Number:	9053	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read Only

P 1.1.25 Phase 1 grid current (RMS)

Shows the grid current (RMS) of phase 1.

Default Value:	NA	**Parameter Type:**	Range (0 — 10000)
Parameter Number:	9066	**Unit:**	A
Data Type:	REAL	**Access Type:**	Read Only

P 1.1.26 Phase 2 grid current (RMS)

Shows the grid current (RMS) of phase 2.

Default Value:	NA	**Parameter Type:**	Range (0 — 10000)
Parameter Number:	9067	**Unit:**	A
Data Type:	REAL	**Access Type:**	Read Only

P 1.1.27 Phase 3 grid current (RMS)

Shows the grid current (RMS) of phase 3.

Default Value:	NA	**Parameter Type:**	Range (0 — 10000)
Parameter Number:	9068	**Unit:**	A
Data Type:	REAL	**Access Type:**	Read Only

P 1.1.28 Total Harmonic Current (THC)

Shows the total harmonic current (THC) of the grid current.

Default Value:	NA	**Parameter Type:**	Range (0 — 100)
Parameter Number:	9069	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read Only

P 1.1.29 Total Harmonic Distortion Current (THDi)

Shows the total harmonic distortion of the grid currents relative to the fundamental current. At partial load a higher percentage of distortion is expected.

Default Value:	NA	**Parameter Type:**	Range (0 — 100)
Parameter Number:	9090	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read Only

6.3.3 Grid Settings (Menu Index 1.2)

P 1.2.1 Grid Type

Select the grid type of the supply system. If set to "As grid type", the selection affects the setting of "1.2.2 RFI filter" and "2.2.1.7 HF DC-link Filter Mode".

Default Value:	0 (TN)	**Parameter Type:**	Selection
Parameter Number:	2942	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Conditional Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	TN	Drive connected to a TN grid.
1	TT	Drive connected to a TT grid.
2	IT	Drive connected to a IT grid.
3	HRG	Drive connected to a High Resistance Grid (HRG).
4	Grounded Delta	Drive is connected to a grounded delta grid.

P 1.2.2 RFI Filter Mode

Select the Radio Frequency Interference (RFI) filter mode.

Default Value:	*	**Parameter Type:**	Selection
Parameter Number:	2943	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Conditional Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Filter inactive	The filter is inactive.
1	Filter active	The filter is active.
2	Filter matches grid type selection	The filter is set according to the selected grid type.

6.3.4 Grid Protection (Menu Index 1.3)

P 1.3.1 Invalid Frequency Response

Select the response after detecting an invalid grid frequency.

Default Value:	1 (Fault)	**Parameter Type:**	Selection
Parameter Number:	2337	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
1	Fault	The drive issues a fault and stops.
2	Automatically derate	The drive continues operation with derated performance.

P 1.3.2 Missing Grid Phase Response

Select the response after detecting a missing grid phase.

Default Value:	2 (Automatically derate)	**Parameter Type:**	Selection
Parameter Number:	2338	**Unit:**	–
Data Type:	UDINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
1	Fault	The drive issues a fault and stops.
2	Automatically derate	The drive continues operation with derated performance.
3	Warning	The drive issues a warning.

P 1.3.3 Undervoltage Protection

Enables the undervoltage protection. The drive trips when the grid voltage is 20% below the selected voltage class level. The voltage class is defined with parameter "2.2.1.1 Unit Voltage Class".

Default Value:	1 (Enabled)	**Parameter Type:**	Selection
Parameter Number:	2344	**Unit:**	–
Data Type:	BOOL	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Disabled	Disables the function.
1	Enabled	Enables the function.

P 1.3.9 Grid Voltage Imbalance Response

Select the mode of grid imbalance protection.

Default Value:	1 (Fault or Warning)	**Parameter Type:**	Selection
Parameter Number:	9056	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Off	Disables the protection.
1	Fault or Warning	Issues a warning or fault if a grid voltage imbalance is detected.
2	Automatically derate	The drive continues operation with derated performance.

P 1.3.10 Grid Spike Response

Select the response to grid voltage spike monitoring. If large spikes occur, the response protects the drive.

Default Value:	3 (Warning)	**Parameter Type:**	Selection
Parameter Number:	2342	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
3	Warning	The drive issues a warning.
9	Fault, ramp to coast	Issues a fault, ramps down, and coast.

6.4 Power Conversion & DC Link (Menu Index 2)

6.4.1 Power Conversion & DC-Link Overview

This parameter group contains parameters for configuring, monitoring, and controlling the power conversion of the drive. The group lets the user configure protection settings of the power unit and settings for the rectifier, DC link, and inverter.

6.4.2 Power Conversion & DC Link Status (Menu Index 2.1)

P 2.1.1 Unit Nominal Voltage

Shows the nominal voltage setting as a result of the setting of parameter "2.2.1.1 Unit Voltage Class".

Default Value:	400	**Parameter Type:**	Range (0 — *)
Parameter Number:	2830	**Unit:**	V
Data Type:	REAL	**Access Type:**	Read Only

P 2.1.2 Unit Nominal Current

Shows the nominal current of the unit.

Default Value:	23	**Parameter Type:**	Range (0 — *)
Parameter Number:	2831	**Unit:**	A
Data Type:	REAL	**Access Type:**	Read Only

P 2.1.3 DC-link Voltage

Shows the actual DC-link voltage.

Default Value:	NA	**Parameter Type:**	Range (0 — *)
Parameter Number:	9044	**Unit:**	V
Data Type:	REAL	**Access Type:**	Read Only

P 2.1.7 DC-link Power

Shows the actual DC-link power.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	5117	**Unit:**	kW

Data Type:	REAL	**Access Type:**	Read Only

P 2.1.10 U-phase RMS Current

Shows the U-phase RMS current.

Default Value:	NA	**Parameter Type:**	Range (0 — *)
Parameter Number:	9020	**Unit:**	A
Data Type:	REAL	**Access Type:**	Read Only

P 2.1.11 V-phase RMS Current

Shows the V-phase RMS current.

Default Value:	NA	**Parameter Type:**	Range (0 — *)
Parameter Number:	9021	**Unit:**	A
Data Type:	REAL	**Access Type:**	Read Only

P 2.1.12 W-phase RMS Current

Shows the W-phase RMS current.

Default Value:	NA	**Parameter Type:**	Range (0 — *)
Parameter Number:	9022	**Unit:**	A
Data Type:	REAL	**Access Type:**	Read Only

P 2.1.14 Actual Relative Output Current Limit

Shows the actual output current limit relative to the nominal motor current.

Default Value:	NA	**Parameter Type:**	Range (0 — 300)
Parameter Number:	2700	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read Only

P 2.1.15 Heat Sink Temperature

Shows the temperature of the power unit heat sink.

Default Value:	NA	**Parameter Type:**	Range (-50 — 200)
Parameter Number:	2950	**Unit:**	°C
Data Type:	REAL	**Access Type:**	Read Only

P 2.1.16 Main Fan Speed

Shows the speed of the main cooling fan.

Default Value:	NA	**Parameter Type:**	Range (0 — 32767)
Parameter Number:	2931	**Unit:**	rpm
Data Type:	INT	**Access Type:**	Read Only

P 2.1.17 Internal Fan Speed

Shows the speed of the internal cooling fan.

Default Value:	NA	**Parameter Type:**	Range (0 — 32767)
Parameter Number:	2926	**Unit:**	rpm
Data Type:	INT	**Access Type:**	Read Only

P 2.1.19 Heat Sink Temperature Output

Select the output indicating if the heat sink temperature is within the specified range.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	2312	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 2.1.20 Drive DC-link Voltage Output

Select the output indicating if the DC-link voltage is within the specified range.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	2311	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 2.1.21 Drive Thermal Load

Shows the actual counter number for the thermal load on the inverter.

Default Value:	–	**Parameter Type:**	Range (0 — 100)
Parameter Number:	6547	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read Only

6.4.3 Power Unit Settings (Menu Index 2.2)

6.4.3.1 General Settings (Menu Index 2.2.1)

P 2.2.1.1 Unit Voltage Class

Select the unit voltage class to optimize the performance of the drive.

Default Value:	*	**Parameter Type:**	Selection
Parameter Number:	2832	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Conditional Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
1	Low-voltage range	Class 1 - Low-voltage range.
2	Mid-voltage range	Class 2 - Mid-voltage range.
3	High-voltage range	Class 3 - High-voltage range.

This parameter specifies a focused voltage range within the input voltage rating of the power unit, for optimized drive control. Each power unit is rated for a wide input voltage range within which the drive can operate. This parameter is used to specify a narrower range within the wide range of input voltage, to determine optimized values for the nominal voltage and current of the power unit. The following table describes the selections available for the parameter.

Table 21: Selection Descriptions

Selection Name	Selection Description
Low Voltage Range	Unit nominal voltage and current are configured according to the lowest voltage of the power unit's voltage range. For example: In 380–480 V (3N04) rated units, the range is 380–414 V AC.
Medium Voltage Range	Unit nominal voltage and current are configured according to the medium voltage level of the power unit's voltage range. For example: In 380–480 V (3N04) rated units, the range is 415–440 V AC.
High Voltage Range	Unit nominal voltage and current are configured according to the highest voltage level of the power unit's voltage range. For example: In 380–480 V (3N04) rated units, the range is 441–480 V AC.

P 2.2.1.2 Overload Mode

Select the overload mode.

Default Value:	*	**Parameter Type:**	Selection
Parameter Number:	2833	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Conditional Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
1	Low overload (LO)	Low overload (LO) operation. Provides overload current up to 110%.
2	High overload (HO1)	High overload (HO1) operation. Provides higher overload current up to 160% for acceleration.
3	High overload increased duty (HO2)	High overload with increaseed duty (HO2) operation. Provides higher overload current with shorter cycle times.

P 2.2.1.3 Relative Output Current Limit

Set the output current limit relative to the motor nominal current from the nameplate.

Default Value:	150	**Parameter Type:**	Range (0 — 999)
Parameter Number:	1325	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read/Write

P 2.2.1.5 Supply Mode

Select the supply mode.

Default Value:	0 (AC)	**Parameter Type:**	Selection
Parameter Number:	1328	**Unit:**	–

Data Type:	UINT	**Access Type:**	Read/Conditional Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	AC	Drive is supplied from AC grid.
1	DC	Drive is supplied from DC terminals.

P 2.2.1.7 HF DC-link Filter Mode

Select the mode of the high-frequency filter in the DC link.

Default Value:	*	**Parameter Type:**	Selection
Parameter Number:	2944	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Conditional Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Filter inactive	The filter is inactive.
1	Filter active	The filter is active.
2	Filter matches grid type selection	The filter is set according to the selected grid type.

P 2.2.1.8 Relative Power Limit Motor

Set the power limit in motor mode in % of nominal motor power.

Default Value:	300	**Parameter Type:**	Range (0 — 1000)
Parameter Number:	1814	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read/Write

P 2.2.1.9 Relative Power Limit Generator

Set the power limit in generator mode in % of nominal motor power.

Default Value:	300	**Parameter Type:**	Range (0 — 1000)
Parameter Number:	1815	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read/Write

P 2.2.1.13 Output Current Limit Response

Select the response for running at the current limit after the time delay set.

Default Value:	0 (No response)	**Parameter Type:**	Selection
Parameter Number:	2359	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	No response	The event is ignored.
1	Info	The event is logged in the event log.
10	Fault	The drive issues a fault and coasts the motor.

P 2.2.1.14 Output Current Limit Delay

Set the delay before the selected response is triggered after the drive has reached the current limit.

Default Value:	–	**Parameter Type:**	Range (0 — 65000)
Parameter Number:	2360	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

P 2.2.1.15 Power Limit Motor Response

Select the response for running at the power limit after the time delay set.

Default Value:	0 (No response)	**Parameter Type:**	Selection
Parameter Number:	2366	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	No response	The event is ignored.
1	Info	The event is logged in the event log.
10	Fault	The drive issues a fault and coasts the motor.

P 2.2.1.16 Power Limit Motor Delay

Set the delay before the selected response is triggered after the drive has reached the power limit.

Default Value:	–	**Parameter Type:**	Range (0 — 65000)
Parameter Number:	2364	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

P 2.2.1.17 Power Limit Generator Response

Select the response for running at the power limit after the time delay set.

Default Value:	0 (No response)	**Parameter Type:**	Selection
Parameter Number:	2367	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	No response	The event is ignored.
1	Info	The event is logged in the event log.
10	Fault	The drive issues a fault and coasts the motor.

P 2.2.1.18 Power Limit Generator Delay

Set the delay before the selected response is triggered after the drive has reached the power limit.

Default Value:	–	**Parameter Type:**	Range (0 — 65000)
Parameter Number:	2365	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

6.4.3.2 Cooling Fan Control (Menu Index 2.2.2)

P 2.2.2.1 Main Fan Minimum Speed

Set the minimum speed of the main cooling fan.

Default Value:	–	**Parameter Type:**	Range (0 — 100)
Parameter Number:	2932	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read/Write

P 2.2.2.2 Internal Fan Minimum Speed

Set the minimum speed of the internal cooling fan.

Default Value:	–	**Parameter Type:**	Range (0 — 100)
Parameter Number:	2928	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read/Write

P 2.2.2.3 Main Fan Fail Response

Select the drive response to a main fan fail.

Default Value:	3 (Warning)	**Parameter Type:**	Selection
Parameter Number:	2939	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
3	Warning	The drive issues a warning.
10	Fault	The drive issues a fault and coasts the motor.

P 2.2.2.4 Internal Fan Fail Response

Select the drive response to an internal fan fail.

Default Value:	3 (Warning)	**Parameter Type:**	Selection
Parameter Number:	2940	**Unit:**	–

Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
3	Warning	The drive issues a warning.
10	Fault	The drive issues a fault and coasts the motor.

6.4.4 Protection (Menu Index 2.3)

6.4.4.1 Settings (Menu Index 2.3.1)

P 2.3.1.1 Retry after Fault

Enables retry functionality (ride-through) after fault.

Default Value:	1 (Enabled)	**Parameter Type:**	Selection
Parameter Number:	2927	**Unit:**	–
Data Type:	BOOL	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Disabled	Disables the function.
1	Enabled	Enables the function.

This parameter enables the retry functionality (fault ride-through) after 1 of the common power conversion protections has activated. The number of retries or the retrying window depends on the power unit type and rating. The protections that can utilize retry are:

- Output current ground leakage fault
- Output overcurrent faults
- DC-link overvoltage and undervoltage faults
- Brake resistor or switching element short circuit faults

P 2.3.1.2 Smart Derate Mode

Select the level of derating if the nominal operational limits of the drive have been exceeded.

Default Value:	0 (Maximum derating)	**Parameter Type:**	Selection
Parameter Number:	2345	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Maximum derating	Drive derates as much as possible.
1	Minimum derating	Drive derates as little as possible.

This parameter selects a level for the derating of the switching frequency whenever it is needed. The drive features multiple protection functions that can derate the switching frequency of the drive, to avoid operating conditions that are harmful for the drive. This parameter can be used to influence the degree of derating. Following are the descriptions of the selections for this parameter:

Table 22: Selection Descriptions

Selection Name	Selection Description
Maximum Derating Mode	When switching frequency derating is applied, the drive reduces the switching frequency to the maximum. This depends on the application scenario.
Minimum Derating Mode	When switching frequency derating is applied, the drive reduces the switching frequency to the minimum. This depends on the application scenario.

P 2.3.1.3 DC-link Voltage Ripple Response

Select the mode of excessive DC-link voltage ripple protection.

Default Value:	1 (Fault)	**Parameter Type:**	Selection
Parameter Number:	2929	**Unit:**	–
Data Type:	UDINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Disabled	Disables the protection.
1	Fault	The drive issues a fault if excessive DC-link voltage ripple is detected.

This parameter selects a response for excessive DC-link voltage ripple protection. Excessive voltage ripples are detected when the peak-to-peak amplitude of the DC voltage exceeds the internal limit of the drive for a long period. Both the limit and time depend on the power unit type and rating. Following are the selection descriptions for the parameter:

Table 23: Selection Descriptions

Selection Name	Selection Description
Disabled	No action is undertaken when excessive rippling is detected.
Trip	After detecting excessive ripples for a long period, the drive issues a fault and performs stop modulation.

P 2.3.1.4 DC-link Imbalance Response

Select a response to an imbalance across the DC-link capacitors' voltage.

Default Value:	10 (Fault)	**Parameter Type:**	Selection
Parameter Number:	2346	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
3	Warning	The drive issues a warning.
10	Fault	The drive issues a fault and coasts the motor.

P 2.3.1.5 Rectifier Thermal Overload Response

Select the mode of rectifier thermal overload protection.

Default Value:	2 (Automatically derate)	**Parameter Type:**	Selection
Parameter Number:	2340	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
1	Fault	The drive issues a fault and stops.
2	Automatically derate	The drive continues operation with derated performance.

This parameter selects a response to the reaction of the drive for rectifier thermal overload protection. Rectifier thermal overload is detected when the drive operates for a long period at a specified rectifier current level. Specific current levels and trip times depend on the power unit type and rating. Following are the descriptions for the selections available for the parameter:

Table 24: Selection Descriptions

Selection Name	Selection Description
Trip	The drive issues a fault and stops modulation.
Automatically derate	The drive derates the rectifier current (DC-link current) to mitigate the cause of rectifier thermal overload. When the drive exits from the overload operation window, derating is stopped.

P 2.3.1.6 Inverter Thermal Overload Response

Select the mode of inverter thermal overload protection.

Default Value:	2 (Automatically derate)	**Parameter Type:**	Selection
Parameter Number:	2341	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
1	Fault	The drive issues a fault and stops.
2	Automatically derate	The drive continues operation with derated performance.

This parameter selects a response to the reaction of the drive for Inverter Thermal Overload protection. Inverter thermal overload is detected when the drive operates for a long period at a specified output current level. Specific current levels and trip times depend on the power unit type and rating. Following are the descriptions for the selections available for the parameter:

Table 25: Selection Descriptions

Selection Name	Selection Description
Trip	The drive issues a fault and stops modulation.
Automatically derate	The drive derates the rectifier current (DC-link current) to mitigate the cause of rectifier thermal overload. When the drive exits from the overload operation window, derating is stopped.

P 2.3.1.7 Ground Fault 0 Response

Select a response if a high-impedance ground fault occurs.

Default Value:	9 (Fault, ramp to coast)	**Parameter Type:**	Selection

Parameter Number:	2347	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	No response	The event is ignored.
9	Fault, ramp to coast	Issues a fault, ramps down, and coast.

6.4.4.2 Overvoltage Protection (Menu Index 2.3.2)

P 2.3.2.1 Overvoltage Control

Enables the DC-link overvoltage controller. It is recommended to disable the overvoltage controller if brake is enabled, or the unit is supplied with a regulated DC.

Default Value:	1 (Enabled)	**Parameter Type:**	Selection
Parameter Number:	1802	**Unit:**	–
Data Type:	BOOL	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Disabled	Disables the function.
1	Enabled	Enables the function.

Table 26: Selection Descriptions

Selection name	Selection description
Disable	• The overvoltage controller does not affect motor speed in any manner. • DC-link voltage is controlled with a brake chopper. NOTE: A DC-link overvoltage fault is usually triggered when the DC-link voltage exceeds acceptable levels.
Enable	When the DC-link voltage level exceeds the overvoltage level, motor speed or deceleration is limited by the controller.

P 2.3.2.2 Overvoltage Control Kp

Set the scaling of the overvoltage control proportional gain.

Default Value:	100	**Parameter Type:**	Range (0 — 10000)
Parameter Number:	1803	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read/Write

P 2.3.2.3 Overvoltage Control Ti

Set the scaling of the overvoltage control integral time.

Default Value:	100	**Parameter Type:**	Range (0 — 10000)

Parameter Number:	1804	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read/Write

P 2.3.2.4 Overvoltage Control Td

Set the scaling of the overvoltage control derivation time.

Default Value:	100	**Parameter Type:**	Range (0 — 10000)
Parameter Number:	1805	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read/Write

P 2.3.2.5 Overvoltage Control Upper limit

Set the upper limit for the overvoltage control. However, the voltage can be limited due to internal derating.

Default Value:	796.5	**Parameter Type:**	Range (* — *)
Parameter Number:	1816	**Unit:**	V
Data Type:	REAL	**Access Type:**	Read/Write

6.4.4.3 Power Loss (Menu Index 2.3.3)

P 2.3.3.3 Power Loss Response

Select the response to an insufficient supply voltage.

Default Value:	1 (Undervoltage control)	**Parameter Type:**	Selection
Parameter Number:	1818	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Conditional Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	None	The function is disabled.
1	Undervoltage control	Drive utilizes the kinetic energy in the system to maintain operation as long as possible.
2	Controlled ramp down	Drive utilizes the kinetic energy in the system to perform a controlled ramp down.
3	Coast	Drive coasts the motor.

This parameter sets the reaction of the drive when the drive has insufficient supply voltage (DC-link voltage). Insufficient voltage is detected when the actual voltage falls below the undervoltage limit.

Table 27: Selection Descriptions

Selection name	Selection description
None	During a power loss scenario, the drive takes no action. The undervoltage controlled is disabled.
Undervoltage control	• When the voltage falls below the undervoltage level, the undervoltage controller is activated. • The controller decelerates the motor speed to regenerate energy to DC-link. • Use this selection for system module drives.

Table 27: Selection Descriptions - (continued)

Selection name	Selection description
Controlled Ramp Down	When the voltage falls below the undervoltage level, the drive stops by ramping the motor speed to zero before stopping modulation.
Coast	When the voltage falls below the undervoltage level, the drive immediately stops modulating.

P 2.3.3.4 Power Recovery Response

Select the action to take when supply voltage returns after a power loss.

Default Value:	0 (Ramp to reference)	**Parameter Type:**	Selection
Parameter Number:	1819	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Conditional Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Ramp to reference	Drive ramps to reference.
1	Ramp fast to reference	Drive ramps as fast as possible to reference.
2	Ramp to zero	Drive ramps down and coasts.

Sets the reaction of the drive when the supply voltage (DC-link voltage) returns after a power loss event. The reaction occurs when the actual voltage returns and exceeds the undervoltage limit.

Table 28: Selection Descriptions

Selection name	Selection description
Ramp to Reference	This is the recommended selection for a system drive. The drive ramps from the actual speed to the reference.
Ramp Fast to Reference	The drive bypasses ramping and operates directly with the reference. NOTE: This selection is only available with the flux motor control principle.

P 2.3.3.5 Undervoltage Control Kp

Set the scaling of the undervoltage control proportional gain.

Default Value:	100	**Parameter Type:**	Range (0.001 — 10000)
Parameter Number:	1806	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read/Write

P 2.3.3.6 Undervoltage Control Ti

Set the scaling of the undervoltage control integral time.

Default Value:	100	**Parameter Type:**	Range (0 — 10000)
Parameter Number:	1807	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read/Write

P 2.3.3.7 Undervoltage Control Td

Set the scaling of the undervoltage control derivation time.

Default Value:	100	**Parameter Type:**	Range (0 — 10000)
Parameter Number:	1808	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read/Write

P 2.3.3.8 Undervoltage Control Activation Level

Set the level at which undervoltage control is activated.

Default Value:	100	**Parameter Type:**	Range (* — *)
Parameter Number:	1817	**Unit:**	V
Data Type:	REAL	**Access Type:**	Read/Write

P 2.3.3.12 Deceleration Time Power Loss

Set the deceleration time from nominal speed to 0 when in power-loss mode.

Default Value:	0.5	**Parameter Type:**	Range (0.02 — 10000)
Parameter Number:	1139	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

6.4.5 Modulation (Menu Index 2.4)

P 2.4.1 Max. Switching Frequency

Set the maximum switching frequency.

Default Value:	16.00	**Parameter Type:**	Range (* — *)
Parameter Number:	2924	**Unit:**	kHz
Data Type:	REAL	**Access Type:**	Read/Write

P 2.4.2 Min. Switching Frequency

Set the minimum switching frequency.

Default Value:	1.00	**Parameter Type:**	Range (* — *)
Parameter Number:	2925	**Unit:**	kHz
Data Type:	REAL	**Access Type:**	Read/Write

P 2.4.3 Switching Frequency

Set the switching frequency.

Default Value:	1.00	**Parameter Type:**	Range (* — *)
Parameter Number:	2920	**Unit:**	kHz
Data Type:	REAL	**Access Type:**	Read/Write

P 2.4.4 Control Frequency Request

Set the requested control frequency. A constant control frequency is enabled by setting this value. If set to 0.0, constant control frequency is disabled.

Default Value:	–	**Parameter Type:**	Range (0.00 — *)
Parameter Number:	2921	**Unit:**	kHz
Data Type:	REAL	**Access Type:**	Read/Conditional Write

P 2.4.6 Overmodulation

Enables the modulation index to exceed 1.0.

Default Value:	1 (Enabled)	**Parameter Type:**	Selection
Parameter Number:	5094	**Unit:**	–
Data Type:	BOOL	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Disabled	Disables the function.
1	Enabled	Enables the function.

6.5 Filters (Menu Index 3)

6.5.1 Filters Overview

This parameter group contains parameters for configuring, monitoring, and controlling the input filters and output filters.

6.5.2 Filters & Brake Chopper Status (Menu Index 3.1)

P 3.1.1 Brake Power

Shows the power dissipated in the brake resistor.

Default Value:	NA	**Parameter Type:**	Range (0.00 — *)
Parameter Number:	2933	**Unit:**	kW
Data Type:	REAL	**Access Type:**	Read Only

P 3.1.2 Average Brake Power

Shows the average power dissipated in the brake resistor, calculated over 120 s.

Default Value:	NA	**Parameter Type:**	Range (0.00 — *)
Parameter Number:	2934	**Unit:**	kW
Data Type:	REAL	**Access Type:**	Read Only

P 3.1.3 AHF Capacitor Connected

Shows if the advanced harmonic filter (AHF) capacitor is connected.

Default Value:	NA	**Parameter Type:**	Selection
Parameter Number:	5410	**Unit:**	–
Data Type:	BOOL	**Access Type:**	Read Only

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	False	Fixed value - False.
1	True	Fixed value - True.

6.5.3 Advanced Harmonic Filter (Menu Index 3.4)

P 3.4.1 Advanced Harmonic Filter

Select if the Advanced Harmonic Filter is connected to the drive.

Default Value:	False	**Parameter Type:**	Selection
Parameter Number:	3410	**Unit:**	–
Data Type:	BOOL	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Disabled	Disables the function.
1	Enabled	Enables the function.

P 3.4.2 Capacitor Disconnect Output

Select the output terminal for disconnecting the capacitor.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	3412	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 3.4.3 Thermal Switch Response

Select which function is activated if the thermal input indicates too high a temperature.

Default Value:	1 (Fault, ramp to coast)	**Parameter Type:**	Selection
Parameter Number:	3413	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
1	Fault, ramp to coast	Issues a fault, ramps down, and coast.
2	Derate	The drive issues a fault, continues operation, and derates to protect the filter.

P 3.4.4 Thermal Switch Input

Select the digital input terminal for the thermal switch.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	3414	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 3.4.5 Power Stabilizer Gain

Set the controller gain for power stabilization. The power stabilizer dampens possible resonance with the grid. If set to -1 the value is selected automatically, if set to 0 the controller is disabled.

Default Value:	-1	**Parameter Type:**	Range (-1 — 500)
Parameter Number:	3415	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read/Write

P 3.4.6 Power Stabilizer Bandwidth

Set the controller bandwidth for power stabilization.

Default Value:	100	**Parameter Type:**	Range (1 — 10000)
Parameter Number:	3416	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read/Write

6.5.4 Output Filter (Menu Index 3.5)

P 3.5.1 Output Filter Type

Select the output filter type.

Default Value:	0 (None)	**Parameter Type:**	Selection
Parameter Number:	5501	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Conditional Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	None	No output filter connected.
1	Sine-wave Filter	When using a sine-wave filter, the maximum output current of the drive might be reduced to protect the filter and drive. Check and correct the values for filter capacitance and inductance.

P 3.5.2 Filter Capacitance

Set the capacitance of the output filter.

Default Value:	*	**Parameter Type:**	Range (0.00 — 1000000.00)
Parameter Number:	5502	**Unit:**	µF
Data Type:	REAL	**Access Type:**	Read/Conditional Write

Set the Cy (capacitance) value of the output filter. See the filter product label for the capacitance value. The value is the equivalent star-connected capacitance of the filter. When the filters are installed in parallel, enter the combined capacitance value of the paralleled filter. The value is the equivalent star-connected capacitance (Cy) of the filter multiplied by the number of installed paralleled filters.

P 3.5.3 Filter Inductance

Set the inductance of the output filter.

Default Value:	*	**Parameter Type:**	Range (0.00 — 1000.00)

Parameter Number:	5503	**Unit:**	mH
Data Type:	REAL	**Access Type:**	Read/Conditional Write

Set the inductance of the output filter. See the product label of the filter for the value of inductance. When filters are installed in parallel, enter the combined inductance value of the installed paralleled filters. The inductance value in the parameter is the inductance value of the filter divided by the number of paralleled filters.

P 3.5.4 Filter Series Resistance

Set the equivalent resistance for the inductance of the output filter as per filter nameplate.

Default Value:	*	**Parameter Type:**	Range (0 — 1000000)
Parameter Number:	5499	**Unit:**	Ω
Data Type:	REAL	**Access Type:**	Read/Conditional Write

6.6 Motor (Menu Index 4)

6.6.1 Motor Overview

This parameter group contains parameters for configuring the motor, motor control, and motor protection.

6.6.2 Motor Status (Menu Index 4.1)

P 4.1.1 Motor Current

Shows the actual motor current.

Default Value:	NA	**Parameter Type:**	Range (0 — *)
Parameter Number:	9000	**Unit:**	A
Data Type:	REAL	**Access Type:**	Read Only

P 4.1.2 Relative Motor Current

Shows the actual motor current in % of the nominal motor current.

Default Value:	NA	**Parameter Type:**	Range (0 — 200)
Parameter Number:	9001	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read Only

P 4.1.3 U-phase RMS Current

Shows the U-phase RMS current.

Default Value:	NA	**Parameter Type:**	Range (0 — *)
Parameter Number:	9020	**Unit:**	A
Data Type:	REAL	**Access Type:**	Read Only

P 4.1.4 V-phase RMS Current

Shows the V-phase RMS current.

Default Value:	NA	**Parameter Type:**	Range (0 — *)
Parameter Number:	9021	**Unit:**	A

Data Type:	REAL	**Access Type:**	Read Only

P 4.1.5 W-phase RMS Current

Shows the W-phase RMS current.

Default Value:	NA	**Parameter Type:**	Range (0 — *)
Parameter Number:	9022	**Unit:**	A
Data Type:	REAL	**Access Type:**	Read Only

P 4.1.6 Motor Voltage

Shows the actual motor voltage.

Default Value:	NA	**Parameter Type:**	Range (0 — *)
Parameter Number:	9005	**Unit:**	V
Data Type:	REAL	**Access Type:**	Read Only

P 4.1.7 Relative Motor Voltage

Shows the actual motor voltage in % of the nominal motor voltage.

Default Value:	NA	**Parameter Type:**	Range (0 — 200)
Parameter Number:	9006	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read Only

P 4.1.11 Motor Torque

Shows the actual motor torque.

Default Value:	NA	**Parameter Type:**	Range (-10000000 — 10000000)
Parameter Number:	9009	**Unit:**	Nm
Data Type:	REAL	**Access Type:**	Read Only

P 4.1.12 Relative Motor Torque

Shows the motor torque in % of the nominal motor torque.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	1708	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read Only

P 4.1.13 Motor Shaft Power

Shows the actual power at the motor shaft.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	9008	**Unit:**	kW
Data Type:	REAL	**Access Type:**	Read Only

P 4.1.14 Relative Motor Shaft Power

Shows the actual motor shaft power in % of the nominal motor shaft power.

Default Value:	NA	**Parameter Type:**	Range (-300 — 300)
Parameter Number:	1707	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read Only

P 4.1.15 Motor Electrical Power

Shows the actual motor power.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	9043	**Unit:**	kW
Data Type:	REAL	**Access Type:**	Read Only

P 4.1.16 Motor Thermal Load (ETR)

Shows the estimated thermal load of the motor calculated by the ETR function.

Default Value:	NA	**Parameter Type:**	Range (0 — 100)
Parameter Number:	2951	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read Only

P 4.1.17 Motor Current Output

Select an output for the motor current signal. The scale of the signal is 0–100% of the nominal current.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	2302	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 4.1.18 Motor Voltage Output

Select an output for the motor voltage signal. The scale of the signal is 0–100% of the nominal voltage.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	2303	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 4.1.19 Absolute Motor Torque Output

Select an output for the motor torque signal. The scale of the signal is 0–100% of the absolute value of the nominal torque.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	2306	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 4.1.20 Extended Motor Torque Output

Select an output for the motor torque signal. The scale of the signal is -200...200% of the nominal torque.

Default Value:	–	**Parameter Type:**	Selection

Parameter Number:	2310	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 4.1.21 Absolute Motor Speed Output

Select an output for the motor speed signal. The scale of the signal is 0–100% of the absolute value of the nominal speed.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	2301	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 4.1.22 Extended Motor Speed Output

Select an output for the motor speed signal. The scale of the signal is -200...200% of the nominal speed.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	2309	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 4.1.23 Motor Power Output

Select an output for the motor power signal. The scale of the signal is 0–100% of the nominal power.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	2305	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 4.1.24 AMA Progress

Shows the progress of the Automatic Motor Adaptation (AMA).

Default Value:	NA	**Parameter Type:**	Range (0 — 100)
Parameter Number:	429	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read Only

P 4.1.25 Motor Shaft Power Filtered

Shows the filtered power at the motor shaft with a filter time of 1 second.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	9042	**Unit:**	kW
Data Type:	REAL	**Access Type:**	Read Only

P 4.1.26 Motor Temperature

Shows the actual temperature of the motor.

Default Value:	NA	**Parameter Type:**	Range (-300 — 300)
Parameter Number:	1630	**Unit:**	°C
Data Type:	REAL	**Access Type:**	Read Only

6.6.3 Motor Data (Menu Index 4.2)

6.6.3.1 General Settings (Menu Index 4.2.1)

P 4.2.1.1 Motor Type

Select the motor type.

Default Value:	0 (Induction Motor)	**Parameter Type:**	Selection
Parameter Number:	407	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Conditional Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Induction Motor	Asynchronous Induction Motor.
1	Permanent Magnet Motor	Permanent Magnet Synchronous Motor.

P 4.2.1.2 Number of Pole Pairs

Set the number of pole pairs. For example, a 4-pole motor is set as 2 pole pairs.

Default Value:	2	**Parameter Type:**	Range (0 — 65535)
Parameter Number:	406	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Conditional Write

The synchronous speed of a motor can be calculated when the supply frequency and number of pole pairs are known. The formula to calculate the synchronous speed of the motor (ns) with supply frequency (f) and number of pole pairs (p) is as follows:

$$ns = \frac{60 \times f}{p} \text{ [RPM]}$$

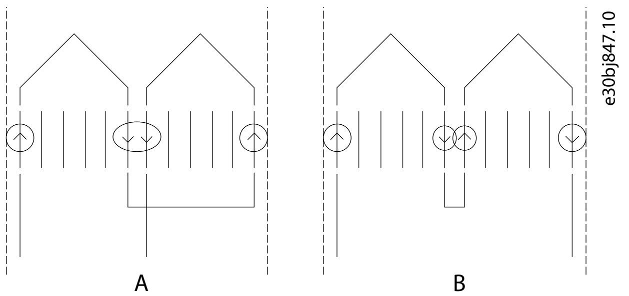


Figure 62: Two Inductors in 1 Phase Connected in Series to A) 2 Poles B) 4 Poles

While the frequency is determined by the grid or the AC drive, the number of poles is determined by the way the stator inductors are connected. Pole pairs (p) or pole number and synchronous motor speed lists the number of poles corresponding to synchronous speed (n0) at 50 Hz and 60 Hz supply.

Table 29: Number of Pole Pairs (p) and Nominal Speed (~nn) for Motors @ 50 Hz and 60 Hz

Number of pole pairs (p)	~nn @ 50 Hz	~nn @ 60 Hz
1	2700–2880	3250–3460
2	1350–1450	1625–1730
3	700–960	840–1153

Table 30: Pole Pairs (p) or Pole Number and Synchronous Motor Speed

Number of pole pairs (p)	1	2	3	4	6
Number of poles	2	4	6	8	12
50 Hz supply	3000	1500	1000	750	500
60 Hz supply	3600	1800	1200	900	600

The dependency of the motor's synchronous speed ns in RPM of the frequency f of the power supply in Hz (parameter ***1.1.1 Grid Frequency***) and the number of pole pairs in parameter ***4.2.1.2 Number of Pole Pairs*** is provided by the earlier formula.

For example, for a motor with 2 pole pairs (4 poles) and a frequency of the power supply of 50 Hz, the synchronous speed of the motor is:

$$ns = \frac{60 \times f}{p} \text{ [RPM]} = 1500 \text{ RPM}$$

P 4.2.1.3 AMA Mode

Select the Automatic Motor Adaptation (AMA) mode. If motor type was set to induction motor, the results of the measurement can be seen in the menu Induction Motor. If motor type was set to either permanent magnet motor or synchronous reluctance motor, the result can be seen in the menu Synchronous Motor.

Default Value:	0 (Off)	**Parameter Type:**	Selection
Parameter Number:	420	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Conditional Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Off	AMA is disabled for normal operation.
3	Motor Data	The next start command initiates measurement of the motor data.
4	Reduced Motor Data (Rs)	The next start command initiates a measurement of the motor stator resistance - Rs. This method also works if a sine-wave filter is connected between motor and drive.

Automatic Motor Adaptation (AMA) is an automated test procedure providing an optimization of the motor parameters for improved shaft performance. The measurement is performed based on the motor product label data in parameter group ***4.2.2 Motor Nameplate Data***. The motor-type-specific parameters in parameter group ***4.2.3 Induction Motor*** or parameter group ***4.2.4 Permanent Magnet Motor*** are recalculated and used to fine-tune the motor control algorithm. Running the AMA procedure also maximizes the automatic energy optimization (AEO) feature of the drive. AMA also allows the automatic detection of the motor type based on the product label data.

- The AMA must be run on a cold motor. Running the AMA multiple times also increases the motor temperature.
- The AMA must be conducted with the motor at standstill.
- Avoid generating external torque during AMA.
- The AMA cannot run with a sine-wave filter connected.
- Uncoupling the load from the motor is not needed.
- The duration of the AMA depends on the power rating of the motor.
- Changing the product label data in parameter group ***4.2.2 Motor Nameplate Data*** also modifies the data in the parameter group ***4.2.3 Induction Motor*** or ***4.2.4 Permanent Magnet Motor***.

NOTE: The parameter automatically switches back to Off after the AMA has been performed.

P 4.2.1.5 Motor Cable Length

Set the motor cable length.

Default Value:	100	**Parameter Type:**	Range (0 — 10000)
Parameter Number:	425	**Unit:**	m
Data Type:	REAL	**Access Type:**	Read/Conditional Write

In some products, depending on the EMC configuration, this parameter may adjust the allowable switching frequency automatically to achieve optimum performance of the drive system.

Depending on whether metric or imperial units are in use, give the value for the parameter in either meters (m) or feet (ft). The value range is different with the different units.

P 4.2.1.6 Output Phase Sequence

Set the output phase sequence. This function virtually swaps the output phases, which can be used to change the direction of motor rotation without having to physically rewire motor cables.

Default Value:	0 (UVW)	**Parameter Type:**	Selection
Parameter Number:	431	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Conditional Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	UVW	Select the normal phase sequence.
1	WVU	Select the reverse phase sequence.

P 4.2.1.7 Motor Rotation Check

Set this parameter to initiate a visual inspection process of the rotation direction of the motor. The process is guided. It will rotate the motor at 5 Hz.

Default Value:	0 (Off)	**Parameter Type:**	Selection
Parameter Number:	7050	**Unit:**	–
Data Type:	BOOL	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Off	The feature is disabled.
1	On	

6.6.3.2 Motor Nameplate Data (Menu Index 4.2.2)

These parameters allow the setting of motor nameplate data.

Often, permanent magnet motors have torque but not power given on the motor nameplate. For those motors, set the speed and torque product label settings, then the system calculates the power value. The system also calculates the torque value for asynchronous motors, when the power and speed values are set.

When a higher priority parameter is set, the value of the lower priority parameter is calculated by the system. The parameters have the following priority order:

1. Nominal Power
2. Nominal Speed
3. Nominal Torque

To calculate the nominal torque of the motor, first set nominal power and then nominal speed.

To calculate nominal power of the motor, first set nominal speed and then nominal torque.

P 4.2.2.1 Nominal Power

Set the nominal motor shaft power.

Default Value:	5.50	**Parameter Type:**	Range (* — *)
Parameter Number:	405	**Unit:**	kW
Data Type:	REAL	**Access Type:**	Read/Conditional Write

P 4.2.2.2 Nominal Current

Set the nominal motor current.

Default Value:	11.5	**Parameter Type:**	Range (* — *)
Parameter Number:	400	**Unit:**	A
Data Type:	REAL	**Access Type:**	Read/Conditional Write

P 4.2.2.3 Nominal Speed

Set the nominal motor shaft speed.

Default Value:	1450	**Parameter Type:**	Range (0 — 100000)
Parameter Number:	402	**Unit:**	rpm
Data Type:	REAL	**Access Type:**	Read/Conditional Write

P 4.2.2.4 Nominal Frequency

Set the nominal motor frequency.

Default Value:	50	**Parameter Type:**	Range (0 — 2000)
Parameter Number:	403	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Conditional Write

P 4.2.2.5 Nominal Voltage

Set the nominal motor voltage.

Default Value:	400	**Parameter Type:**	Range (* — *)
Parameter Number:	401	**Unit:**	V
Data Type:	REAL	**Access Type:**	Read/Conditional Write

P 4.2.2.6 Nominal Torque

Set the nominal torque from the nameplate of the motor.

Default Value:	52521.13	**Parameter Type:**	Range (* — *)
Parameter Number:	9951	**Unit:**	NomTorqueSI
Data Type:	REAL	**Access Type:**	Read/Conditional Write

6.6.3.3 Induction Motor (Menu Index 4.2.3)

P 4.2.3.1 Stator Resistance Rs

Set the motor stator resistance. Overwritten by AMA.

Default Value:	1.21	**Parameter Type:**	Range (0 — 1000000)
Parameter Number:	408	**Unit:**	Ω
Data Type:	REAL	**Access Type:**	Read/Conditional Write

P 4.2.3.2 Rotor Resistance Rr

Set the motor rotor resistance. Overwritten by AMA.

Default Value:	0.79	**Parameter Type:**	Range (0 — 1000000)
Parameter Number:	409	**Unit:**	Ω
Data Type:	REAL	**Access Type:**	Read/Conditional Write

Use any of the following methods for setting Rr:

- Run an AMA on a cold motor. The drive measures the value from the motor. All compensations are reset to 100%.
- Enter the Rr value manually. Obtain the value from the motor supplier.
- Use the Rr default setting. The drive establishes the setting based on the motor nameplate data.

P 4.2.3.3 Iron Loss Resistance Rfe

Set the motor iron-loss equivalent resistance.

Default Value:	874	**Parameter Type:**	Range (0 — 11000000000)
Parameter Number:	413	**Unit:**	Ω
Data Type:	REAL	**Access Type:**	Read/Conditional Write

The RFe value cannot be found by performing an AMA. The RFe value is especially important in torque control applications. If RFe is unknown, make sure to keep the default setting of the parameter.

P 4.2.3.4 Stator Leakage Reactance Xls

Set the motor stator leakage reactance. Overwritten by AMA.

Default Value:	0.03	**Parameter Type:**	Range (0.00 — 62.83)
Parameter Number:	440	**Unit:**	Ω
Data Type:	REAL	**Access Type:**	Read/Conditional Write

Use any of the following methods for setting Xls:

- Run an AMA on a cold motor. The drive measures the value from the motor.
- Enter the Xls value manually. Obtain the value from the motor supplier.
- Use the Xls default setting. The drive establishes the setting based on the motor nameplate data.

P 4.2.3.5 Rotor Leakage Reactance Xlr

Set the motor rotor leakage reactance. Overwritten by AMA.

Default Value:	0.03	**Parameter Type:**	Range (0.00 — 62.83)
Parameter Number:	441	**Unit:**	Ω
Data Type:	REAL	**Access Type:**	Read/Conditional Write

Use any of the following methods to set Xlr:

- Run an AMA on a cold motor. The drive measures the value from the motor.
- Enter the Xlr value manually. Obtain the value from the motor supplier.
- Use the Xlr default setting. The drive establishes the setting based on the motor nameplate data.

P 4.2.3.6 Magnetizing Reactance Xm

Set the motor magnetizing reactance. Overwritten by AMA.

Default Value:	0.94	**Parameter Type:**	Range (0.00 — 62.83)
Parameter Number:	442	**Unit:**	Ω
Data Type:	REAL	**Access Type:**	Read/Conditional Write

6.6.3.4 Synchronous Motor (Menu Index 4.2.4)

P 4.2.4.1 Back EMF

Set the stator nominal induced voltage (back-EMF voltage) when running at 1000 RPM (line-to-line RMS). Overwritten by AMA.

Default Value:	190	**Parameter Type:**	Range (0 — 10000)
Parameter Number:	415	**Unit:**	V
Data Type:	REAL	**Access Type:**	Read/Conditional Write

P 4.2.4.2 Stator Resistance Rs

Set the motor stator resistance. Overwritten by AMA.

Default Value:	1.21	**Parameter Type:**	Range (0 — 1000000)
Parameter Number:	408	**Unit:**	Ω
Data Type:	REAL	**Access Type:**	Read/Conditional Write

P 4.2.4.3 d-axis Inductance Ld

Set the motor non-saturated d-axis inductance. Overwritten by AMA.

Default Value:	23.00	**Parameter Type:**	Range (0.00 — 1000.00)
Parameter Number:	417	**Unit:**	mH
Data Type:	REAL	**Access Type:**	Read/Conditional Write

P 4.2.4.4 d-axis Inductance Ld-Sat

Set the motor saturated d-axis inductance. Overwritten by AMA.

Default Value:	23.00	**Parameter Type:**	Range (0.00 — 1000.00)
Parameter Number:	418	**Unit:**	mH
Data Type:	REAL	**Access Type:**	Read/Conditional Write

P 4.2.4.5 Ld Saturation Point

Set the point (in % of nominal motor current) at which the Ld inductance saturates (average of non-saturated and saturated). Overwritten by AMA.

Default Value:	100	**Parameter Type:**	Range (0 — 300)
Parameter Number:	426	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read/Conditional Write

P 4.2.4.6 q-axis Inductance Lq

Set the motor non-saturated q-axis inductance. Overwritten by AMA.

Default Value:	85.00	**Parameter Type:**	Range (0.00 — 1000.00)
Parameter Number:	427	**Unit:**	mH
Data Type:	REAL	**Access Type:**	Read/Conditional Write

P 4.2.4.7 q-axis Inductance Lq-Sat

Set the motor saturated q-axis inductance. Overwritten by AMA.

Default Value:	85.00	**Parameter Type:**	Range (0.00 — 1000.00)
Parameter Number:	422	**Unit:**	mH
Data Type:	REAL	**Access Type:**	Read/Conditional Write

P 4.2.4.8 Lq Saturation Point

Set the point (in % of nominal motor current) at which the Lq inductance saturates (average of non-saturated and saturated). Overwritten by AMA.

Default Value:	100	**Parameter Type:**	Range (0 — 300)
Parameter Number:	424	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read/Conditional Write

6.6.4 Motor Control (Menu Index 4.3)

6.6.4.1 General Settings (Menu Index 4.3.1)

P 4.3.1.1 Motor Control Principle

Select the motor control principle.

Default Value:	1 (VVC+ Control)	**Parameter Type:**	Selection
Parameter Number:	2503	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Conditional Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	U/f Control	Selects U/f control as motor control.
1	VVC+ Control	Selects Voltage Vector Control (VVC+) as motor control.

P 4.3.1.2 Breakaway Current Boost

Enables the breakaway current boost, which temporarily allows a higher starting current.

Default Value:	False	**Parameter Type:**	Selection
Parameter Number:	2930	**Unit:**	–
Data Type:	BOOL	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Disabled	Disables the function.
1	Enabled	Enables the function.

6.6.4.2 U/f Settings (Menu Index 4.3.2)

The parameters are used to set the U/f motor control curve manually. Make sure that the parameter ***Motor Control Principle*** is set to ***U/f***.

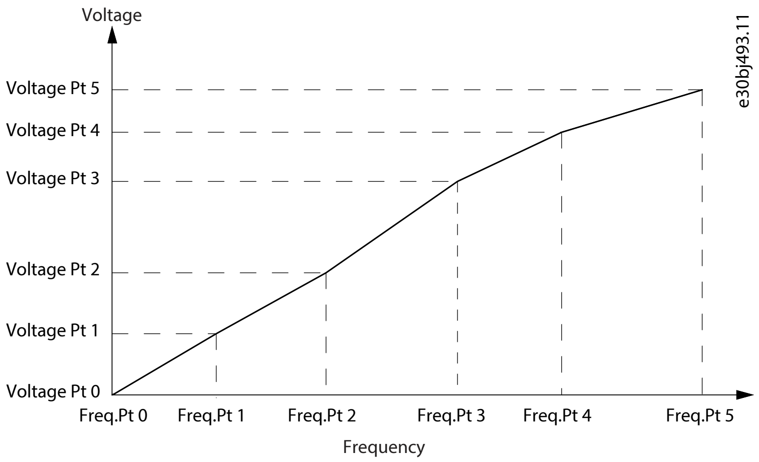


Figure 63: U/f Settings

P 4.3.2.1 Voltage Point 0

Set the U/f curve voltage point 0.

Default Value:	8	**Parameter Type:**	Range (0 — *)
Parameter Number:	2600	**Unit:**	V
Data Type:	REAL	**Access Type:**	Read/Write

P 4.3.2.2 Voltage Point 1

Set the U/f curve voltage point 1.

Default Value:	80	**Parameter Type:**	Range (0 — *)
Parameter Number:	2601	**Unit:**	V
Data Type:	REAL	**Access Type:**	Read/Write

P 4.3.2.3 Voltage Point 2

Set the U/f curve voltage point 2.

Default Value:	160	**Parameter Type:**	Range (0 — *)

Parameter Number:	2602	**Unit:**	V
Data Type:	REAL	**Access Type:**	Read/Write

P 4.3.2.4 Voltage Point 3

Set the U/f curve voltage point 3.

Default Value:	240	**Parameter Type:**	Range (0 — *)
Parameter Number:	2603	**Unit:**	V
Data Type:	REAL	**Access Type:**	Read/Write

P 4.3.2.5 Voltage Point 4

Set the U/f curve voltage point 4.

Default Value:	320	**Parameter Type:**	Range (0 — *)
Parameter Number:	2604	**Unit:**	V
Data Type:	REAL	**Access Type:**	Read/Write

P 4.3.2.6 Voltage Point 5

Set the U/f curve voltage point 5.

Default Value:	400	**Parameter Type:**	Range (0 — *)
Parameter Number:	2605	**Unit:**	V
Data Type:	REAL	**Access Type:**	Read/Write

P 4.3.2.7 Frequency Point 0

Set the U/f curve frequency point 0.

Default Value:	–	**Parameter Type:**	Range (0 — 2000)
Parameter Number:	2610	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 4.3.2.8 Frequency Point 1

Set the U/f curve frequency point 1.

Default Value:	10	**Parameter Type:**	Range (0 — 2000)
Parameter Number:	2611	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 4.3.2.9 Frequency Point 2

Set the U/f curve frequency point 2.

Default Value:	20	**Parameter Type:**	Range (0 — 2000)
Parameter Number:	2612	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 4.3.2.10 Frequency Point 3

Set the U/f curve frequency point 3.

Default Value:	30	**Parameter Type:**	Range (0 — 2000)
Parameter Number:	2613	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 4.3.2.11 Frequency Point 4

Set the U/f curve frequency point 4.

Default Value:	40	**Parameter Type:**	Range (0 — 2000)
Parameter Number:	2614	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 4.3.2.12 Frequency Point 5

Set the U/f curve frequency point 5.

Default Value:	50	**Parameter Type:**	Range (0 — 2000)
Parameter Number:	2615	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

6.6.4.3 VVC+ & U/f Settings (Menu Index 4.3.4)

P 4.3.4.1 Slip Compensation

Set the slip compensation in % of nominal motor slip.

Default Value:	0	**Parameter Type:**	Range (0 — 1000)
Parameter Number:	2804	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read/Write

P 4.3.4.2 Slip Compensation Tc

Set the slip compensation time constant.

Default Value:	50.00	**Parameter Type:**	Range (0.00 — 100000.00)
Parameter Number:	2805	**Unit:**	ms
Data Type:	REAL	**Access Type:**	Read/Write

P 4.3.4.3 High-speed Load Comp.

Set the high-speed load compensation in % of the motor voltage drop.

Default Value:	100	**Parameter Type:**	Range (0 — 1000)
Parameter Number:	2803	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read/Write

The parameters ***4.3.4.3 High-speed Load Comp.*** and ***4.3.4.4 Low Speed Load Comp.*** are used to set the % value to compensate voltage in relation to load when the motor is running at high/low speed, and obtain the optimum U/f characteristics. The motor size determines the frequency range within which the parameters are active, as shown in the illustration.

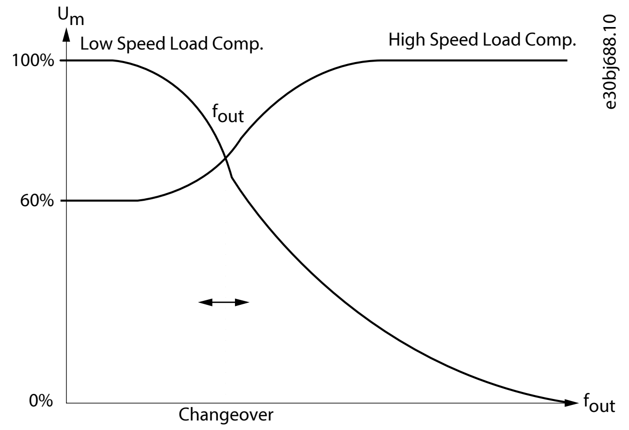


Figure 64: Changeover from Low Speed Load Compensation to High Speed Load Compensation

P 4.3.4.4 Low-speed Load Comp.

Set the low-speed load compensation in % of the motor voltage drop.

Default Value:	100	**Parameter Type:**	Range (0 — 1000)
Parameter Number:	2802	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read/Write

P 4.3.4.5 Res. Damp. Gain

Set the resonance damping gain in % of nominal slip for induction motors, and 0.1 times the nominal frequency for permanent magnet motors.

Default Value:	100	**Parameter Type:**	Range (0 — 50000)
Parameter Number:	2806	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read/Write

P 4.3.4.6 Res. Damp. High Pass Tc

Set the resonance damping high-pass time constant.

Default Value:	50.00	**Parameter Type:**	Range (0.00 — 100000.00)
Parameter Number:	2807	**Unit:**	ms
Data Type:	REAL	**Access Type:**	Read/Write

P 4.3.4.7 Res. Damp Low Pass Tc

Set the resonance damping low-pass time constant.

Default Value:	1.00	**Parameter Type:**	Range (0.00 — 100000.00)
Parameter Number:	2808	**Unit:**	ms
Data Type:	REAL	**Access Type:**	Read/Write

P 4.3.4.9 Res. Damp. High Pass Tc (SM)

Set time constant of resonance damping for VVC+ control of synchronous motors (SM).

Default Value:	–	**Parameter Type:**	Range (0 — 1)
Parameter Number:	2819	**Unit:**	s

Data Type:	REAL	**Access Type:**	Read/Write

P 4.3.4.10 Motor Model Tc (SM)

Set the time constant of the internal model used for VVC+ control of synchronous motors (SM). A lower value improves the dynamic control performance. A higher value improves the noise reduction.

Default Value:	–	**Parameter Type:**	Range (0 — 1)
Parameter Number:	2820	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

P 4.3.4.11 Low Speed Minimum Current

Set the low-speed minimum current reference in % of nominal motor current.

Default Value:	50	**Parameter Type:**	Range (0 — 100)
Parameter Number:	2837	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read/Write

P 4.3.4.12 Nominal Magnetization Speed

Set the minimum speed for nominal motor magnetization. Used by constant torque (CT).

Default Value:	0.5	**Parameter Type:**	Range (0 — 1000)
Parameter Number:	2844	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 4.3.4.13 Zero Speed Magnetization

Set the % of motor magnetization at 0 speed used by constant torque (CT). The selection of a low value reduces energy loss in the motor, but also reduces load capacity.

Default Value:	100	**Parameter Type:**	Range (0 — 1000)
Parameter Number:	2845	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read/Write

P 4.3.4.14 Current Limiter Kp

Set the proportional gain of the current limit controller.

Default Value:	100	**Parameter Type:**	Range (0 — 500)
Parameter Number:	3193	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read/Write

P 4.3.4.15 Current Limiter Ti

Set the integration time of the current limit controller. The value is scaled to % of the nominal setting.

Default Value:	100	**Parameter Type:**	Range (0 — 500)
Parameter Number:	3194	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read/Write

6.6.5 Protection (Menu Index 4.5)

P 4.5.1 Missing Phase Start-up Detection

Enables detection of missing motor phase at start-up.

Default Value:	0 (Disabled)	**Parameter Type:**	Selection
Parameter Number:	6070	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Disabled	Disables the function.
1	Enabled	Enables the function.

P 4.5.2 Missing Motor Phase Response

Select the response to a missing motor phase.

Default Value:	1 (Fault)	**Parameter Type:**	Selection
Parameter Number:	2348	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	No response	The event is ignored.
2	Warning	The drive issues a warning.
1	Fault	The drive issues a fault and coasts the motor.

P 4.5.3 Disconnected Motor Response

Select the response to a disconnected motor.

Default Value:	0 (No response)	**Parameter Type:**	Selection
Parameter Number:	2349	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	No response	The event is ignored.
2	Warning	The drive issues a warning.
1	Fault	The drive issues a fault and coasts the motor.
3	Motor Check	The drive checks if the motor is reconnected and resumes operation.

P 4.5.4 ETR Overtemperature Response

Select the response to motor overtemperature indicated by the electronic thermal relay (ETR).

Default Value:	10 (Fault)	**Parameter Type:**	Selection
Parameter Number:	2825	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	No response	The event is ignored.
1	Info	The event is logged in the event log.
3	Warning	The drive issues a warning.
9	Fault, ramp to coast	Issues a fault, ramps down, and coast.
10	Fault	The drive issues a fault and coasts the motor.

P 4.5.5 Motor Thermistor Input

Select an input for the motor thermistor feedback.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	2839	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 4.5.6 Motor Thermistor Response

Select the response to a motor thermistor event.

Default Value:	9 (Fault, ramp to coast)	**Parameter Type:**	Selection
Parameter Number:	2846	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
3	Warning	The drive issues a warning.
9	Fault, ramp to coast	Issues a fault, ramps down, and coast.
10	Fault	The drive issues a fault and coasts the motor.

P 4.5.7 Motor Temperature Input

Select the input for the motor temperature sensor.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	2847	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 4.5.8 Motor Temperature Warning Level

Set the temperature level for issuing a warning.

Default Value:	120	**Parameter Type:**	Range (-300 — 300)
Parameter Number:	2848	**Unit:**	°C
Data Type:	REAL	**Access Type:**	Read/Write

P 4.5.9 Motor Temperature Fault Level

Set the temperature level for issuing a fault. The response is ramp down and coast.

Default Value:	150	**Parameter Type:**	Range (-300 — 300)
Parameter Number:	2919	**Unit:**	°C
Data Type:	REAL	**Access Type:**	Read/Write

P 4.5.10 Motor Sync Loss

Select the drive response if the synchronization between motor and drive is lost. This is only relevant when using a permanent magnet or synchronous reluctance motor.

Default Value:	3 (Warning)	**Parameter Type:**	Selection
Parameter Number:	2922	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Disable	Synchronization loss detection is disabled.
1	Fault	The drive issues a fault if this event happens.
3	Warning	The drive will issue a warning if this event happens.

P 4.5.11 Motor Check Retry Time

Used in combination with Motor Check as Disconnected Motor response. Sets the time for the motor check retry. If the retry check fails, a Disconnected Motor event is given. When set to zero, it keeps checking for a connected motor at regular time intervals.

Default Value:	–	**Parameter Type:**	Range (0 — 5)
Parameter Number:	2350	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

P 4.5.12 Demagnetization Protection

Set the maximum allowed motor current. At this level the drive will disable the inverter to protect the motor. This limit can be used to protect PM motors from demagnetization caused by too high peak currents. The value is given in percentage of motor nominal current. If set to 0, the function is disabled.

Default Value:	–	**Parameter Type:**	Range (0 — *)
Parameter Number:	2368	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read/Write

6.7 Application (Menu Index 5)

6.7.1 Application Overview

This parameter group contains parameters for application-specific features such as process control, speed control, torque control, mechanical brake control, and many more.

6.7.2 Application Status (Menu Index 5.1)

P 5.1.1 Motor Ctrl. Status Word

Shows the motor control status word.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	1714	**Unit:**	–
Data Type:	WORD	**Access Type:**	Read Only

Table 31: Motor Ctrl. Status Word bit descriptions

Bit	Description
0	Ready
1	Run
2	Reverse
3	Fault
4	Reserved
5	At reference
6	Zero speed
7	Protection mode active

P 5.1.2 Motor Ctrl. Ready Status Word

Shows the motor control ready status word. All status bits must be true before the drive is ready.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	1716	**Unit:**	–
Data Type:	WORD	**Access Type:**	Read Only

Table 32: Motor Ctrl. Ready Status Word bit descriptions

Bit	Description
0	Run Enable high.
1	No fault active.
2	DC-link pre-charging done.
3	DC Voltage within limits.
4	Power manager initialized.
5	Brake test not running.
6	System software is not blocking start.
7	Grid voltage within limits.

Table 32: Motor Ctrl. Ready Status Word bit descriptions - (continued)

Bit	Description
8	Temperature within limits.
9	Valid motor data.
10	Valid control configuration.

P 5.1.3 Motor Regulator Status Word

Shows the current state of the motor regulator status word. The status word indicates if a limit controller is active.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	1715	**Unit:**	–
Data Type:	WORD	**Access Type:**	Read Only

Table 33: Motor Regulator Status Word bit descriptions

Bit	Description
0	Current limit control active (motoring side).
1	Current limit control active (generator side).
2	Torque limit control active (motoring side).
3	Torque limit control active (generator side).
4	Overvoltage control active.
5	Undervoltage control active.
6	Power limit control active (motoring side).
7	Power limit control active (generator side).
8	Speed limit control active.
9	AC-brake control active.

P 5.1.5 Fault Status Word 1

Shows the fault status word 1.

Default Value:	–	**Parameter Type:**	Range (* — *)
Parameter Number:	6203	**Unit:**	–
Data Type:	DWORD	**Access Type:**	–

P 5.1.8 Warning Status Word 1

Shows the warning status word 1.

Default Value:	–	**Parameter Type:**	Range (* — *)
Parameter Number:	6205	**Unit:**	–
Data Type:	DWORD	**Access Type:**	–

P 5.1.13 Application Status Word

Shows the application-specific status word.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	1608	**Unit:**	–
Data Type:	WORD	**Access Type:**	Read Only

Table 34: Application Status Word bit descriptions

Bit	Bit = False	Bit = True
0	Reserved	Reserved
1	Inching not Active	Inching Active
2	Process Control not Active	Process Control Active
3	Reserved	Reserved
4	Reserved	Reserved
5	Reserved	Reserved
6	Reserved	Reserved
7	Reserved	Reserved
8	Reserved	Reserved
9	Reserved	Reserved
10	Reserved	Reserved
11	Reserved	Reserved
12	Reserved	Reserved
13	Normal Reference	Freeze Reference
14	Normal Reference	Reverse Reference
15	Speed Within Limits	Speed Limit Active

P 5.1.32 Logic State

Shows the current active state in Logic.

Default Value:	NA	**Parameter Type:**	Selection
Parameter Number:	21094	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	No State	No state active.
1	State 1	State 1 active.
2	State 2	State 2 active.
3	State 3	State 3 active.
4	State 4	State 4 active.
5	State 5	State 5 active.

P 5.1.33 Logic Time In Current State

Shows the time that the current state in Logic has been active.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	21095	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

6.7.3 Protection (Menu Index 5.2)

6.7.3.1 Cooling Monitor (Menu Index 5.2.1)

P 5.2.1.1 Cooling Monitor Input

Select the input for the negated cooling monitor signal.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	2400	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.2.1.2 Cooling Monitor Fault Delay

Set a delay before the cooling monitor issues a fault. Only valid if fault is selected.

Default Value:	3	**Parameter Type:**	Range (0 — 100)
Parameter Number:	2401	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

P 5.2.1.3 Cooling Monitor Response

Select the response to a missing cooling monitor signal. The response is selected for both stopped and running states.

Default Value:	2 (Warning, Fault after Timeout while running)	**Parameter Type:**	Selection
Parameter Number:	2402	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Warning while running	The drive issues a warning if the drive is in running state.
1	Warning	Drive issues a warning immediately.
2	Warning, Fault after Timeout while running	Drive issues a warning immediately, and if the drive is running, the warning escalates into a fault after a timeout.
3	Warning and Fault after Timeout while running	When stopped, no response is given. When running, the drive issues a warning immediately. The warning escalates into a fault after a timeout.

6.7.3.2 External Interlock (Menu Index 5.2.2)

Events can be issued via an external signal with the parameters of the External Event parameter group. The event can be delayed with parameters ***5.2.2.9 External Event 1 Delay*** and ***5.2.2.10 External Event 2 Delay***.

P 5.2.2.2 External Event 1 Inverse Input

Select an input for external event 1.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	4558	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.2.2.3 External Event 1 Response

Select the response to an external event.

Default Value:	9 (Fault, Ramp down to stop)	**Parameter Type:**	Selection
Parameter Number:	4559	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
9	Fault, Ramp down to stop	Event will trigger fault state, motor ramped to stop and entry added to event history log.
10	Fault, Coast	The event triggers a fault, immediately coasts the motor, and an entry is added to the event history log.

P 5.2.2.5 External Event 2 Inverse Input

Select an input for external event 2.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	4561	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.2.2.6 External Event 2 Response

Select the response to an external event.

Default Value:	9 (Fault, Ramp down to stop)	**Parameter Type:**	Selection
Parameter Number:	4562	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
9	Fault, Ramp down to stop	Event will trigger fault state, motor ramped to stop and entry added to event history log.
10	Fault, Coast	The event triggers a fault, immediately coasts the motor, and an entry is added to the event history log.

P 5.2.2.9 External Event 1 Delay

Set the time delay before external event 1 is raised.

Default Value:	–	**Parameter Type:**	Range (0 — 600)
Parameter Number:	4592	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

P 5.2.2.10 External Event 2 Delay

Set the time delay before external event 2 is raised.

Default Value:	–	**Parameter Type:**	Range (0 — 600)
Parameter Number:	4593	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

6.7.3.3 Measured Temp. Protection (Menu Index 5.2.3)

6.7.3.4 Blocked Rotor Detection (Menu Index 5.2.6)

Use the blocked rotor detection function to detect if the rotor is blocked by the application. This feature can protect the motor or application and identify if something is preventing the drive from ramping up the motor to the desired speed reference. If the motor is running in either torque or current limit for the set detection time, the blocked rotor function triggers an event. The function only is active in the speed range from 0 up to the set blocked rotor maximum speed.

P 5.2.6.1 Blocked Rotor Response

Select how the drive responds when detecting a blocked rotor.

Default Value:	0 (No response)	**Parameter Type:**	Selection
Parameter Number:	2370	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	No response	The event is ignored.
3	Warning	The drive issues a warning.
1	Fault	The drive issues a fault and coasts the motor.

P 5.2.6.2 Blocked Rotor Max. Speed

Set the maximum speed for checking for a blocked rotor.

Default Value:	10	**Parameter Type:**	Range (0 — 100)
Parameter Number:	2371	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 5.2.6.3 Blocked Rotor Detection Time

Set the duration that the rotor can be blocked before a response is triggered.

Default Value:	0.5	**Parameter Type:**	Range (0.1 — 100)
Parameter Number:	2372	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

6.7.3.5 Lost Load Detection (Menu Index 5.2.7)

P 5.2.7.1 Lost-load Response

Select an action for the lost-load detection. The lost-load detection is active if the motor speed is above 15 Hz.

Default Value:	0 (No response)	**Parameter Type:**	Selection
Parameter Number:	9072	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	No response	The event is ignored.
1	Info	The event is logged in the event log.
3	Warning	The drive issues a warning.
9	Fault, ramp to coast	Issues a fault, ramps down, and coast.
10	Fault	The drive issues a fault and coasts the motor.

P 5.2.7.2 Lost-load Detection Torque Level

Set the minimum allowed torque level in % of nominal motor torque. The lost-load detection can be activated below the set level.

Default Value:	10	**Parameter Type:**	Range (5 — 100)
Parameter Number:	9070	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read/Write

P 5.2.7.3 Lost-load Detection Delay

Set the minimum duration that the torque has to be below the detection limit before activating the lost-load exception.

Default Value:	10	**Parameter Type:**	Range (0 — 600)
Parameter Number:	9071	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

6.7.3.6 HMI Connection Loss (Menu Index 5.2.9)

P 5.2.9.1 HMI Connection Loss Response

Select the response after connection is lost to control panel or PC tool while they are in control. The response occurs after the timeout defined with 5.2.9.2 HMI Connection Loss Delay.

Default Value:	0 (No response)	**Parameter Type:**	Selection
Parameter Number:	5420	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	No response	The event is ignored.
2	Info	The event is logged in the event log.

Selection Number	Selection Name	Selection Description
4	Warning - Persistent	The drive issues a warning that stays active until acknowledged by a reset.
9	Fault, ramp to coast	Issues a fault, ramps down, and coast.
10	Fault	The drive issues a fault and coasts the motor.

P 5.2.9.2 HMI Connection Loss Delay

Set the delay before the selected response is triggered after the drive loses connection to control panel or PC tool.

Default Value:	5	**Parameter Type:**	Range (0 — 120)
Parameter Number:	5421	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

6.7.3.7 Run Permissive (Menu Index 5.2.11)

P 5.2.11.1 Run Permissive Enable

Enables the run permissive functionality.

Default Value:	False	**Parameter Type:**	Selection
Parameter Number:	5002	**Unit:**	–
Data Type:	BOOL	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Disabled	Disables the function.
1	Enabled	Enables the function.

P 5.2.11.2 Run Permissive Input

Select the run permissive digital input terminal. Used to monitor for the external condition to become true, after which the motor can start spinning.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	5003	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.2.11.3 Run Permissive Output

Select the run permissive digital output terminal. Set to trigger an external component when the motor starts.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	5007	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

6.7.3.8 Torque Limits (Menu Index 5.2.14)

P 5.2.14.1 Motoring Torque Limit

Set the torque limit in motoring mode (quadrants 1 and 3) in % of nominal motor torque.

Default Value:	300	**Parameter Type:**	Range (0 — 500)
Parameter Number:	1321	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read/Write

P 5.2.14.2 Regenerative Torque Limit

Set the torque limit in regenerative mode (quadrants 2 and 4) in % of nominal motor torque.

Default Value:	300	**Parameter Type:**	Range (0 — 500)
Parameter Number:	1323	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read/Write

P 5.2.14.3 Motoring Torque Limit Response

Select the response for running in motoring torque limit after the time delay defined.

Default Value:	0 (No response)	**Parameter Type:**	Selection
Parameter Number:	2361	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	No response	The event is ignored.
1	Info	The event is logged in the event log.
10	Fault	The drive issues a fault and coasts the motor.

P 5.2.14.4 Motoring Torque Limit Delay

Set the delay the drive is allowed to be in motoring torque limit before a response is issued.

Default Value:	–	**Parameter Type:**	Range (0 — 65000)
Parameter Number:	2358	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

P 5.2.14.5 Regenerative Torque Limit Response

Select the response for running in regenerative torque limit after the time delay defined.

Default Value:	0 (No response)	**Parameter Type:**	Selection
Parameter Number:	2362	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	No response	The event is ignored.
1	Info	The event is logged in the event log.
10	Fault	The drive issues a fault and coasts the motor.

P 5.2.14.6 Regenerative Torque Limit Delay

Set the delay the drive is allowed to be in regenerative torque limit before a response is issued.

Default Value:	–	**Parameter Type:**	Range (0 — 65000)
Parameter Number:	2363	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

6.7.3.9 Live Zero (Menu Index 5.2.15)

P 5.2.15.2 Live Zero Response

Select the drive response to a missing input signal (live zero).

Default Value:	3 (Warning)	**Parameter Type:**	Selection
Parameter Number:	4555	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	No Action	The event is ignored.
1	Info	The event is logged in the event log.
3	Warning	The drive issues a warning.
10	Fault	The drive issues a fault.

6.7.4 Load (Menu Index 5.3)

6.7.4.1 Load Status (Menu Index 5.3.1)

P 5.3.1.1 Inertia Estimation Status

Shows the status of the inertia estimation routine. 0 = Inactive, 1 = In progress, 2 = Completed successfully, 3 = Completed unsuccessfully.

Default Value:	NA	**Parameter Type:**	Selection
Parameter Number:	666	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read Only

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Inactive	
1	In progress	
2	Completed successfully	
3	Completed unsuccessfully	

6.7.4.2 Torque & AEO (Menu Index 5.3.3)

P 5.3.3.1 Torque Characteristic

Select the torque characteristics matching the application needs.

Default Value:	2 (Automatic Energy Optimization (AEO))	**Parameter Type:**	Selection
Parameter Number:	2809	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Constant torque (CT)	Typically used for applications where high load is present in the full speed range.
1	Variable torque (VT)	Typically used with quadratic loads like fans and centrifugal pumps.
2	Automatic Energy Optimization (AEO)	Motor magnetization is adapted to the current load. This functionality optimizes energy efficiency, but reduces dynamics to torque changes.

P 5.3.3.2 AEO Minimum Speed

Set the speed above which Automatic Energy Optimization (AEO) is active.

Default Value:	10	**Parameter Type:**	Range (0 — 2000)
Parameter Number:	2810	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 5.3.3.3 AEO Minimum Magnetization

Set the minimum magnetization current used by Automatic Energy Optimization (AEO).

Default Value:	40	**Parameter Type:**	Range (0 — 100)
Parameter Number:	2811	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read/Write

P 5.3.3.4 Variable Torque Zero Speed Magnetization

Set the magnetization current level at 0 speed. Used in variable torque (VT) setting.

Default Value:	66	**Parameter Type:**	Range (40 — 90)
Parameter Number:	8020	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read/Write

6.7.5 Operation Mode (Menu Index 5.4)

6.7.5.1 Settings (Menu Index 5.4.2)

P 5.4.2.16 Operation Mode

Select the drive operation mode.

Default Value:	0 (Speed control)	**Parameter Type:**	Selection
Parameter Number:	2500	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Speed control	The drive controls the motor speed.
21	Process control	The drive controls a process variable based on feedback to the process controller.
22	Multi pump control	The drive controls a system where multiple pumps contribute to generating flow and pressure in the system. A process controller is used to control the process variable based on feedback.

P 5.4.2.20 Rotational Direction Limit

Sets the limit for directional rotation of the motor.

Default Value:	1 (Positive Direction)	**Parameter Type:**	Selection
Parameter Number:	2501	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Both Directions	Allow the motor to spin both clockwise and counterclockwise.
1	Positive Direction	

6.7.6 Control Places (Menu Index 5.5)

6.7.6.1 Control Places Overview

The parameters of parameter group ***5.5 Control Places*** are used to configure the source from where the drive receives its commands, and what types of references are used. The configuration of the reference sources is part of the application controller parameterization. Commands and references are configured per operation mode of the drive (see also parameter ***5.4.2.16***). The Industry application software supports the following control places:

- Local control through the control panel
- Fieldbus control
- I/O control
- Advanced control

Advanced control allows the logical combination of 2 command sources.

The supported command logic for Advanced control is:

- Source 1
- Source 2
- AND
- OR
- NAND
- NOR
- XOR
- XNOR

The supported reference logic (except for local control) is:

- Source 1
- Source 2
- Sum
- Subtract
- Divide
- Multiply
- Maximum
- Minimum
- Toggle

The following illustration shows how control places function in the iC7 drive:

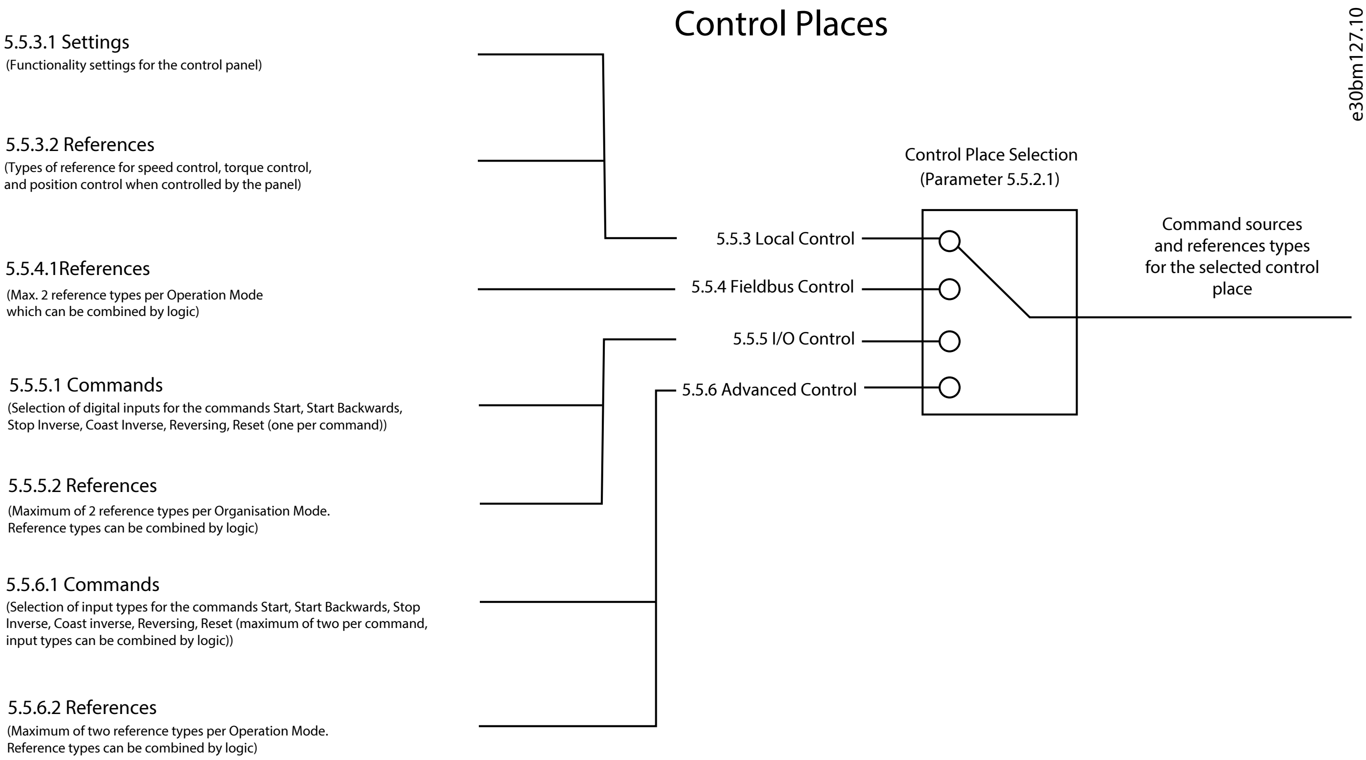


Figure 65: Control Places

6.7.6.2 Control Places Status (Menu Index 5.5.1)

P 5.5.1.1 Active Control Place

Shows the control place that controls the drive.

Default Value:	NA	**Parameter Type:**	Selection
Parameter Number:	113	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read Only

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	PC control	The drive is controlled by a software tool.
1	Local control	The drive is controlled by a connected control panel.
2	Fieldbus control	The drive is controlled via a fieldbus.
3	I/O control	The drive is controlled via I/O.
4	Advanced control	The drive is controlled via a combination of I/O and fieldbus.

P 5.5.1.2 Local Control Active Output

Select an output terminal indicating that the drive is in local control.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	5178	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.5.1.3 Fieldbus Control Active Output

Select an output terminal indicating that the drive is in fieldbus control.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	5197	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.5.1.4 I/O Control Active Output

Select an output terminal indicating that the drive is in I/O control.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	5177	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.5.1.5 Advanced Control Active Output

Select an output terminal indicating that the drive is in advanced control.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	4727	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

6.7.6.3 Control Place Settings (Menu Index 5.5.2)

P 5.5.2.1 Control Place Selection

Select the active control place.

Default Value:	4 (Advanced control)	**Parameter Type:**	Selection
Parameter Number:	114	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
1	Local control	The drive is controlled by a connected control panel.
2	Fieldbus control	The drive is controlled via a fieldbus.
3	I/O control	The drive is controlled via I/O.
4	Advanced control	The drive is controlled via a combination of I/O and fieldbus.

P 5.5.2.7 Control Place Independent Reset

Enable faults to be reset from all control places.

Default Value:	1 (Enabled)	**Parameter Type:**	Selection
Parameter Number:	109	**Unit:**	–
Data Type:	BOOL	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Disabled	Disables the function.
1	Enabled	Enables the function.

P 5.5.2.9 Alternative Control Place Selection

Select the alternative control place.

Default Value:	4 (Advanced control)	**Parameter Type:**	Selection
Parameter Number:	115	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
1	Local control	The drive is controlled by a connected control panel.
2	Fieldbus control	The drive is controlled via a fieldbus.
3	I/O control	The drive is controlled via I/O.
4	Advanced control	The drive is controlled via a combination of I/O and fieldbus.

P 5.5.2.10 Alternative Control Place Input

Select the digital input terminal for activating the alternative control place.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	111	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

6.7.6.4 Local Control (Menu Index 5.5.3)

6.7.6.4.1 Settings (Menu Index 5.5.3.1)

P 5.5.3.1.1 Allow Local Control Force Stop

Select whether the control panel stop button always stops the drive, regardless of the selected control place. Pressing the stop button also places the drive in local control.

Default Value:	1 (Enabled)	**Parameter Type:**	Selection
Parameter Number:	106	**Unit:**	–
Data Type:	BOOL	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Disabled	Disables the function.
1	Enabled	Enables the function.

P 5.5.3.1.2 Local Control Mode

Select restrictions of local control by the control panel.

Default Value:	0 (Allow Local Control)	**Parameter Type:**	Selection
Parameter Number:	107	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Allow Local Control	Local mode from control panel is enabled.
1	Deny Local Start	Start in local mode from control panel is disabled.
2	Deny Local Control	Local mode from control panel is disabled.

P 5.5.3.1.3 Continue Operation in Local Control

Enables running state when changing to local control.

Default Value:	1 (Enabled)	**Parameter Type:**	Selection
Parameter Number:	108	**Unit:**	–
Data Type:	BOOL	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Disabled	Disables the function.
1	Enabled	Enables the function.

P 5.5.3.1.4 Local Control Stop Button Action

Select the action of the stop button in the control panel. Selecting 'Stop, Hold to Coast' will stop and coast if the stop button is pressed for 2 s.

Default Value:	2 (Stop, Hold to Coast)	**Parameter Type:**	Selection
Parameter Number:	110	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Stop	Push stop button to stop the motor.
1	Coast Stop	Push stop button to coast the motor.
2	Stop, Hold to Coast	Push stop button to stop. If pressed for 2 s, motor coasts.

P 5.5.3.1.5 Operation Mode in Local Control

Select operation mode while in local control. Normally local control is in speed controller operation mode. With this parameter is possible to continue process controller operation while in local control.

Default Value:	False	**Parameter Type:**	Selection
Parameter Number:	5422	**Unit:**	–
Data Type:	BOOL	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Switch to Speed Control	When switching into local mode, the drive operates in speed control.
1	Keep Operation Mode	In local mode, the drive continues to run in the selected operation mode (speed or process control).

6.7.6.4.2 References (Menu Index 5.5.3.2)

P 5.5.3.2.1 Local Speed Reference Source

Select the speed reference source for when the drive is in local control.

Default Value:	1 (Local reference)	**Parameter Type:**	Selection
Parameter Number:	1912	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
1	Local reference	Use local reference from the control panel.
2	Fieldbus reference	Use reference from the fieldbus.
3	Reference 1 input	Use the reference from I/O reference 1.
4	Reference 2 input	Use the reference from I/O reference 2.
5	Preset reference	Use reference from the preset reference.
9	Logic Reference	Use reference from Logic.

P 5.5.3.2.3 Local Process Reference Source

Select the process control reference source for when the drive is in local control.

Default Value:	1 (Local reference)	**Parameter Type:**	Selection
Parameter Number:	6051	**Unit:**	–

Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
1	Local reference	Use local reference from the control panel.
2	Fieldbus reference	Use reference from the fieldbus.
3	Reference 1 input	Use the reference from I/O reference 1.
4	Reference 2 input	Use the reference from I/O reference 2.
5	Preset reference	Use reference from the preset reference.
6	Wet Bulb Temperature Setpoint	Use the reference from the Wet Bulb Temperature and approach calculation.
9	Logic Reference	Use reference from Logic.

6.7.6.5 Fieldbus control (Menu Index 5.5.4)

6.7.6.5.1 References (Menu Index 5.5.4.1)

P 5.5.4.1.1 Fieldbus Speed Reference Source

Select the speed reference sources for when the drive operates in fieldbus control. Select 2 sources to combine them into 1 reference value.

Default Value:	[2,0]	**Parameter Type:**	Selection
Parameter Number:	1914	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	None	No source selected equals a 0 value.
2	Fieldbus reference	Use reference from the fieldbus.
3	Reference 1 input	Use the reference from I/O reference 1.
4	Reference 2 input	Use the reference from I/O reference 2.
5	Preset reference	Use reference from the preset reference.
9	Logic Reference	Use reference from Logic.

P 5.5.4.1.2 Fieldbus Speed Reference Logic

Select how to form the speed reference out of the 2 inputs when operating in fieldbus control.

Default Value:	0 (Source 1)	**Parameter Type:**	Selection
Parameter Number:	1911	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Source 1	Use value from source 1 only.
1	Source 2	Use value from source 2 only.
2	Sum	Add references from source 1 and 2 together.
3	Subtract	Subtract source 2 from source 1.
4	Divide	Divide source 1 with source 2.
5	Multiply	Multiply source 1 with source 2.
6	Maximum	Use highest value of source 1 and source 2.
7	Minimum	Use lowest value of source 1 and source 2.
8	Toggle	Toggle between source 1 and 2 using a digital input.

P 5.5.4.1.3 Fieldbus Speed Reference Toggle Input

Select an input for toggling between the 2 speed reference sources selected, when operating in fieldbus control and toggling logic is used. A low signal selects the 1st source and high signal selects the 2nd source.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	1939	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.5.4.1.6 Fieldbus Process Reference Source

Select the process control reference sources for when the drive operates in fieldbus control. Define multiple entries for combining several sources into 1 reference value.

Default Value:	[2,0]	**Parameter Type:**	Selection
Parameter Number:	6052	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	None	
2	Fieldbus reference	Use reference from the fieldbus.
3	Reference 1 input	Use the reference from I/O reference 1.
4	Reference 2 input	Use the reference from I/O reference 2.
5	Preset reference	Use reference from the preset reference.
6	Wet Bulb Temperature Setpoint	Use the reference from the Wet Bulb Temperature and approach calculation.
9	Logic Reference	Use reference from Logic.

P 5.5.4.1.7 Fieldbus Process Reference Logic

Select how to form the process control reference out of the 2 sources when operating in fieldbus control.

Default Value:	0 (Source 1)	**Parameter Type:**	Selection
Parameter Number:	6057	**Unit:**	–

Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Source 1	Use value from source 1 only.
1	Source 2	Use value from source 2 only.
2	Sum	Add references from source 1 and 2 together.
3	Subtract	Subtract source 2 from source 1.
4	Divide	Divide source 1 with source 2.
5	Multiply	Multiply source 1 with source 2.
6	Maximum	Use highest value of source 1 and source 2.
7	Minimum	Use lowest value of source 1 and source 2.

6.7.6.6 I/O Control (Menu Index 5.5.5)

6.7.6.6.1 Commands (Menu Index 5.5.5.1)

P 5.5.5.1.1 Start Input

Select the digital input for the start command.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	200	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.5.5.1.2 Start Backward Input

Select the digital input for the start command in the backward direction.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	210	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.5.5.1.3 Stop Inverse Input

Select the digital input for the inverted stop command.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	201	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.5.5.1.4 Coast Inverse Input

Select the digital input for the inverted coast command.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	202	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.5.5.1.5 Reversing Input

Select the digital input for inverting the reference signal. The reverse command does not provide a start signal.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	204	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.5.5.1.6 Reset Input

Select the digital input for resetting faults.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	203	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.5.5.1.8 Start Signal Mode

Select the mode of the start signal.

Default Value:	0 (State High Start)	**Parameter Type:**	Selection
Parameter Number:	211	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	State High Start	Start command remains as long as input is true.
1	Rising Edge Start	Start command is set when input becomes true and remains latched until a stop command is given.
2	High Pulse Start	Start command is set when input becomes true and remains latched until stop command is given.

6.7.6.6.2 References (Menu Index 5.5.5.2)

P 5.5.5.2.1 I/O Speed Reference Source

Select the speed reference sources for when the drive operates in I/O control. Select 2 sources to combine them into 1 reference value.

Default Value:	[3,0]	**Parameter Type:**	Selection
Parameter Number:	1913	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	None	No source selected equals a 0 value.
2	Fieldbus reference	Use reference from the fieldbus.
3	Reference 1 input	Use the reference from I/O reference 1.
4	Reference 2 input	Use the reference from I/O reference 2.

Selection Number	Selection Name	Selection Description
5	Preset reference	Use reference from the preset reference.
9	Logic Reference	Use reference from Logic.

P 5.5.5.2.2 I/O Speed Reference Logic

Select how to form the speed reference out of the 2 sources when operating in I/O control.

Default Value:	0 (Source 1)	**Parameter Type:**	Selection
Parameter Number:	1910	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Source 1	Use value from source 1 only.
1	Source 2	Use value from source 2 only.
2	Sum	Add references from source 1 and 2 together.
3	Subtract	Subtract source 2 from source 1.
4	Divide	Divide source 1 with source 2.
5	Multiply	Multiply source 1 with source 2.
6	Maximum	Use highest value of source 1 and source 2.
7	Minimum	Use lowest value of source 1 and source 2.
8	Toggle	Toggle between source 1 and 2 using a digital input.

P 5.5.5.2.3 I/O Speed Reference Toggle Input

Select an input for toggling between the 2 speed reference sources selected, when operating in I/O control and toggling logic is used. A low signal selects the 1st source and high signal selects the 2nd source.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	1940	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.5.5.2.6 I/O Process Reference Source

Select the process control reference sources for when the drive operates in I/O control. Select 2 sources to combine them into 1 reference value.

Default Value:	[3,0]	**Parameter Type:**	Selection
Parameter Number:	6055	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	None	
2	Fieldbus reference	Use reference from the fieldbus.
3	Reference 1 input	Use the reference from I/O reference 1.
4	Reference 2 input	Use the reference from I/O reference 2.
5	Preset reference	Use reference from the preset reference.
6	Wet Bulb Temperature Setpoint	Use the reference from the Wet Bulb Temperature and approach calculation.
9	Logic Reference	Use reference from Logic.

P 5.5.5.2.7 I/O Process Reference Logic

Select how to form the process control reference out of the 2 sources when operating in I/O control.

Default Value:	0 (Source 1)	**Parameter Type:**	Selection
Parameter Number:	6059	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Source 1	Use value from source 1 only.
1	Source 2	Use value from source 2 only.
2	Sum	Add references from source 1 and 2 together.
3	Subtract	Subtract source 2 from source 1.
4	Divide	Divide source 1 with source 2.
5	Multiply	Multiply source 1 with source 2.
6	Maximum	Use highest value of source 1 and source 2.
7	Minimum	Use lowest value of source 1 and source 2.

6.7.6.7 Advanced control (Menu Index 5.5.6)

6.7.6.7.1 Commands (Menu Index 5.5.6.1)

P 5.5.6.1.1 Advanced Start Input

Select inputs for starting in the forward direction when operating in advanced control.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	4722	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.5.6.1.2 Advanced Start Logic

Select the combination logic for the start command of advanced control.

Default Value:	3 (OR)	**Parameter Type:**	Selection
Parameter Number:	1933	**Unit:**	–

Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Source 1	Use value from source 1 only.
1	Source 2	Use value from source 2 only.
2	AND	Logically AND source 1 and 2.
3	OR	Logically OR source 1 and 2.
4	NAND	Logically NAND source 1 and 2.
5	NOR	Logically NOR source 1 and 2.
6	XOR	Logically XOR source 1 and 2.
7	XNOR	Logically XNOR source 1 and 2.

P 5.5.6.1.3 Advanced Start Backward Input

Select inputs for starting in the backward direction when operating in advanced control.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	4725	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.5.6.1.4 Advanced Start Backward Logic

Select the combination logic for the start-backward command of advanced control.

Default Value:	0 (Source 1)	**Parameter Type:**	Selection
Parameter Number:	1934	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Source 1	Use value from source 1 only.
1	Source 2	Use value from source 2 only.
2	AND	Logically AND source 1 and 2.
3	OR	Logically OR source 1 and 2.
4	NAND	Logically NAND source 1 and 2.
5	NOR	Logically NOR source 1 and 2.
6	XOR	Logically XOR source 1 and 2.
7	XNOR	Logically XNOR source 1 and 2.

P 5.5.6.1.5 Advanced Stop Inverse Input

Select inputs for stopping when operating in advanced control. False means the drive is stopped.

Default Value:	–	**Parameter Type:**	Selection

Parameter Number:	4723	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.5.6.1.6 Advanced Stop Inverse Logic

Select the combination logic for the stop command of advanced control.

Default Value:	0 (Source 1)	**Parameter Type:**	Selection
Parameter Number:	1935	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Source 1	Use value from source 1 only.
1	Source 2	Use value from source 2 only.
2	AND	Logically AND source 1 and 2.
3	OR	Logically OR source 1 and 2.
4	NAND	Logically NAND source 1 and 2.
5	NOR	Logically NOR source 1 and 2.
6	XOR	Logically XOR source 1 and 2.
7	XNOR	Logically XNOR source 1 and 2.

P 5.5.6.1.7 Advanced Coast Inverse Input

Select inputs for the coast when operating in advanced control. False means the drive is coasted.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	4724	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.5.6.1.8 Advanced Coast Inverse Logic

Select the combination logic for the inverted coast command of advanced control.

Default Value:	0 (Source 1)	**Parameter Type:**	Selection
Parameter Number:	1936	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Source 1	Use value from source 1 only.
1	Source 2	Use value from source 2 only.
2	AND	Logically AND source 1 and 2.
3	OR	Logically OR source 1 and 2.
4	NAND	Logically NAND source 1 and 2.

Selection Number	Selection Name	Selection Description
5	NOR	Logically NOR source 1 and 2.
6	XOR	Logically XOR source 1 and 2.
7	XNOR	Logically XNOR source 1 and 2.

P 5.5.6.1.9 Advanced Reversing Input

Select inputs for inverting the reference signal when operating in advanced control. The reverse command does not provide a start signal.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	4730	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.5.6.1.10 Advanced Reverse Logic

Select the combination logic for the reverse command of advanced control.

Default Value:	3 (OR)	**Parameter Type:**	Selection
Parameter Number:	1937	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Source 1	Use value from source 1 only.
1	Source 2	Use value from source 2 only.
2	AND	Logically AND source 1 and 2.
3	OR	Logically OR source 1 and 2.
4	NAND	Logically NAND source 1 and 2.
5	NOR	Logically NOR source 1 and 2.
6	XOR	Logically XOR source 1 and 2.
7	XNOR	Logically XNOR source 1 and 2.

P 5.5.6.1.11 Advanced Reset Input

Select inputs for resetting faults when operating in advanced control.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	4731	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.5.6.1.13 Advanced Start Mode

Select the starting logic for advanced control.

Default Value:	0 (State High Start)	**Parameter Type:**	Selection
Parameter Number:	4726	**Unit:**	–

Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	State High Start	Start command remains as long as input is true.
1	Rising Edge Start	Start command is set when input becomes true and remains latched until a stop command is given.
2	High Pulse Start	Start command is set when input becomes true and remains latched until stop command is given.

P 5.5.6.1.15 Fieldbus CTW Feature Bits

Enables non-control-place-dependent control word bits to be active in advanced control place.

Default Value:	1 (Enabled)	**Parameter Type:**	Selection
Parameter Number:	4627	**Unit:**	–
Data Type:	BOOL	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Disabled	Disables the function.
1	Enabled	Enables the function.

6.7.6.7.2 References (Menu Index 5.5.6.2)

P 5.5.6.2.1 Adv. Speed Reference Source

Select the speed reference sources for when the drive operates in advanced control. Select 2 sources to combine them into 1 reference value.

Default Value:	[2,3]	**Parameter Type:**	Selection
Parameter Number:	1915	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	None	No source selected equals a 0 value.
2	Fieldbus reference	Use reference from the fieldbus.
3	Reference 1 input	Use the reference from I/O reference 1.
4	Reference 2 input	Use the reference from I/O reference 2.
5	Preset reference	Use reference from the preset reference.
9	Logic Reference	Use reference from Logic.

P 5.5.6.2.2 Adv. Speed Reference Logic

Select how to form the speed reference out of the 2 sources when operating in advanced control.

Default Value:	2 (Sum)	**Parameter Type:**	Selection
Parameter Number:	1916	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Source 1	Use value from source 1 only.
1	Source 2	Use value from source 2 only.
2	Sum	Add references from source 1 and 2 together.
3	Subtract	Subtract source 2 from source 1.
4	Divide	Divide source 1 with source 2.
5	Multiply	Multiply source 1 with source 2.
6	Maximum	Use highest value of source 1 and source 2.
7	Minimum	Use lowest value of source 1 and source 2.
8	Toggle	Toggle between source 1 and 2 using a digital input.

P 5.5.6.2.3 Adv. Speed Reference Toggle Input

Select an input for toggling between the 2 speed reference sources selected, when operating in advanced control and toggling logic is used. A low signal selects the 1st source and high signal selects the 2nd source.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	1941	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.5.6.2.6 Adv. Process Reference Source

Select the process control reference sources for when the drive operates in advanced control. Define multiple entries for combining several sources into 1 reference value.

Default Value:	[2,3]	**Parameter Type:**	Selection
Parameter Number:	6054	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	None	
2	Fieldbus reference	Use reference from the fieldbus.
3	Reference 1 input	Use the reference from I/O reference 1.
4	Reference 2 input	Use the reference from I/O reference 2.
5	Preset reference	Use reference from the preset reference.

Selection Number	Selection Name	Selection Description
6	Wet Bulb Temperature Setpoint	Use the reference from the Wet Bulb Temperature and approach calculation.
9	Logic Reference	Use reference from Logic.

P 5.5.6.2.7 Adv. Process Reference Logic

Select how to form the process control reference out of the 2 inputs when operating in advanced control.

Default Value:	2 (Sum)	**Parameter Type:**	Selection
Parameter Number:	6045	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Source 1	Use value from source 1 only.
1	Source 2	Use value from source 2 only.
2	Sum	Add references from source 1 and 2 together.
3	Subtract	Subtract source 2 from source 1.
4	Divide	Divide source 1 with source 2.
5	Multiply	Multiply source 1 with source 2.
6	Maximum	Use highest value of source 1 and source 2.
7	Minimum	Use lowest value of source 1 and source 2.

6.7.7 Start Settings (Menu Index 5.6)

6.7.7.1 Start Settings Overview

The application software provides the possibility to configure a DC start before entering normal motor control, for purposes of motor pre-heating, pre-magnetization, DC holding, or a start delay.

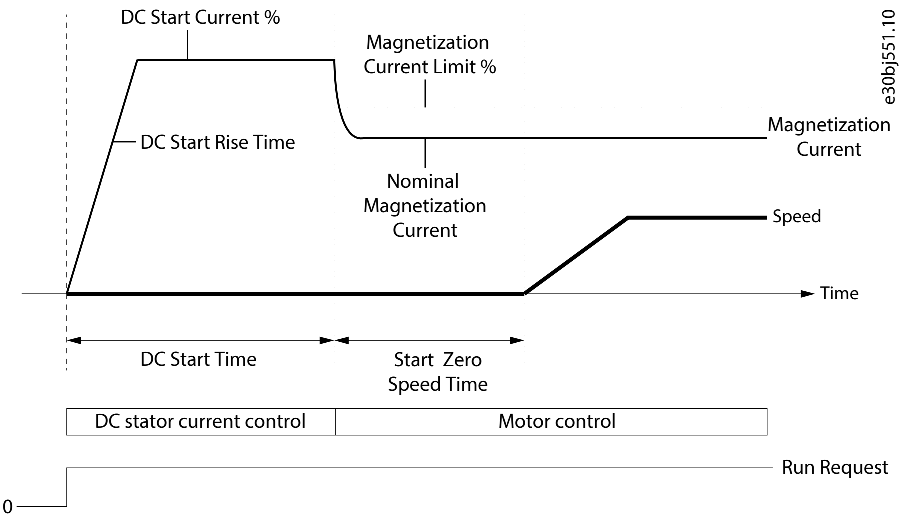


Figure 66: Induction Motor Start from Zero Speed with DC Start and Start Zero Speed Time > 0

DC start is configured using 3 parameters, ***5.6.2.3 DC Start Current %***, ***5.6.2.1 DC Start Time***, and ***5.6.2.2 DC Start Rise Time***.

By default, DC start is disabled by setting parameter ***5.6.2.1 DC Start Time*** to 0. The following illustration shows an example of starting an induction at zero speed.

DC start is also used as a start delay by setting parameter ***5.6.2.1 DC Start Time*** to the desired delay time and ***5.6.2.3 DC Start Current %*** to 0.

DC start is only applied when starting at zero speed, or when parameter ***5.6.1.2 Enable Flying Start*** is set to 0 [Disable] and motor back-emf voltage is not detected.

Synchronous motor control start settings

DC start is also possible from zero speed with synchronous motor control.

The following illustration shows a zero-speed example with DC start and initial position handling as rotor angle detection. To set the initial position handling to rotor angle detection, set parameter ***5.6.3.1 Sync. Motor Start Mode*** to 0 [Rotor angle detection].

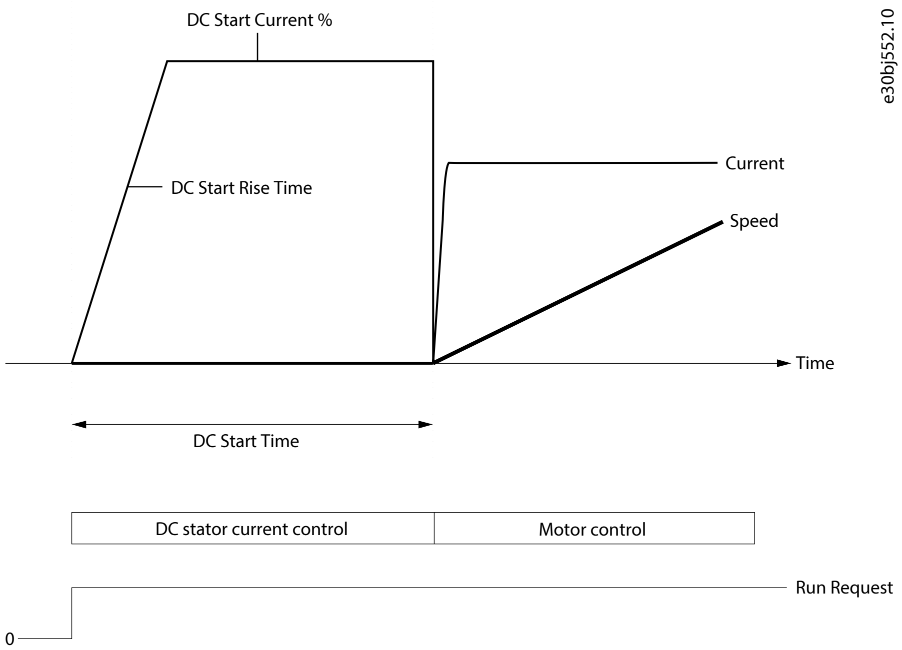


Figure 67: Synchronous Motor Start from Zero Speed with DC Start

As an alternative to rotor angle detection for a synchronous motor, it is possible to set the initial position handling as rotor angle parking by setting parameter ***5.6.3.1 Sync. Motor Start Mode*** to 1 [Rotor angle parking]. This option forces the motor shaft to move to a fixed position defined by the parameter ***5.6.3.5 Sync. Motor Parking Angle Reference***, before ramp release.

Synchronous motor start from zero speed with DC-Start and parking is shown in the following illustration.

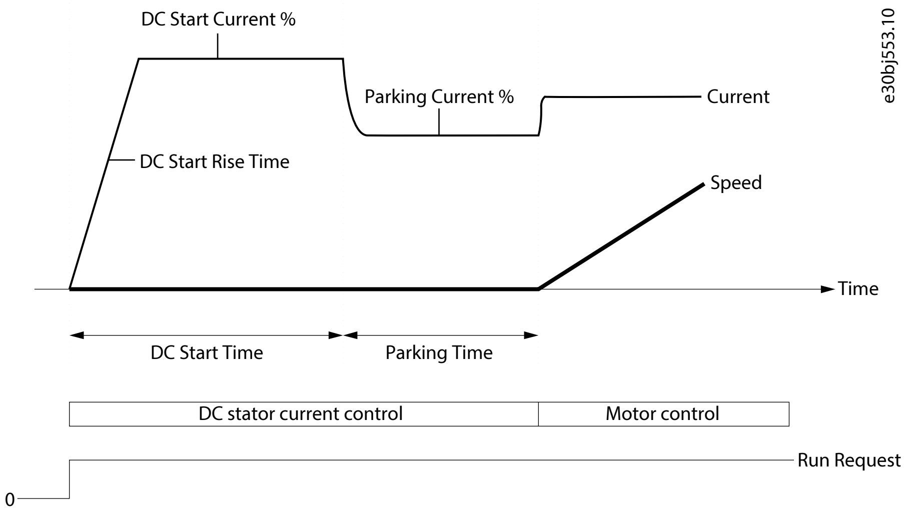


Figure 68: Synchronous Motor Start from Zero Speed with DC Start and Parking

6.7.7.2 General Settings (Menu Index 5.6.1)

P 5.6.1.1 Magnetization Time

Set a delay to magnetize the motor or synchronize parallel motors before starting ramping. Set to -1 for automatic calculation.

Default Value:	-1	**Parameter Type:**	Range (-1 — 10000)
Parameter Number:	2328	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

P 5.6.1.2 Flying Start

Enables a flying start. The drive will detect its current speed at the moment the start signal is given, and start to ramp towards the given reference.

Default Value:	False	**Parameter Type:**	Selection
Parameter Number:	4025	**Unit:**	–
Data Type:	BOOL	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Disabled	Disables the function.
1	Enabled	Enables the function.

P 5.6.1.5 Run Enable Input

Select an input enabling the drive to run.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	103	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.6.1.11 Flying Start Search Direction

Select whether the search direction for flying start can be limited by speed limits.

Default Value:	0 (Based on speed limits)	**Parameter Type:**	Selection
Parameter Number:	4622	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Based on speed limits	Flying start does not search for the motor in rotating directions limited by speed limit parameters.
1	Both directions	Flying start will search for the motor from both rotating directions regardless of any speed limits.

6.7.7.3 DC Start (Menu Index 5.6.2)

P 5.6.2.1 DC Start Time

Set the duration of the current injection during DC start.

Default Value:	–	**Parameter Type:**	Range (0 — 10000)
Parameter Number:	2264	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

P 5.6.2.2 DC Start Current Rise Time

Set the time to ramp the current from 0 to the specified injection level.

Default Value:	–	**Parameter Type:**	Range (0 — 100)
Parameter Number:	2265	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

P 5.6.2.3 DC Start Current

Set the DC current in % of nominal motor current. This current is injected during the DC start time.

Default Value:	–	**Parameter Type:**	Range (0 — 1000)
Parameter Number:	2263	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read/Write

6.7.7.4 Synchronous Motor Start (Menu Index 5.6.3)

P 5.6.3.1 Sync. Motor Start Mode

Set the synchronous motor initial postion handling.

Default Value:	1 (Rotor angle detection)	**Parameter Type:**	Selection
Parameter Number:	2322	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Disabled	Drive will not try to obtain motor angle.
1	Rotor angle detection	The drive will force the motor to be at the angle set as motor parking angle.
2	Rotor angle parking	The drive will force the motor to be at the angle set as motor parking angle.

P 5.6.3.2 Sync. Motor Detection Current

Set the rotor angle detection gain in % of the nominal motor current.

Default Value:	150	**Parameter Type:**	Range (0 — 200)
Parameter Number:	2323	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read/Write

P 5.6.3.3 Sync. Motor Parking Time

Set the duration of the rotor parking.

Default Value:	3	**Parameter Type:**	Range (0 — 10000)
Parameter Number:	2324	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

P 5.6.3.4 Sync. Motor Parking Current

Set the rotor angle parking current in % of the nominal motor current.

Default Value:	100	**Parameter Type:**	Range (0 — 1000)
Parameter Number:	2325	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read/Write

P 5.6.3.5 Sync. Motor Parking Angle

Set the electrical parking angle for the rotor.

Default Value:	–	**Parameter Type:**	Range (0 — 360)
Parameter Number:	2326	**Unit:**	°
Data Type:	REAL	**Access Type:**	Read/Write

6.7.8 Stop Settings (Menu Index 5.7)

6.7.8.1 Stop Settings Overview

DC braking

The application software enables configuration of DC braking for induction motor control.

By default, the DC brake is disabled and parameter ***5.6.2.1 DC Start Time*** is set to 0.

The following settings can be configured:

- Speed at which DC braking starts by setting the required speed with parameter ***5.7.2.3 DC Brake Speed***.
- Percentage of the brake current to be applied to the motor with parameter ***5.7.2.2 DC Brake Current***.
- Duration for which the DC brake is active for a DC-braking current injection with parameter ***5.7.2.1 DC-Brake Time***.

The following illustration shows a DC-braking scenario.

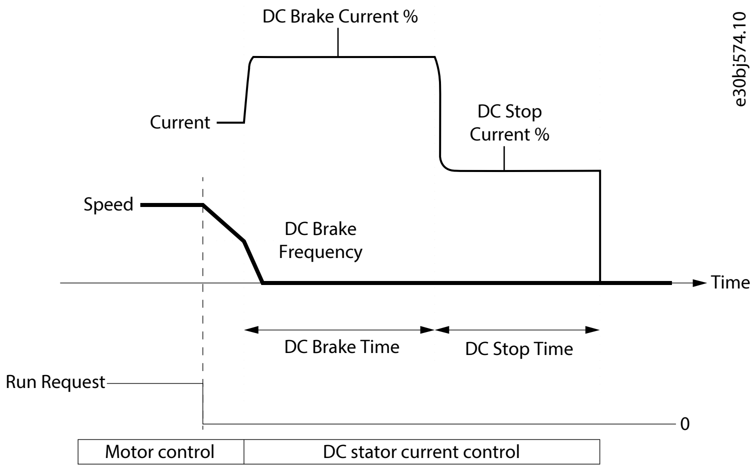


Figure 69: DC Braking and DC Stop

DC stop and stop delay

Besides the DC brake, the application software allows the configuring of DC stop, which can be used for DC hold or magnetization purposes. DC stop is configured with parameters ***5.7.2.5 DC Stop Current %*** and ***5.7.2.4 DC Stop Time***. By default, DC stop is disabled and the parameter ***5.7.2.4 DC Stop Time*** is set to 0.

DC stop is always applied at zero speed and as the last activity before the drive begins to coast.

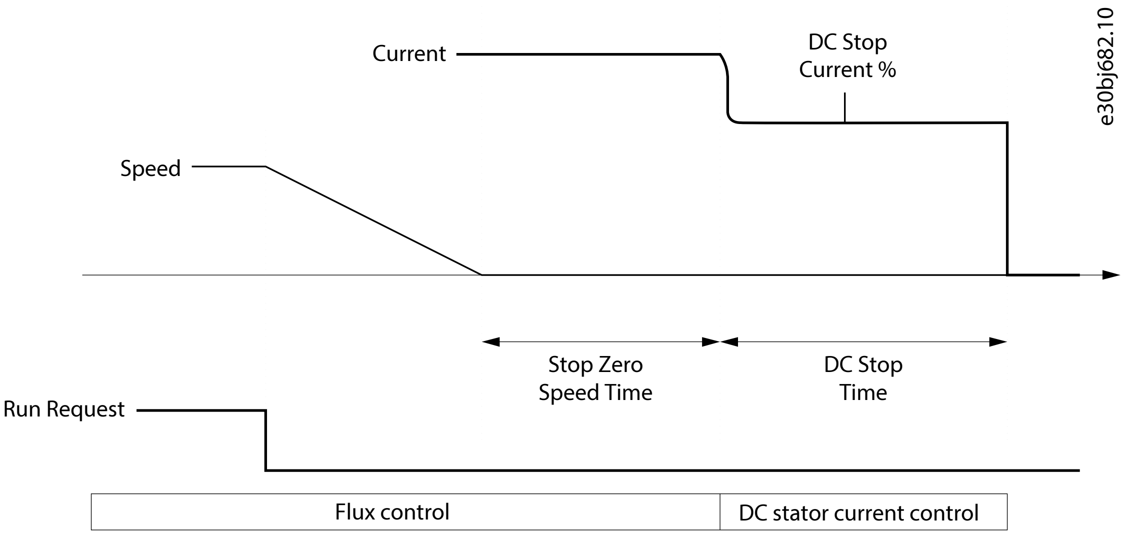


Figure 70: DC Stop and Stop Delay

When both parameters ***5.7.1.1 Stop Zero Speed Time*** and ***5.7.2.4 DC Stop Time*** are set to -1, then the parameter ***5.7.1.1 Stop Zero Speed Time*** has priority.

To introduce stop delay, use parameter ***5.7.1.1 Stop Zero Speed Time***. By default, stop delay is disabled and parameter ***5.7.1.1 Stop Zero Speed Time*** is set to 0. The parameter defines the duration from reaching 0 speed to the time when the drive stops modulating or continues with DC stop. During the stop delay duration, the drive remains in run mode, modulates, and reacts to load changes.

NOTE: When the drive is configured for DC braking, the parameter ***5.7.1.1 Stop Zero Speed Time*** has no effect.

6.7.8.2 Settings (Menu Index 5.7.1)

P 5.7.1.1 Stop Zero Speed Time

Set the time that motor control stays active after reaching 0 speed. The value -1 means indefinitely.

Default Value:	–	**Parameter Type:**	Range (-1 — 10000)
Parameter Number:	2331	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

P 5.7.1.3 Torque Ramp Down Time

Set the time for ramping down the remaining torque after reaching standstill.

Default Value:	–	**Parameter Type:**	Range (0 — 10000)
Parameter Number:	2336	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

P 5.7.1.4 Zero-speed Detection Level

Set the speed that is considered standstill.

Default Value:	0.2	**Parameter Type:**	Range (0 — 2)
Parameter Number:	2339	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 5.7.1.5 Zero-speed Detection Delay

Set the time that the speed must be below zero-speed detection level before standstill is detected.

Default Value:	0.02	**Parameter Type:**	Range (0 — 2)
Parameter Number:	2356	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

6.7.8.3 DC Injection (Menu Index 5.7.2)

P 5.7.2.1 DC-brake Time

Set the duration for a DC braking current injection.

Default Value:	–	**Parameter Type:**	Range (0 — 10000)
Parameter Number:	2267	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

P 5.7.2.2 DC-brake Current

Set the DC braking current in % of nominal motor current.

Default Value:	–	**Parameter Type:**	Range (0 — 1000)
Parameter Number:	2266	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read/Write

P 5.7.2.3 DC-brake Speed

Set the speed below which DC braking is activated.

Default Value:	–	**Parameter Type:**	Range (0 — *)

Parameter Number:	2268	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 5.7.2.4 DC Stop Time

Set the DC stopping injection duration. The value -1 means indefinitely.

Default Value:	–	**Parameter Type:**	Range (-1 — 10000)
Parameter Number:	2320	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

P 5.7.2.5 DC Stop Current

Set the DC stopping current in % of nominal motor current. Applied after the drive has reached standstill.

Default Value:	–	**Parameter Type:**	Range (0 — 1000)
Parameter Number:	2321	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read/Write

6.7.8.4 Quick Stop (Menu Index 5.7.3)

P 5.7.3.1 Quick Stop Inverse Input

Select an input terminal for activating the Quick Stop Inverse function.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	212	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.7.3.2 Quick Stop Ramp Time

Set the deceleration time for the quick stop ramp.

Default Value:	1	**Parameter Type:**	Range (0 — 10000)
Parameter Number:	1129	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

P 5.7.3.8 Allow Quick Stop In All Control Places

Allow quick stop in all control places, including local control.

Default Value:	0 (Disabled)	**Parameter Type:**	Selection
Parameter Number:	213	**Unit:**	–
Data Type:	BOOL	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Disabled	Disables the function.
1	Enabled	Enables the function.

6.7.8.5 AC Brake (Menu Index 5.7.4)

P 5.7.4.1 AC Brake

Enables the AC Brake.

Default Value:	False	**Parameter Type:**	Selection
Parameter Number:	4026	**Unit:**	–
Data Type:	BOOL	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Disabled	Disables the function.
1	Enabled	Enables the function.

P 5.7.4.2 AC-brake Voltage Control Kp

Set the scaling of the proportional gain of the AC-brake controller.

Default Value:	100	**Parameter Type:**	Range (0 — 500)
Parameter Number:	4027	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read/Write

P 5.7.4.3 AC-brake Voltage Control Ti

Set the scaling of the integral time of the AC-brake controller.

Default Value:	100	**Parameter Type:**	Range (0 — 500)
Parameter Number:	4028	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read/Write

P 5.7.4.4 AC-brake Current

Set the maximum allowed motor current in % of nominal motor current when AC brake is enabled.

Default Value:	100	**Parameter Type:**	Range (0 — 150)
Parameter Number:	4057	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read/Write

6.7.9 Speed Control (Menu Index 5.8)

6.7.9.1 Speed Control Overview

Parameter group ***5.8 Speed Control***contains the settings and the readout values related to the speed controller.

6.7.9.2 Speed Control Status (Menu Index 5.8.1)

P 5.8.1.1 Motor Shaft Speed

Shows the shaft speed in RPM.

Default Value:	NA	**Parameter Type:**	Range (-100000 — 100000)
Parameter Number:	9010	**Unit:**	rpm

Data Type:	REAL	**Access Type:**	Read Only

P 5.8.1.2 Motor Speed

Shows the actual motor speed.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	9011	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read Only

P 5.8.1.3 Output Frequency

Shows the output frequency.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	9015	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 5.8.1.6 Speed Error

Shows the difference between speed reference after ramp and motor speed.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	4023	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read Only

P 5.8.1.7 Speed Reference

Shows the speed reference.

Default Value:	NA	**Parameter Type:**	Range (-2000 — 2000)
Parameter Number:	1718	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 5.8.1.8 Speed Reference Before Ramp

Shows the value of speed reference before the ramp generator.

Default Value:	NA	**Parameter Type:**	Range (-2000 — 2000)
Parameter Number:	6049	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read Only

P 5.8.1.9 Speed Reference After Ramp

Shows the value of the speed reference after the ramp generator.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	6150	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read Only

P 5.8.1.10 Final Speed Reference

Shows the value of the speed reference before feeding it to the speed controller.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	6151	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read Only

P 5.8.1.11 Control Panel Speed Reference

Shows the value of the speed reference given from the control panel.

Default Value:	NA	**Parameter Type:**	Range (0 — *)
Parameter Number:	6153	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 5.8.1.12 Absolute Output Frequency Output

Select an output terminal for the output frequency scaled between 0 Hz and positive speed limits in Hz.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	2300	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

NOTE: Selection lists with inputs and/or outputs consist of the name of the hardware option and the numbers of the terminals. For example, terminal number 13 of the Integrated I/O is called Integrated I/O T13 in the selection list.

P 5.8.1.13 Absolute Speed Reference Output

Select an output terminal for the absolute speed reference, scaled between 0 and positive speed limit.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	2304	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

NOTE: Selection lists with inputs and/or outputs consist of the name of the hardware option and the numbers of the terminals. For example, terminal number 13 of the Integrated I/O is called Integrated I/O T13 in the selection list.

P 5.8.1.14 Output Frequency Output

Select an output terminal for the output frequency scaled between minimum speed limit and positive speed limits in Hz.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	2308	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

NOTE: Selection lists with inputs and/or outputs consist of the name of the hardware option and the numbers of the terminals. For example, terminal number 13 of the Integrated I/O is called Integrated I/O T13 in the selection list.

P 5.8.1.17 Logic Speed Reference

Shows Logic speed reference.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	21110	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

6.7.9.3 Speed Limits and Monitor (Menu Index 5.8.3)

P 5.8.3.1 Maximum Speed Limit

Set the maximum speed in both positive and negative directions.

Default Value:	50	**Parameter Type:**	Range (0 — *)
Parameter Number:	1729	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 5.8.3.3 Minimum Speed Limit

Set the minimum speed for positive and negative direction.

Default Value:	–	**Parameter Type:**	Range (* — *)
Parameter Number:	1722	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 5.8.3.4 High Speed Warning

Set the speed value which activates the high speed warning. Activated after 1 s.

Default Value:	1000	**Parameter Type:**	Range (0 — 1000)
Parameter Number:	1200	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 5.8.3.5 High Speed Fault

Set the speed value which activates the high speed fault after a delay.

Default Value:	1000	**Parameter Type:**	Range (0 — 1000)
Parameter Number:	1201	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 5.8.3.6 High Speed Fault Delay

Set the delay time after which a fault is issued if the speed set for high speed fault is exceeded.

Default Value:	10	**Parameter Type:**	Range (0 — 360)
Parameter Number:	1202	**Unit:**	s
Data Type:	UDINT	**Access Type:**	Read/Write

P 5.8.3.7 Start Speed Fault

Set the speed which must be reached within the delay time after start. Otherwise a fault is issued.

Default Value:	–	**Parameter Type:**	Range (0 — 10000)

Parameter Number:	1203	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 5.8.3.8 Start Speed Fault Delay

Set the time after which a fault is the issued if start speed fault value is not reached.

Default Value:	20	**Parameter Type:**	Range (0 — 360)
Parameter Number:	1204	**Unit:**	s
Data Type:	UDINT	**Access Type:**	Read/Write

P 5.8.3.9 Low Speed Monitor Limit

Set the speed value which activates the low speed fault after a delay.

Default Value:	0	**Parameter Type:**	Range (0 — 1000)
Parameter Number:	1205	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 5.8.3.10 Low Speed Fault Delay

Set the delay after which a fault is issued if speed drops below the level set for low speed monitor limit.

Default Value:	20	**Parameter Type:**	Range (0 — 360)
Parameter Number:	1206	**Unit:**	s
Data Type:	UDINT	**Access Type:**	Read/Write

6.7.9.4 Speed Reference (Menu Index 5.8.4)

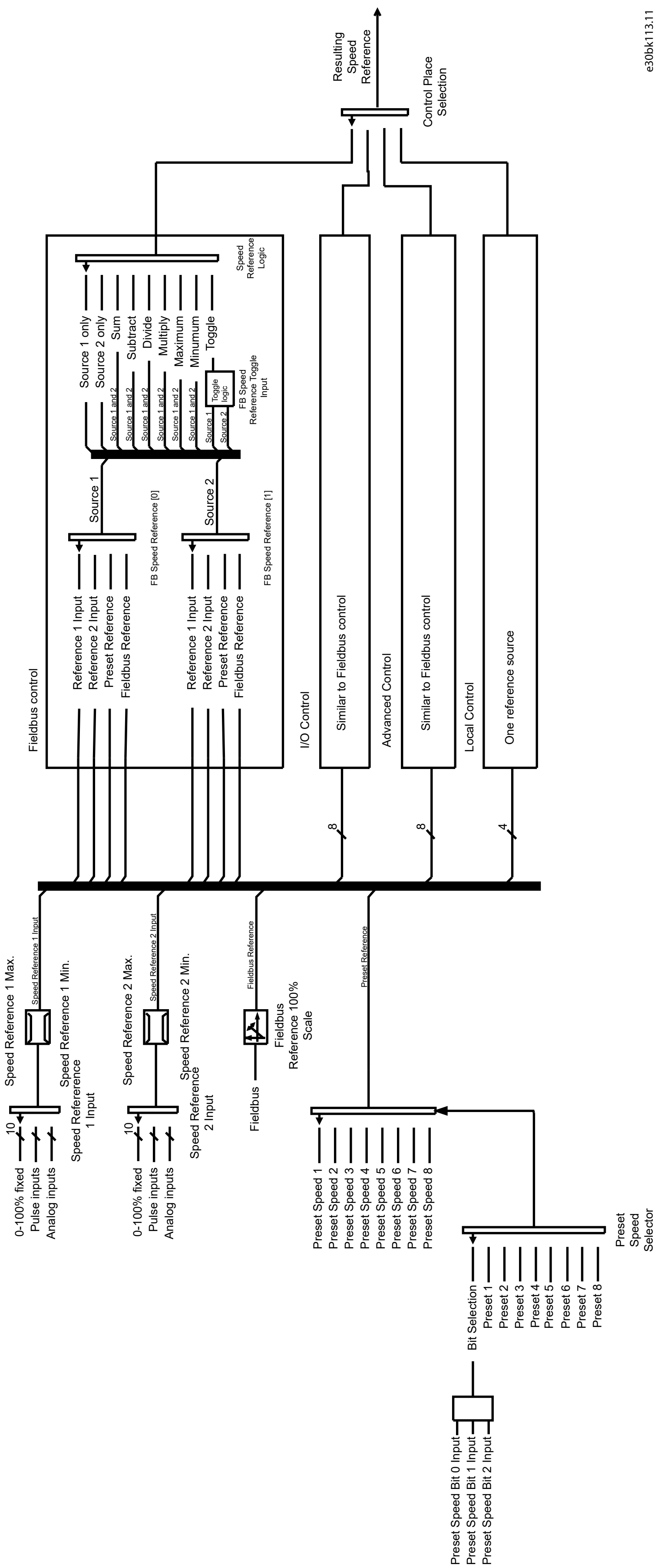


Figure 71: Reference Handling for Speed Control

P 5.8.4.1 Speed Reference 1 Input

Select the input terminal or a predefined fixed value for the speed reference.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	501	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.8.4.2 Speed Reference 2 Input

Select the input terminal or a predefined fixed value for the speed reference.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	502	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.8.4.3 Speed Reference 1 Max.

Set the maximum value of the reference. It defines the upper point for the scaling of the reference input.

Default Value:	50	**Parameter Type:**	Range (-1000 — 1000)
Parameter Number:	1724	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 5.8.4.4 Speed Reference 1 Min.

Set the minimum value of the reference. It defines the lower point for the scaling of the reference input.

Default Value:	–	**Parameter Type:**	Range (-1000 — 1000)
Parameter Number:	1725	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 5.8.4.5 Speed Reference 2 Max.

Set the maximum value of the reference. It defines the upper point for the scaling of the reference input.

Default Value:	50	**Parameter Type:**	Range (-1000 — 1000)
Parameter Number:	1726	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 5.8.4.6 Speed Reference 2 Min.

Set the minimum value of the reference. It defines the lower point for the scaling of the reference input.

Default Value:	–	**Parameter Type:**	Range (-1000 — 1000)
Parameter Number:	1727	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 5.8.4.7 Preset Speed Reference Selector

Select the preset reference. The preset reference can be selected as a fixed value or by 3 digital inputs.

Default Value:	1 (Preset 1)	**Parameter Type:**	Selection

Parameter Number:	702	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Bit Selection	Use digital inputs to select the preset reference number.
1	Preset 1	Use preset 1.
2	Preset 2	Use preset 2.
3	Preset 3	Use preset 3.
4	Preset 4	Use preset 4.
5	Preset 5	Use preset 5.
6	Preset 6	Use preset 6.
7	Preset 7	Use preset 7.
8	Preset 8	Use preset 8.

P 5.8.4.8 Preset Speed 1

Set the value of the preset reference.

Default Value:	10	**Parameter Type:**	Range (-1000 — 1000)
Parameter Number:	703	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 5.8.4.9 Preset Speed 2

Set the value of the preset reference.

Default Value:	20	**Parameter Type:**	Range (-1000 — 1000)
Parameter Number:	704	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 5.8.4.10 Preset Speed 3

Set the value of the preset reference.

Default Value:	30	**Parameter Type:**	Range (-1000 — 1000)
Parameter Number:	705	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 5.8.4.11 Preset Speed 4

Set the value of the preset reference.

Default Value:	40	**Parameter Type:**	Range (-1000 — 1000)
Parameter Number:	706	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 5.8.4.12 Preset Speed 5

Set the value of the preset reference.

Default Value:	50	**Parameter Type:**	Range (-1000 — 1000)
Parameter Number:	707	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 5.8.4.13 Preset Speed 6

Set the value of the preset reference.

Default Value:	60	**Parameter Type:**	Range (-1000 — 1000)
Parameter Number:	708	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 5.8.4.14 Preset Speed 7

Set the value of the preset reference.

Default Value:	70	**Parameter Type:**	Range (-1000 — 1000)
Parameter Number:	709	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 5.8.4.15 Preset Speed 8

Set the value of the preset reference.

Default Value:	80	**Parameter Type:**	Range (-1000 — 1000)
Parameter Number:	710	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 5.8.4.16 Preset Speed Reference Bit 0 Input

Select the digital input used as bit 0 addressing the preset reference.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	711	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.8.4.17 Preset Speed Reference Bit 1 Input

Select the digital input used as bit 1 for addressing the preset reference.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	712	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.8.4.18 Preset Speed Reference Bit 2 Input

Select the digital input used as bit 2 for addressing the preset reference.

Default Value:	–	**Parameter Type:**	Selection

Parameter Number:	713	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.8.4.19 Fieldbus Speed Reference Scale

Set the fieldbus reference scale equal to 100% reference.

Default Value:	50	**Parameter Type:**	Range (0 — 1000)
Parameter Number:	1723	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 5.8.4.20 Low Reference Limit

Reference below this limit is considered to be 0 and coasts the drive.

Default Value:	0.5	**Parameter Type:**	Range (0 — 100)
Parameter Number:	5044	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 5.8.4.21 Speed Ref. Filter Tc

Set the time constant of the reference filter. Set to 0 disables the filter.

Default Value:	–	**Parameter Type:**	Range (0 — 1000)
Parameter Number:	1719	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

6.7.9.5 Reference Freeze (Menu Index 5.8.5)

This feature makes it possible to freeze the active reference by a digital input to the actual output speed and to increase/decrease the reference by using 2 other digital inputs. Additionally, independent ramp times, delays, and speed steps can be configured.

When enabling the freeze reference feature, the reference is frozen to the actual output. If this reference is out of the allowed speed range, the frozen reference is set to the closest speed limit. After starting up or after cycling the power of the drive, the reference for the freeze feature is set to either the last freeze reference or to the minimum speed of the drive. See parameter ***5.8.5.7 Freeze Initialization***.

When reaching the upper speed limit or the lower speed limit of the drive, the freeze reference is not further increased or decreased in the limited direction. If the drive is configured for both rotation directions and a minimum speed has been defined, the reference bypasses the area between the positive and the negative minimum speed while Freeze Up or Freeze Down are used.

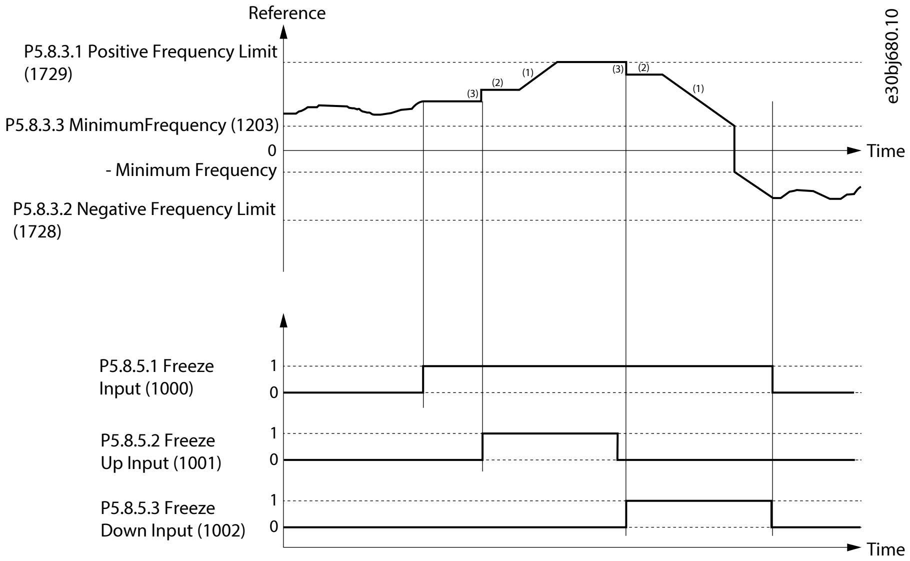


Figure 72: Reference Freeze Example

1	Freeze Up/Down Ramp Time	2	Freeze Up/Down Ramp Delay
3	Freeze Up/Down Step Delta		

P 5.8.5.1 Freeze Input

Select the digital input for freezing the reference. Freezing is used to control the speed reference with 2 digital inputs, 1 increasing the reference and the other decreasing the reference.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	1000	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.8.5.2 Freeze Up Input

Select the digital input for increasing the reference while reference freezing is activated.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	1001	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.8.5.3 Freeze Down Input

Select the digital input for decreasing the reference while reference freezing is activated.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	1002	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.8.5.4 Freeze Ramp Time

Set the ramp time for increasing/decreasing the reference while reference freeze is active.

Default Value:	10	**Parameter Type:**	Range (0 — 1000)
Parameter Number:	1003	**Unit:**	s

Data Type:	REAL	**Access Type:**	Read/Write

P 5.8.5.5 Freeze Ramp Delay

Set the delay before ramping the reference while reference freeze is active.

Default Value:	4	**Parameter Type:**	Range (0 — 3600)
Parameter Number:	1004	**Unit:**	s
Data Type:	UDINT	**Access Type:**	Read/Write

P 5.8.5.6 Freeze Step Delta

Set the reference step for increasing/decreasing the reference while reference freeze is active.

Default Value:	1	**Parameter Type:**	Range (0 — 1000)
Parameter Number:	1005	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 5.8.5.7 Freeze Initialization

Enable freeze initialization. If enabled, freeze reference is initialized to the minimum speed after start-up or a start signal is applied. If disabled, the latest value is used.

Default Value:	False	**Parameter Type:**	Selection
Parameter Number:	1006	**Unit:**	–
Data Type:	BOOL	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Disabled	Disables the function.
1	Enabled	Enables the function.

P 5.8.5.8 Freeze Ramp/Step Mode

Select how to increase or decrease the reference while reference freeze is active.

Default Value:	0 (Step and Ramp)	**Parameter Type:**	Selection
Parameter Number:	1007	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Step and Ramp	Step increment and ramp thereafter.
1	Ramp	Ramp increment.
2	Step	Step increment.

6.7.9.6 Speed Ramps (Menu Index 5.8.6)

6.7.9.6.1 Speed Ramps Overview

Ramps are used for reaching the desired speed reference in a controlled manner. The parameters in the Speed Ramps parameter group is used to select the ramp type and to adjust their shapes.

Ramps 1–4 can be configured as linear or S-ramps. A linear ramp provides the motor a constant acceleration. The S-ramp allows the drive to compensate for jerk in the application and/or to reduce sway.

The following diagram illustrates how the ramp parameters are used for adjusting the ramp profiles.

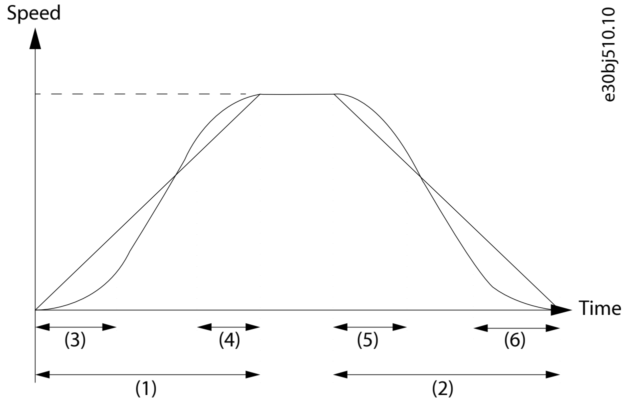


Figure 73: Speed Ramps

1	Ramp acceleration time	2	Ramp deceleration time
3	Ramp acceleration increase time for S-ramps	4	Ramp acceleration decrease time for S-ramps
5	Ramp deceleration increase time for S-ramps	6	Ramp deceleration decrease time for S-ramps

Furthermore, the drive supports a variable ramp profile, which allows the changing of the acceleration and deceleration time dynamically with analog inputs.

6.7.9.6.2 Speed Ramp Settings (Menu Index 5.8.6.1)

P 5.8.6.1.1 Ramp Selector

Select the speed ramp.

Default Value:	0 (Ramp 1)	**Parameter Type:**	Selection
Parameter Number:	1100	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
4	Bit Selection	Use digital inputs to select ramp.
0	Ramp 1	Use ramp 1.
1	Ramp 2	Use ramp 2.
2	Ramp 3	Use ramp 3.
3	Ramp 4	Use ramp 4.

P 5.8.6.1.2 Ramp Selection Bit 0 Input

Select the digital input used as bit 0 addressing the speed ramp.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	1130	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.8.6.1.3 Ramp Selection Bit 1 Input

Select the digital input used as bit 1 addressing the speed ramp.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	1131	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

6.7.9.6.3 Ramp 1 (Menu Index 5.8.6.2)

P 5.8.6.2.2 Ramp 1 Accel. Time

Set the acceleration time from 0 to nominal motor speed.

Default Value:	5	**Parameter Type:**	Range (0 — 10000)
Parameter Number:	1101	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

P 5.8.6.2.3 Ramp 1 Decel. Time

Set the deceleration time from nominal motor speed to 0.

Default Value:	5	**Parameter Type:**	Range (0 — 10000)
Parameter Number:	1105	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

6.7.9.6.4 Ramp 2 (Menu Index 5.8.6.3)

P 5.8.6.3.2 Ramp 2 Accel. Time

Set the acceleration time from 0 to nominal motor speed.

Default Value:	5	**Parameter Type:**	Range (0 — 10000)
Parameter Number:	1106	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

P 5.8.6.3.3 Ramp 2 Decel. Time

Set the deceleration time from nominal motor speed to 0.

Default Value:	5	**Parameter Type:**	Range (0 — 10000)
Parameter Number:	1102	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

6.7.9.6.5 Ramp 3 (Menu Index 5.8.6.4)

P 5.8.6.4.2 Ramp 3 Accel. Time

Set the acceleration time from 0 to nominal motor speed.

Default Value:	5	**Parameter Type:**	Range (0 — 10000)
Parameter Number:	1103	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

P 5.8.6.4.3 Ramp 3 Decel. Time

Set the deceleration time from nominal motor speed to 0.

Default Value:	5	**Parameter Type:**	Range (0 — 10000)
Parameter Number:	1107	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

6.7.9.6.6 Ramp 4 (Menu Index 5.8.6.5)

P 5.8.6.5.2 Ramp 4 Accel. Time

Set the acceleration time from 0 to nominal motor speed.

Default Value:	5	**Parameter Type:**	Range (0 — 10000)
Parameter Number:	1104	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

P 5.8.6.5.3 Ramp 4 Decel. Time

Set the deceleration time from nominal motor speed to 0.

Default Value:	5	**Parameter Type:**	Range (0 — 10000)
Parameter Number:	1108	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

6.7.9.6.7 Pump Ramps (Menu Index 5.8.6.7)

P 5.8.6.7.1 Initial Ramp Time

Set the initial ramp time. The initial ramp is active from start until the minimum motor speed limit is reached.

Default Value:	–	**Parameter Type:**	Range (0 — 10000)
Parameter Number:	1460	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

P 5.8.6.7.2 Final Ramp Time

Set the final ramp time. The final ramp is active while stopping from the check valve speed limit until stopped.

Default Value:	–	**Parameter Type:**	Range (0 — 10000)
Parameter Number:	1461	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

P 5.8.6.7.3 Check Valve Ramp Time

While stopping, the check valve ramp is active from the minimum speed limit until the check valve speed limit.

Default Value:	–	**Parameter Type:**	Range (0 — 10000)
Parameter Number:	1462	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

P 5.8.6.7.4 Check Valve Speed Limit

The speed at which the check valve ramp is deactivated and final ramp is activated.

Default Value:	–	**Parameter Type:**	Range (0 — *)
Parameter Number:	1463	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

6.7.9.7 Speed Bypass (Menu Index 5.8.8)

Some systems call for some output frequencies to be avoided due to, for example, mechanical resonance problems. With the parameters of this group, a definition of the bandwidth around each of these parameters can be provided.

These parameters allow the setting of up to 4 speed bands that are avoided.

P 5.8.8.1 Band 1, Low Limit

Set the bypass hysteresis speed band, low limit.

Default Value:	–	**Parameter Type:**	Range (0 — 100)
Parameter Number:	4520	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 5.8.8.2 Band 1, High Limit

Set the bypass hysteresis speed band, high limit.

Default Value:	–	**Parameter Type:**	Range (0 — 100)
Parameter Number:	4521	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 5.8.8.3 Band 2, Low Limit

Set the bypass hysteresis speed band, low limit.

Default Value:	–	**Parameter Type:**	Range (0 — 100)
Parameter Number:	4522	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 5.8.8.4 Band 2, High Limit

Set the bypass hysteresis speed band, high limit.

Default Value:	–	**Parameter Type:**	Range (0 — 100)
Parameter Number:	4523	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 5.8.8.5 Band 3, Low Limit

Set the bypass hysteresis speed band, low limit.

Default Value:	–	**Parameter Type:**	Range (0 — 100)
Parameter Number:	4524	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 5.8.8.6 Band 3, High Limit

Set the bypass hysteresis speed band, high limit.

Default Value:	–	**Parameter Type:**	Range (0 — 100)
Parameter Number:	4525	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 5.8.8.7 Band 4, Low Limit

Set the bypass hysteresis speed band, low limit.

Default Value:	–	**Parameter Type:**	Range (0 — 100)
Parameter Number:	4526	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 5.8.8.8 Band 4, High Limit

Set the bypass hysteresis speed band, high limit.

Default Value:	–	**Parameter Type:**	Range (0 — 100)
Parameter Number:	4527	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

6.7.10 Process Control (Menu Index 5.10)

6.7.10.1 Process Control Overview

The process controller enables maintaining process parameters such as temperature, pressure, and flow within a specified range or at a desired value. This is achieved by controlling the output frequency of the drive based on continuous measurement of the actual value of the process parameter (feedback) and the comparison of the process parameter with a setpoint.

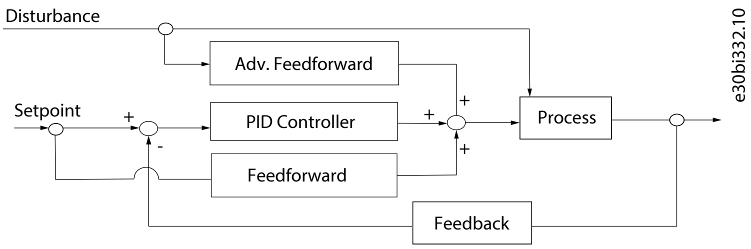


Figure 74: Process Controller

The embedded process controller features the following:

- Adjustable proportional gain, integral time, and derivative time
- Auto-tuning of the controller
- Bumpless operation
- 8 preset references

- 2 reference sources which can be combined
- Feedforward control
- Inverse control
- 2 feedback sources (analog inputs and fieldbus)
- Feedback calculations including sum, difference, average, minimum, and maximum
- Anti-windup
- Low-pass filtering of setpoint or feedback
- Status of the most important process parameters

6.7.10.2 Process Control Status (Menu Index 5.10.1)

P 5.10.1.1 On Reference

Indicates if the controlled process is operating on the current reference.

Default Value:	NA	**Parameter Type:**	Selection
Parameter Number:	6074	**Unit:**	–
Data Type:	BOOL	**Access Type:**	Read Only

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	False	Fixed value - False.
1	True	Fixed value - True.

P 5.10.1.2 Process Controller Output

Shows the output speed of the process controller, used as the speed reference for the speed controller.

Default Value:	NA	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6075	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read Only

P 5.10.1.3 Setpoint Value

Shows the actual value of the setpoint.

Default Value:	NA	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6092	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read Only

P 5.10.1.4 Feedback Value

Shows the actual value of the feedback.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	6090	**Unit:**	CustomProcessUnit
Data Type:	REAL	**Access Type:**	Read Only

P 5.10.1.6 Feedback 1 Value

Shows the actual value of feedback 1.

Default Value:	NA	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6080	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read Only

P 5.10.1.7 Feedback 2 Value

Shows the actual value of feedback 2.

Default Value:	NA	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6085	**Unit:**	CustomProcessUnit
Data Type:	REAL	**Access Type:**	Read Only

P 5.10.1.8 Feedback 3 Value

Shows the actual value of feedback 3.

Default Value:	NA	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6104	**Unit:**	CustomProcessUnit
Data Type:	REAL	**Access Type:**	Read Only

P 5.10.1.9 Control Panel Process Reference

Shows the value of the process reference given from the control panel.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	6094	**Unit:**	CustomProcessUnit
Data Type:	REAL	**Access Type:**	Read/Write

P 5.10.1.10 Process Controller Enabled

Indicates whether the process controller is active or not.

Default Value:	NA	**Parameter Type:**	Selection
Parameter Number:	6053	**Unit:**	–
Data Type:	BOOL	**Access Type:**	Read Only

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	False	Fixed value - False.
1	True	Fixed value - True.

P 5.10.1.11 Active Multi Zone

Shows which zone in a multi zone setup is currently controlled.

Default Value:	NA	**Parameter Type:**	Selection
Parameter Number:	6386	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Multi-zone control inactive	
1	Zone 1 active	
2	Zone 2 active	
3	Zone 3 active	

P 5.10.1.12 Final Reference Multi Zone 1

Shows the reference for zone 1 in a multi zone configuration.

Default Value:	NA	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6387	**Unit:**	CustomProcessUnit
Data Type:	REAL	**Access Type:**	Read/Write

P 5.10.1.13 Final Reference Multi Zone 2

Shows the reference for zone 2 in a multi zone configuration.

Default Value:	NA	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6388	**Unit:**	CustomProcessUnit
Data Type:	REAL	**Access Type:**	Read/Write

P 5.10.1.14 Final Reference Multi Zone 3

Shows the reference for zone 3 in a multi zone configuration.

Default Value:	NA	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6389	**Unit:**	CustomProcessUnit
Data Type:	REAL	**Access Type:**	Read/Write

P 5.10.1.15 Wet Bulb Temperature

Shows the calculated Wet Bulb Temperature.

Default Value:	NA	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6427	**Unit:**	°C
Data Type:	REAL	**Access Type:**	Read Only

P 5.10.1.16 Measured Temperature

Shows the temperature measured from the analog input.

Default Value:	NA	**Parameter Type:**	Range (-100000 — 100000)
Parameter Number:	6428	**Unit:**	°C
Data Type:	REAL	**Access Type:**	Read Only

P 5.10.1.17 Measured Relative Humidity

Shows the relative humidity measured from the analog input.

Default Value:	NA	**Parameter Type:**	Range (-100000 — 100000)
Parameter Number:	6429	**Unit:**	RH%
Data Type:	REAL	**Access Type:**	Read Only

P 5.10.1.18 WBT Temperature Setpoint

Shows the Wet Bulb Temperature and Approach Setpoint.

Default Value:	NA	**Parameter Type:**	Range (-100000 — 100000)
Parameter Number:	6430	**Unit:**	°C
Data Type:	REAL	**Access Type:**	Read Only

P 5.10.1.19 Logic Process Reference

Shows Logic process reference.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	21112	**Unit:**	CustomProcessUnit
Data Type:	REAL	**Access Type:**	Read/Write

P 5.10.1.20 Process Controller On Reference Output

Select an output for indicating that the process controller is on reference.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	6555	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

6.7.10.3 General Settings (Menu Index 5.10.2)

P 5.10.2.1 On Reference Tolerance

Set the tolerance of the On Reference indicator. When the control error (the difference between the reference and the feedback) is less than the defined percentage of the reference, the On Reference flag is True.

Default Value:	0.01	**Parameter Type:**	Range (0 — 0.4)
Parameter Number:	6050	**Unit:**	PercentageFromFraction
Data Type:	REAL	**Access Type:**	Read/Write

P 5.10.2.3 Process Unit

Unit of the process controller references and feedbacks (no automatic conversion is done when changing the value of this parameter).

Default Value:	31 ( )	**Parameter Type:**	Selection
Parameter Number:	6628	**Unit:**	–
Data Type:	USINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
31		Process Unit (No Unit or Custom Process Unit).
0	mbar	Pressure in millibars.
1	bar	Pressure in bars.
2	Pa	Pressure in pascals.
3	kPa	Pressure in kilopascals.
4	l/s	Liters per second.
5	l/min	Liters per minute.
6	l/h	Liters per hour.
7	m^3/s	Cubic meters per second.
8	m^3/min	Cubic meters per minute.
9	m^3/h	Cubic meters per hour.
10	U.S. gallon/s (GPS)	U.S. gallons per second.
11	U.S. gallon/min (GPM)	U.S. gallons per minute.
12	U.S. gallon/h (GPH)	U.S. gallons per hour.
13	in^3/s	Cubic inches per second.
14	in^3/min	Cubic inches per minute.
15	in^3/h	Cubic inches per hour.
16	ft^3/s	Cubic feet per second.
17	ft^3/min	Cubic feet per minute.
18	ft^3/h	Cubic feet per hour.
19	m WG	Meter water gauge.
20	mm Hg	Millimeters of mercury.
21	°C	Degrees Celcius.
22	°F	Degrees Fahrenheit.
23	kg/s	Kilograms per second.
24	kg/min	Kilograms per minute.
25	kg/h	Kilograms per hour.
26	t/min	Tons per minute.
27	t/h	Tons per hour.
28	m/s	Meters per second.
29	m/min	Meters per minute.
30	m/h	Meters per hour.
32	psi	lb/in^2.
33	in WG	Inches of water.
34	in Hg	Inches of mercury.
35	ft WG	Feet of water.

P 5.10.2.4 Process Input Max. Limit

Set the limit for the maximum value of the reference. This parameter is also used for internal controller normalization.

Default Value:	10	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6013	**Unit:**	CustomProcessUnit
Data Type:	REAL	**Access Type:**	Read/Write

P 5.10.2.5 Process Input Min. Limit

Set the limit for the minimum value of the reference. This parameter is also used for internal controller normalization.

Default Value:	–	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6014	**Unit:**	CustomProcessUnit
Data Type:	REAL	**Access Type:**	Read/Write

P 5.10.2.6 Process Type

Default Value:	0 (Not Selected)	**Parameter Type:**	Selection
Parameter Number:	3133	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Not Selected	
1	Pressure Control	
2	Flow Control	
3	Temperature Control	

6.7.10.4 Process Reference (Menu Index 5.10.3)

P 5.10.3.3 Process Reference 1 Input

Select the input terminal or a predefined fixed value for the process reference.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	6025	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.10.3.4 Process Reference 2 Input

Select the input terminal or a predefined fixed value for the the process reference.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	6026	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.10.3.5 Process Reference 1 Min.

Set the minimum process reference for the input.

Default Value:	–	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6047	**Unit:**	CustomProcessUnit
Data Type:	REAL	**Access Type:**	Read/Write

P 5.10.3.6 Process Reference 1 Max.

Set the maximum process reference for the input.

Default Value:	10	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6048	**Unit:**	CustomProcessUnit
Data Type:	REAL	**Access Type:**	Read/Write

P 5.10.3.7 Process Reference 2 Min.

Set the minimum process reference for the input.

Default Value:	–	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6033	**Unit:**	CustomProcessUnit
Data Type:	REAL	**Access Type:**	Read/Write

P 5.10.3.8 Process Reference 2 Max.

Set the maximum process reference for the input.

Default Value:	10	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6029	**Unit:**	CustomProcessUnit
Data Type:	REAL	**Access Type:**	Read/Write

P 5.10.3.9 Preset Process Reference Selector

Select the preset reference. The preset reference can be selected as a fixed value or by 3 digital inputs.

Default Value:	1 (Preset 1)	**Parameter Type:**	Selection
Parameter Number:	6032	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Bit Selection	Use digital inputs to select the preset reference number.
1	Preset 1	Use preset 1.
2	Preset 2	Use preset 2.
3	Preset 3	Use preset 3.
4	Preset 4	Use preset 4.
5	Preset 5	Use preset 5.
6	Preset 6	Use preset 6.
7	Preset 7	Use preset 7.
8	Preset 8	Use preset 8.

P 5.10.3.10 Preset Process Ref. Bit 0 Input

Select the digital input used as bit 0 addressing the preset reference.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	6034	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.10.3.11 Preset Process Ref. Bit 1 Input

Select the digital input used as bit 1 addressing the preset reference.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	6035	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.10.3.12 Preset Process Ref. Bit 2 Input

Select the digital input used as bit 2 addressing the preset reference.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	6036	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.10.3.13 Preset Process Ref. 1

Set the value of the preset reference.

Default Value:	1	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6037	**Unit:**	CustomProcessUnit
Data Type:	REAL	**Access Type:**	Read/Write

P 5.10.3.14 Preset Process Ref. 2

Set the value of the preset reference.

Default Value:	2	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6038	**Unit:**	CustomProcessUnit
Data Type:	REAL	**Access Type:**	Read/Write

P 5.10.3.15 Preset Process Ref. 3

Set the value of the preset reference.

Default Value:	3	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6039	**Unit:**	CustomProcessUnit
Data Type:	REAL	**Access Type:**	Read/Write

P 5.10.3.16 Preset Process Ref. 4

Set the value of the preset reference.

Default Value:	4	**Parameter Type:**	Range (-1000000 — 1000000)

Parameter Number:	6040	**Unit:**	CustomProcessUnit
Data Type:	REAL	**Access Type:**	Read/Write

P 5.10.3.17 Preset Process Ref. 5

Set the value of the preset reference.

Default Value:	5	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6041	**Unit:**	CustomProcessUnit
Data Type:	REAL	**Access Type:**	Read/Write

P 5.10.3.18 Preset Process Ref. 6

Set the value of the preset reference.

Default Value:	6	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6042	**Unit:**	CustomProcessUnit
Data Type:	REAL	**Access Type:**	Read/Write

P 5.10.3.19 Preset Process Ref. 7

Set the value of the preset reference.

Default Value:	7	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6043	**Unit:**	CustomProcessUnit
Data Type:	REAL	**Access Type:**	Read/Write

P 5.10.3.20 Preset Process Ref. 8

Set the value of the preset reference.

Default Value:	8	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6044	**Unit:**	CustomProcessUnit
Data Type:	REAL	**Access Type:**	Read/Write

P 5.10.3.21 Process Ref. Ramp Rise Time

Set the rising rate of the ramp for the setpoint.

Default Value:	10000	**Parameter Type:**	Range (0 — 1000000)
Parameter Number:	6005	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 5.10.3.22 Process Ref. Ramp Fall Time

Set the falling rate of the ramp for the setpoint.

Default Value:	10000	**Parameter Type:**	Range (0 — 1000000)
Parameter Number:	6006	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

Editing the setpoint falling time ramp defines the ramp-down time. The falling ramp for the setpoint is defined as slew rates which refers to process unit per time such as bar/s, °C/s. Setting the parameter to high values (compared to the dynamics of the requested setpoint) disables the ramp-down function.

P 5.10.3.23 Process Ref. Lowpass Filter Tc

Set the time constant of the reference filter. Setting it to 0 disables the filter.

Default Value:	–	**Parameter Type:**	Range (0.00 — 30000.00)
Parameter Number:	6083	**Unit:**	ms
Data Type:	REAL	**Access Type:**	Read/Write

P 5.10.3.24 Process Controller Start Speed

Set the start speed of the process controller.

Default Value:	–	**Parameter Type:**	Range (-1000 — 1000)
Parameter Number:	6056	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 5.10.3.26 Fieldbus Process Reference Scale

Set the fieldbus reference scale equal to 100% reference.

Default Value:	10	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6030	**Unit:**	CustomProcessUnit
Data Type:	REAL	**Access Type:**	Read/Write

6.7.10.5 Feedback (Menu Index 5.10.4)

P 5.10.4.1 Feedback Mode

Select the function to combine feedback 1 and feedback 2.

Default Value:	0 (Feedback 1)	**Parameter Type:**	Selection
Parameter Number:	6106	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Feedback 1	Use value from feedback source 1 only.
1	Feedback 2	Use value from feedback source 2 only.
2	Feedback 3	
3	Sum (All Active Feedbacks)	
4	Difference (Feedback 1 - Feedback 2)	
5	Minimum (All active feedbacks)	
6	Maximum (All active feedbacks)	
7	Average (All active feedbacks)	

Selection Number	Selection Name	Selection Description
8	Multi Zone Minimum	In this mode the references in a multi zone configuration are handled as minimum. If one feedback is below its reference, that zone will be actively controlled.
9	Multi Zone Maximum	In this mode the references in a multi zone configuration are handled as maximum. If one feedback is above its reference, that zone will be actively controlled.

P 5.10.4.2 Feedback 1 Type

Select the type of feedback.

Default Value:	1 (Analog Feedback Terminal)	**Parameter Type:**	Selection
Parameter Number:	6021	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Feedback disabled	
1	Analog Feedback Terminal	Use feedback value from the analog input.
2	Fieldbus Feedback	Use feedback value from the fieldbus.
3	Converted Signal 1	Readout from Signal Converter 1.
4	Converted Signal 2	Readout from Signal Converter 2.
5	Converted Signal 3	Readout from Signal Converter 3.

P 5.10.4.3 Feedback 1 Maximum Scaling

Set the maximum scaling value of the feedback.

Default Value:	10	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6015	**Unit:**	CustomProcessUnit
Data Type:	REAL	**Access Type:**	Read/Write

P 5.10.4.4 Feedback 1 Minimum Scaling

Set the minimum scaling value of the feedback.

Default Value:	–	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6016	**Unit:**	CustomProcessUnit
Data Type:	REAL	**Access Type:**	Read/Write

P 5.10.4.5 Analog Input Feedback 1

Select the input or a predefined fixed value for the feedback.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	6027	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.10.4.7 Feedback 2 Type

Select the type of feedback.

Default Value:	0 (Feedback disabled)	**Parameter Type:**	Selection
Parameter Number:	6022	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Feedback disabled	
1	Analog Feedback Terminal	Use feedback value from the analog input.
2	Fieldbus Feedback	Use feedback value from the fieldbus.
3	Converted Signal 1	Readout from Signal Converter 1.
4	Converted Signal 2	Readout from Signal Converter 2.
5	Converted Signal 3	Readout from Signal Converter 3.

P 5.10.4.8 Feedback 2 Maximum Scaling

Set the maximum scaling value of the feedback.

Default Value:	10	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6017	**Unit:**	CustomProcessUnit
Data Type:	REAL	**Access Type:**	Read/Write

P 5.10.4.9 Feedback 2 Minimum Scaling

Set the minimum scaling value of the feedback.

Default Value:	–	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6018	**Unit:**	CustomProcessUnit
Data Type:	REAL	**Access Type:**	Read/Write

P 5.10.4.10 Analog Input Feedback 2

Set the input for the feedback.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	6028	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.10.4.12 Feedback 3 Type

Select the type of feedback.

Default Value:	0 (Feedback disabled)	**Parameter Type:**	Selection
Parameter Number:	6105	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Feedback disabled	
1	Analog Feedback Terminal	Use feedback value from the analog input.
2	Fieldbus Feedback	Use feedback value from the fieldbus.
3	Converted Signal 1	Readout from Signal Converter 1.
4	Converted Signal 2	Readout from Signal Converter 2.
5	Converted Signal 3	Readout from Signal Converter 3.

P 5.10.4.13 Feedback 3 Maximum Scaling

Set the maximum scaling value of the feedback.

Default Value:	10	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6102	**Unit:**	CustomProcessUnit
Data Type:	REAL	**Access Type:**	Read/Write

P 5.10.4.14 Feedback 3 Minimum Scaling

Set the minimum scaling value of the feedback.

Default Value:	–	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6103	**Unit:**	CustomProcessUnit
Data Type:	REAL	**Access Type:**	Read/Write

P 5.10.4.15 Analog Input Feedback 3

Set the input for the feedback.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	6100	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.10.4.17 Feedback Filter Tc

Set the time constant of the feedback filter. Relevant if the feedback signal is fluctuates or is noisy.

Default Value:	100.00	**Parameter Type:**	Range (0.00 — 30000.00)
Parameter Number:	6084	**Unit:**	ms
Data Type:	REAL	**Access Type:**	Read/Write

6.7.10.6 PID Controller (Menu Index 5.10.5)

P 5.10.5.1 Proportional Gain

Set the propoportional gain of the PID controller.

Default Value:	1	**Parameter Type:**	Range (0 — 100000)
Parameter Number:	6065	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 5.10.5.2 Integral Time

Set the integral time of the PID controller. Values above 10000 deactivate the I part of the controller.

Default Value:	1	**Parameter Type:**	Range (0 — 1000000)
Parameter Number:	6058	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

P 5.10.5.4 Anti-windup

Enable Anti-windup, which ceases the regulation of an error when the minimum or maximum speed is reached.

Default Value:	1 (Enabled)	**Parameter Type:**	Selection
Parameter Number:	6061	**Unit:**	–
Data Type:	BOOL	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Disabled	Disables the function.
1	Enabled	Enables the function.

P 5.10.5.5 Derivative Time

Set the derivative time of the PID controller. The differentiator does not react to a constant error, but provides a gain only when the error changes. The shorter the PID differentiation time, the stronger the gain from the differentiator. When set to 0 the derivative part is disabled.

Default Value:	–	**Parameter Type:**	Range (0 — 1000)
Parameter Number:	6068	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

P 5.10.5.6 Derivative Gain

Set a limit for the differentiator gain. If there is no limit, the differentiator gain increases when there are fast changes. To obtain a pure differentiator gain at slow changes and a constant differentiator gain where fast changes occur, limit the differentiator gain.

Default Value:	5	**Parameter Type:**	Range (1 — 100)
Parameter Number:	6069	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 5.10.5.7 PID Inverted

Inverts the output of the PID controller.

Default Value:	False	**Parameter Type:**	Selection
Parameter Number:	6066	**Unit:**	–
Data Type:	BOOL	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Disabled	Disables the function.
1	Enabled	Enables the function.

6.7.10.7 Auto Tuning (Menu Index 5.10.7)

P 5.10.7.1 Process Controller Auto Tuning

Enables the auto tuning procedure of the process controller. Requires start signal and returns to false after completion.

Default Value:	0 (Disabled)	**Parameter Type:**	Selection
Parameter Number:	6901	**Unit:**	–
Data Type:	BOOL	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Disabled	Disables the function.
1	Enabled	Enables the function.

P 5.10.7.2 Auto Tuning Reference

Set the reference point where the auto tuning is executed. Values are entered in process units.

Default Value:	–	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6902	**Unit:**	CustomProcessUnit
Data Type:	REAL	**Access Type:**	Read/Write

P 5.10.7.3 Closed Loop Type

Selects the time constant "tau" of your system. It should be set up like this: <10s - FAST PRESSURE, 10-30s - SLOW PRESSURE, 30-600s - FAST TEMPERATURE, >600s - SLOW TEMPERATURE.

Default Value:	10 (Fast Pressure)	**Parameter Type:**	Selection
Parameter Number:	7000	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
10	Fast Pressure	
30	Slow Pressure	
600	Fast Temperature	
1800	Slow Temperature	

6.7.10.8 Multi Zone (Menu Index 5.10.8)

P 5.10.8.1 Multi Zone Reference 1

Set the reference for zone 1 in a multi zone configuration.

Default Value:	–	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6383	**Unit:**	CustomProcessUnit
Data Type:	REAL	**Access Type:**	Read/Write

P 5.10.8.2 Multi Zone Reference 2

Set the reference for zone 2 in a multi zone configuration.

Default Value:	–	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6384	**Unit:**	CustomProcessUnit
Data Type:	REAL	**Access Type:**	Read/Write

P 5.10.8.3 Multi Zone Reference 3

Set the reference for zone 3 in a multi zone configuration.

Default Value:	–	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6385	**Unit:**	CustomProcessUnit
Data Type:	REAL	**Access Type:**	Read/Write

6.7.10.9 Wet Bulb Temperature (Menu Index 5.10.9)

P 5.10.9.1 Relative Humidity Analog Input

Set the analog input terminal for the relative humidity measurement.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	6420	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.10.9.2 Relative Humidity Max. Scaling

Set the maximum scaling value of the analog signal. The value should match the maximum output value of the sensor.

Default Value:	100	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6423	**Unit:**	RH%
Data Type:	REAL	**Access Type:**	Read/Write

P 5.10.9.3 Relative Humidity Min. Scaling

Set the minimum scaling value of the analog signal. The value should match the minimum output value of the sensor.

Default Value:	0	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6424	**Unit:**	RH%
Data Type:	REAL	**Access Type:**	Read/Write

P 5.10.9.4 Temperature Analog Input

Set the analog input terminal for the temperature measurement.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	6421	**Unit:**	–

Data Type:	UINT	**Access Type:**	Read/Write

P 5.10.9.5 Temperature Input Max. Scaling

Set the maximum scaling value of the analog signal. The value should match the maximum output value of the sensor.

Default Value:	10	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6425	**Unit:**	°C
Data Type:	REAL	**Access Type:**	Read/Write

P 5.10.9.6 Temperature Input Min. Scaling

Set the minimum scaling value of the analog signal. The value should match the minimum output value of the sensor.

Default Value:	0	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6426	**Unit:**	°C
Data Type:	REAL	**Access Type:**	Read/Write

P 5.10.9.7 Approach Setpoint

Set the approach setpoint, which is added to the Wet Bulb Temperature calculation.

Default Value:	0	**Parameter Type:**	Range (-100000 — 100000)
Parameter Number:	6422	**Unit:**	°C
Data Type:	REAL	**Access Type:**	Read/Write

6.7.11 Inching (Menu Index 5.11)

The inching feature can temporarily override the reference settings of the drive and run it in speed control at a fixed speed. This way the drive can be made to respond to special situations, such as slow down when the service door is opened or run at maximum speed for cleaning purposes, for example.

Inching has 2 channels. The channels can be used separately or simultaneously. When both channels are used, channel 2 has priority.

When the inching feature is activated, the drive is automatically given a start command.

NOTE: Inching has its own ramping time, which overrides the set speed ramp times.

P 5.11.2 Enable Inching Input

Select a terminal to enable inching.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	1080	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.11.3 Inching Ramp Time

Set the ramp time for inching.

Default Value:	10	**Parameter Type:**	Range (0.01 — 3600)
Parameter Number:	1083	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

P 5.11.4 Inching Reference 1

Set reference 1 for inching.

Default Value:	15	**Parameter Type:**	Range (0 — 1000)
Parameter Number:	1082	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 5.11.5 Inching Activate Input 1

Select the terminal to inching with reference 1. Enable inching input must be active.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	1084	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.11.6 Inching Reference 2

Set reference 2 for inching.

Default Value:	30	**Parameter Type:**	Range (0 — 1000)
Parameter Number:	1085	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 5.11.7 Inching Activate Input 2

Select the terminal to inching with reference 2. Enable inching input must be active.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	1086	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.11.8 Inching Active Output

Select the output terminal or status bit indicating that inching is active.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	1087	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

6.7.12 Additional Status Outputs (Menu Index 5.26)

6.7.12.1 General Digital Outputs (Menu Index 5.26.1)

P 5.26.1.1 Ready Output

Select an output to indicate that the unit is in ready mode.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	205	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.26.1.2 Run Output

Select an output to indicate that the unit is in run mode.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	206	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.26.1.3 On Reference Output

Select an output to indicate that the unit is on reference.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	207	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.26.1.4 Fault Event Output

Select an output to indicate that a fault has occurred.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	208	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.26.1.5 Warning Event Output

Select an output to indicate that a warning has occurred.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	209	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.26.1.26 Motor Disconnected Output

Select an output to indicate that the motor is disconnected. Motor check must be enabled in disconnected motor response.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	216	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

6.7.13 Fieldbus Process Data (Menu Index 5.27)

6.7.13.1 Fieldbus Process Data Status (Menu Index 5.27.1)

P 5.27.1.42 Fieldbus Control Word

Shows the profile specific fieldbus control word.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	1335	**Unit:**	–
Data Type:	WORD	**Access Type:**	Read/Write

The fieldbus control word is either the PROFIdrive control word or the iC Speed control word described in 8.1.2 Control Word. The fieldbus profile is selected with parameter ***10.3.1.2 Fieldbus Profile***.

P 5.27.1.43 Fieldbus Speed Reference 1

Shows the fieldbus speed reference.

Default Value:	NA	**Parameter Type:**	Range (-32768 — 32767)
Parameter Number:	1339	**Unit:**	–
Data Type:	INT	**Access Type:**	Read/Write

P 5.27.1.50 Fieldbus Status Word

Shows the profile specific fieldbus status word.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	1307	**Unit:**	–
Data Type:	WORD	**Access Type:**	Read Only

The fieldbus status word is either the PROFIdrive status word or the iC Speed status word described in 8.1.3 Status Word. The fieldbus profile is selected with parameter ***10.3.1.2 Fieldbus Profile***.

P 5.27.1.51 Actual Motor Speed

Shows the actual motor speed.

Default Value:	NA	**Parameter Type:**	Range (-32768 — 32767)
Parameter Number:	1308	**Unit:**	–
Data Type:	INT	**Access Type:**	Read Only

P 5.27.1.54 Fieldbus Speed Reference

Shows the fieldbus speed reference.

Default Value:	NA	**Parameter Type:**	Range (-1000 — 1000)
Parameter Number:	1345	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 5.27.1.89 Fieldbus Control Word 2

Shows the fieldbus control word 2.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	1347	**Unit:**	–
Data Type:	WORD	**Access Type:**	Read/Write

The fieldbus control and status words are freely configurable, and specific features can be assigned to the bits.

P 5.27.1.90 Fieldbus Status Word 2

Shows the profile specific fieldbus status word 2.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	1344	**Unit:**	–
Data Type:	WORD	**Access Type:**	Read Only

The fieldbus control and status words are freely configurable, and specific features can be assigned to the bits.

P 5.27.1.100 Fieldbus Process Reference

Shows the fieldbus process reference used in the process controller.

Default Value:	NA	**Parameter Type:**	Range (-32768 — 32767)
Parameter Number:	6046	**Unit:**	–
Data Type:	INT	**Access Type:**	Read/Write

6.7.14 Pump Features (Menu Index 5.31)

6.7.14.1 Flow Monitoring (Menu Index 5.31.1)

6.7.14.1.1 Flow Monitor Status (Menu Index 5.31.1.1)

P 5.31.1.1.1 No-Flow Power

Shows the actual calculated No-Flow Power at the current speed.

Default Value:	NA	**Parameter Type:**	Range (0.00 — *)
Parameter Number:	6624	**Unit:**	kW
Data Type:	REAL	**Access Type:**	Read Only

P 5.31.1.1.2 No-Flow Status

Indicates if a no-flow situation has occurred.

Default Value:	NA	**Parameter Type:**	Selection
Parameter Number:	6637	**Unit:**	–
Data Type:	BOOL	**Access Type:**	Read Only

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Not Detected	The situation is not detected.
1	Detected	The situation is detected.

P 5.31.1.1.3 Dry-Run Status

Indicates if a dry-run situation has occurred and there is no water in the pump.

Default Value:	NA	**Parameter Type:**	Selection
Parameter Number:	6638	**Unit:**	–
Data Type:	BOOL	**Access Type:**	Read Only

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Not Detected	The situation is not detected.
1	Detected	The situation is detected.

P 5.31.1.1.4 End Of Curve Status

Indicates if an end-of-curve situation has occurred.

Default Value:	NA	**Parameter Type:**	Selection
Parameter Number:	6639	**Unit:**	–
Data Type:	BOOL	**Access Type:**	Read Only

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Not Detected	The situation is not detected.
1	Detected	The situation is detected.

P 5.31.1.1.5 No-Flow Output

Select an output for indicating that 'No-Flow' is detected.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	4212	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.31.1.1.6 Dry-Run Output

Select an output for indicating that 'Dry-Run' is detected.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	4211	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.31.1.1.7 End of Curve Output

Select an output for indicating that 'End of Curve' is detected.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	4210	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.31.1.1.8 Sleep Mode Output

Select an output for indicating that the drive is in Sleep Mode.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	4215	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.31.1.1.9 No-Flow Boost Active Output

Select an output for indicating that a no-flow boost is active.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	6556	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

6.7.14.1.2 General Settings (Menu Index 5.31.1.2)

P 5.31.1.2.1 No-Flow Detection Mode

Choose the method to detect a no-flow situation.

Default Value:	0 (Disabled)	**Parameter Type:**	Selection
Parameter Number:	6062	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Disabled	
1	No-Flow Boost Detection	
2	No-Flow Power Detection	
3	No-Flow Low Speed	

P 5.31.1.2.2 No-Flow Response

Select the desired response in case a no-flow situation occurs. If no-flow is a desired or expected state, Sleep Mode could be a relevant response.

Default Value:	0 (Sleep Mode)	**Parameter Type:**	Selection
Parameter Number:	6031	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Sleep Mode	
3	Warning	The drive issues a warning.
9	Fault, Ramp down to stop	Event will trigger fault state, motor ramped to stop and entry added to event history log.

6.7.14.1.3 Power Curve (Menu Index 5.31.1.3)

P 5.31.1.3.1 Guided Power Curve Generation

Initiate a guide to support acquiring the two speed points for a power curve.

Default Value:	False	**Parameter Type:**	Selection
Parameter Number:	6077	**Unit:**	–
Data Type:	BOOL	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Off	The feature is disabled.
1	On	

P 5.31.1.3.2 Correction Factor

Set a correction factor for the Power Curve, used to tune No-Flow and Dry-Run detections based on the power curve.

Default Value:	1	**Parameter Type:**	Range (0.01 — 4)
Parameter Number:	6623	**Unit:**	PercentageFromFraction
Data Type:	REAL	**Access Type:**	Read/Write

P 5.31.1.3.3 Low Point Power

Enter the power at the low point in a forced no-flow situation, at around 50% of maximum speed.

Default Value:	–	**Parameter Type:**	Range (0.00 — *)
Parameter Number:	6620	**Unit:**	kW
Data Type:	REAL	**Access Type:**	Read/Write

P 5.31.1.3.4 High Point Power

Enter the power at the high point in a forced no-flow situation, at around 85% of maximum speed.

Default Value:	–	**Parameter Type:**	Range (0.00 — *)
Parameter Number:	6621	**Unit:**	kW
Data Type:	REAL	**Access Type:**	Read/Write

P 5.31.1.3.5 Low Speed Point

Set the low speed value to define the Power Curve.

Default Value:	25	**Parameter Type:**	Range (* — *)
Parameter Number:	6622	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 5.31.1.3.6 High Speed Point

Set the high speed value to define the Power Curve.

Default Value:	50	**Parameter Type:**	Range (* — *)
Parameter Number:	6226	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

6.7.14.1.4 No-Flow (Menu Index 5.31.1.4)

P 5.31.1.4.1 No-Flow Detection Mode

Choose the method to detect a no-flow situation.

Default Value:	0 (Disabled)	**Parameter Type:**	Selection
Parameter Number:	6062	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Disabled	No-Flow detection is disabled.
1	Boost Detection	Detects by boosting the setpoint at specified intervals, and monitors the feedback.
2	Power Detection	Detects when the actual power of the motor falls below the measured power curve.
3	Low Speed Detection	Detects when the motor operates below the speed set in No-Flow Speed Limit.

P 5.31.1.4.2 No-Flow Response

Select the desired response in case a no-flow situation occurs. If no-flow is a desired or expected state, Sleep Mode could be a relevant response.

Default Value:	0 (Sleep Mode)	**Parameter Type:**	Selection
Parameter Number:	6031	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Sleep Mode	
3	Warning	The drive issues a warning.
9	Fault, Ramp down to stop	Event will trigger fault state, motor ramped to stop and entry added to event history log.

P 5.31.1.4.3 No-Flow Speed Limit

Set the speed limit which triggers a no-flow situation.

Default Value:	–	**Parameter Type:**	Range (* — 0.00)
Parameter Number:	6002	**Unit:**	MotorRpm
Data Type:	REAL	**Access Type:**	Read/Write

P 5.31.1.4.4 Detection Time

Set the on reference duration before setpoint is boosted.

Default Value:	60	**Parameter Type:**	Range (0 — 600)
Parameter Number:	6003	**Unit:**	s
Data Type:	UDINT	**Access Type:**	Read/Write

P 5.31.1.4.5 No-Flow Delay

Set the time delay before No-Flow is activated after going below the No-Flow Speed Limit.

Default Value:	5	**Parameter Type:**	Range (0 — 600)
Parameter Number:	6004	**Unit:**	s
Data Type:	UDINT	**Access Type:**	Read/Write

P 5.31.1.4.6 Setpoint Percent Boost Value

Set the percentage by which the setpoint increases when the setpoint boost is active.

Default Value:	0.05	**Parameter Type:**	Range (* — 1)
Parameter Number:	6007	**Unit:**	PercentageFromFraction
Data Type:	REAL	**Access Type:**	Read/Write

P 5.31.1.4.7 No-Flow Boost Timeout

Set the maximum boost time.

Default Value:	60	**Parameter Type:**	Range (0 — 600)
Parameter Number:	6020	**Unit:**	s
Data Type:	UDINT	**Access Type:**	Read/Write

P 5.31.1.4.8 Sleep Mode With Boost

Set the boost before entering Sleep Mode. The drive must run in process controller mode, No-Flow Response must be set to Sleep Mode, and No-Flow Mode must be power detection or low speed detection.

Default Value:	False	**Parameter Type:**	Selection
Parameter Number:	6635	**Unit:**	–
Data Type:	BOOL	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Disabled	Disables the function.
1	Enabled	Enables the function.

6.7.14.1.5 Dry-Run (Menu Index 5.31.1.5)

P 5.31.1.5.1 Dry-Run

Enable the Dry-Run monitor.

Default Value:	False	**Parameter Type:**	Selection
Parameter Number:	6625	**Unit:**	–
Data Type:	BOOL	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Disabled	Disables the function.
1	Enabled	Enables the function.

P 5.31.1.5.2 Dry-Run Response

Select the Dry-Run Response.

Default Value:	3 (Warning)	**Parameter Type:**	Selection
Parameter Number:	6626	**Unit:**	–

Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
3	Warning	The drive issues a warning.
9	Fault, Ramp down to stop	Event will trigger fault state, motor ramped to stop and entry added to event history log.

P 5.31.1.5.3 Dry-Run Delay

Set the time delay before Dry-Run is triggered after going below the Power Curve at maximum motor speed.

Default Value:	5	**Parameter Type:**	Range (0 — 600)
Parameter Number:	6627	**Unit:**	s
Data Type:	UDINT	**Access Type:**	Read/Write

6.7.14.1.6 Sleep Mode (Menu Index 5.31.1.6)

P 5.31.1.6.1 Sleep Mode Terminal

Select a digital input terminal for triggering Sleep Mode.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	5040	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.31.1.6.2 Minimum Run Time

Set the minimum time that the drive must run before Sleep Mode can be activated.

Default Value:	5	**Parameter Type:**	Range (0 — 1000)
Parameter Number:	5041	**Unit:**	s
Data Type:	UDINT	**Access Type:**	Read/Write

P 5.31.1.6.3 Minimum Sleep Time

Set the minimum time that the drive stays in Sleep Mode.

Default Value:	5	**Parameter Type:**	Range (0 — 1000)
Parameter Number:	5042	**Unit:**	s
Data Type:	UDINT	**Access Type:**	Read/Write

P 5.31.1.6.4 Wake up Margin

Set the percent margin of the setpoint which is compared to the feedback. Relevant in process controller mode only.

Default Value:	0.1	**Parameter Type:**	Range (0 — 1)
Parameter Number:	5043	**Unit:**	PercentageFromFraction
Data Type:	REAL	**Access Type:**	Read/Write

P 5.31.1.6.5 Wake up Reference

Set the reference which will trigger wake up from Sleep Mode.

Default Value:	–	**Parameter Type:**	Range (* — *)
Parameter Number:	6199	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

6.7.14.1.7 End of Curve (Menu Index 5.31.1.7)

P 5.31.1.7.1 End of Curve

Enable the End of Curve monitor.

Default Value:	False	**Parameter Type:**	Selection
Parameter Number:	6109	**Unit:**	–
Data Type:	BOOL	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Disabled	Disables the function.
1	Enabled	Enables the function.

P 5.31.1.7.2 End of Curve Response

Select the End of Curve Response.

Default Value:	3 (Warning)	**Parameter Type:**	Selection
Parameter Number:	6107	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
3	Warning	
9	Fault, Ramp down to stop	Event will trigger fault state, motor ramped to stop and entry added to event history log.

P 5.31.1.7.3 End of Curve Delay

Set the time delay before the End of Curve function is activated after reaching the end of the curve.

Default Value:	10	**Parameter Type:**	Range (0 — 600)
Parameter Number:	6099	**Unit:**	s
Data Type:	UDINT	**Access Type:**	Read/Write

P 5.31.1.7.4 End of Curve Tolerance

Set the percentage of the setpoint that the pressure can fall below before the End of Curve function is triggered.

Default Value:	0.02	**Parameter Type:**	Range (0 — 0.3)
Parameter Number:	6108	**Unit:**	PercentageFromFraction
Data Type:	REAL	**Access Type:**	Read/Write

6.7.14.2 Multi-Pump Control (Menu Index 5.31.2)

6.7.14.2.1 Multi-Pump Control Status (Menu Index 5.31.2.1)

P 5.31.2.1.1 MPC Status

Shows the status of the Multi Pump Controller.

Default Value:	NA	**Parameter Type:**	Selection
Parameter Number:	5362	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read Only

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Inactive	Multi Pump Control is not selected as Operation Mode.
1	Off	Multi-pump system is off.
2	Running	Multi-pump system is running.
3	Staging	Multi-pump system is staging an additional pump.
4	Destaging	Multi-pump system is destaging a running pump.
5	Stopping	Multi-pump system is stopping all pumps.
6	Running with fault	Multi-pump system continues to run while the drive is in fault state.

P 5.31.2.1.2 Number Of Fixed-Speed Pumps Running

Shows the number of fixed-speed pumps that are running.

Default Value:	NA	**Parameter Type:**	Range (0 — 5)
Parameter Number:	5331	**Unit:**	–
Data Type:	USINT	**Access Type:**	Read Only

P 5.31.2.1.3 Fixed-Speed Pump 1 Status

Shows the status of fixed-speed pump 1. Running, Locked, Not Configured (terminal is not configured), Off (terminal is configured but the pump is not running).

Default Value:	NA	**Parameter Type:**	Selection
Parameter Number:	5340	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read Only

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Off	
1	Running	
2	Locked	
3	Not Configured	

P 5.31.2.1.4 Fixed-Speed Pump 2 Status

Shows the status of fixed-speed pump 2. Running, Locked, Not Configured (terminal is not configured), Off (terminal is configured but the pump is not running).

Default Value:	NA	**Parameter Type:**	Selection
Parameter Number:	5341	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read Only

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Off	
1	Running	
2	Locked	
3	Not Configured	

P 5.31.2.1.5 Fixed-Speed Pump 3 Status

Shows the status of fixed-speed pump 3. Running, Locked, Not Configured (terminal is not configured), Off (terminal is configured but the pump is not running).

Default Value:	NA	**Parameter Type:**	Selection
Parameter Number:	5342	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read Only

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Off	
1	Running	
2	Locked	
3	Not Configured	

P 5.31.2.1.6 Fixed-Speed Pump 4 Status

Shows the status of fixed-speed pump 4. Running, Locked, Not Configured (terminal is not configured), Off (terminal is configured but the pump is not running).

Default Value:	NA	**Parameter Type:**	Selection
Parameter Number:	5343	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read Only

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Off	
1	Running	
2	Locked	
3	Not Configured	

P 5.31.2.1.7 Fixed-Speed Pump 5 Status

Shows the status of fixed-speed pump 5. Running, Locked, Not Configured (terminal is not configured), Off (terminal is configured but the pump is not running).

Default Value:	NA	**Parameter Type:**	Selection
Parameter Number:	5344	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read Only

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Off	
1	Running	
2	Locked	
3	Not Configured	

P 5.31.2.1.8 Fixed-Speed Pump 1 Running Hours

Shows running hours of fixed-speed pump 1.

Default Value:	[0,0,0,0,0]	**Parameter Type:**	Range (0 — 1000000)
Parameter Number:	5350	**Unit:**	h
Data Type:	UDINT	**Access Type:**	Read/Write

P 5.31.2.1.9 Fixed-Speed Pump 2 Running Hours

Shows running hours of fixed-speed pump 2.

Default Value:	[0,0,0,0,0]	**Parameter Type:**	Range (0 — 1000000)
Parameter Number:	5351	**Unit:**	h
Data Type:	UDINT	**Access Type:**	Read/Write

P 5.31.2.1.10 Fixed-Speed Pump 3 Running Hours

Shows running hours of fixed-speed pump 3.

Default Value:	[0,0,0,0,0]	**Parameter Type:**	Range (0 — 1000000)
Parameter Number:	5352	**Unit:**	h
Data Type:	UDINT	**Access Type:**	Read/Write

P 5.31.2.1.11 Fixed-Speed Pump 4 Running Hours

Shows running hours of fixed-speed pump 4.

Default Value:	[0,0,0,0,0]	**Parameter Type:**	Range (0 — 1000000)
Parameter Number:	5353	**Unit:**	h
Data Type:	UDINT	**Access Type:**	Read/Write

P 5.31.2.1.12 Fixed-Speed Pump 5 Running Hours

Shows running hours of fixed-speed pump 5.

Default Value:	[0,0,0,0,0]	**Parameter Type:**	Range (0 — 1000000)
Parameter Number:	5354	**Unit:**	h
Data Type:	UDINT	**Access Type:**	Read/Write

P 5.31.2.1.13 Fixed-Speed Pump 1 Number of Starts

Shows the number of times the fixed-speed pump 1 has started.

Default Value:	0	**Parameter Type:**	Range (0 — 65500)
Parameter Number:	5357	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read Only

P 5.31.2.1.14 Fixed-Speed Pump 2 Number of Starts

Shows the number of times the fixed-speed pump 2 has started.

Default Value:	0	**Parameter Type:**	Range (0 — 65500)
Parameter Number:	5358	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read Only

P 5.31.2.1.15 Fixed-Speed Pump 3 Number of Starts

Shows the number of times the fixed-speed pump 3 has started.

Default Value:	0	**Parameter Type:**	Range (0 — 65500)
Parameter Number:	5359	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read Only

P 5.31.2.1.16 Fixed-Speed Pump 4 Number of Starts

Shows the number of times the fixed-speed pump 4 has started.

Default Value:	0	**Parameter Type:**	Range (0 — 65500)
Parameter Number:	5360	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read Only

P 5.31.2.1.17 Fixed-Speed Pump 5 Number of Starts

Shows the number of times the fixed-speed pump 5 has started.

Default Value:	0	**Parameter Type:**	Range (0 — 65500)
Parameter Number:	5361	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read Only

6.7.14.2.2 General Settings (Menu Index 5.31.2.2)

P 5.31.2.2.1 Maximum Number Of Fixed-Speed Pumps

Set the number of available fixed-speed pumps. A maximum of 5 fixed-speed pumps are supported.

Default Value:	5	**Parameter Type:**	Range (0 — 5)
Parameter Number:	5325	**Unit:**	–

Data Type:	USINT	**Access Type:**	Read/Write

P 5.31.2.2.2 General Fault Response

Select the response of the Multi Pump Controller to a general fault. The response to system faults such as Live Zero, No-Flow, Dry-Run, End of Curve, and Flow Confirmation is not configurable. System faults turn off all pumps.

Default Value:	0 (Turn Off Variable-Speed Pump)	**Parameter Type:**	Selection
Parameter Number:	5356	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Turn Off Variable-Speed Pump	Turn off only the variable-speed pump and continue operating the fixed-speed pumps.
1	Turn Off All Pumps	Turn off the variable-speed pump and all fixed-speed pumps.

P 5.31.2.2.3 Motor Start Type

Select the motor start type that fits the application.

Default Value:	0 (Direct on Line)	**Parameter Type:**	Selection
Parameter Number:	5363	**Unit:**	–
Data Type:	USINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Direct on Line	Select this for motors that are running directly on grid.
1	Softstarter	Select this if the pumps are connected to a softstarter.

6.7.14.2.3 Pump Configuration (Menu Index 5.31.2.3)

P 5.31.2.3.1 Fixed-Speed Pump 1 Terminal

Select an output terminal for fixed-speed pump 1.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	5320	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.31.2.3.2 Fixed-Speed Pump 2 Terminal

Select an output terminal for fixed-speed pump 2.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	5321	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.31.2.3.3 Fixed-Speed Pump 3 Terminal

Select an output terminal for fixed-speed pump 3.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	5322	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.31.2.3.4 Fixed-Speed Pump 4 Terminal

Select an output terminal for fixed-speed pump 4.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	5323	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.31.2.3.5 Fixed-Speed Pump 5 Terminal

Select an output terminal for fixed-speed pump 5.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	5324	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.31.2.3.6 Fixed-Speed Pump 1 Interlock

Select the input to lock or unlock fixed-speed pump 1.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	5335	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.31.2.3.7 Fixed-Speed Pump 2 Interlock

Select the input to lock or unlock fixed-speed pump 2.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	5336	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.31.2.3.8 Fixed-Speed Pump 3 Interlock

Select the input to lock or unlock fixed-speed pump 3.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	5337	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.31.2.3.9 Fixed-Speed Pump 4 Interlock

Select the input to lock or unlock fixed-speed pump 4.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	5338	**Unit:**	–

Data Type:	UINT	**Access Type:**	Read/Write

P 5.31.2.3.10 Fixed-Speed Pump 5 Interlock

Select the input to lock or unlock fixed-speed pump 5.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	5339	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

6.7.14.2.4 Staging Settings (Menu Index 5.31.2.4)

P 5.31.2.4.1 Staging Mode

Select the staging mode. While staging, the drive ramps down in speed, and while destaging, the drive ramps up in speed. The staging mode defines when the process control takes over again. For rapid staging, that happens earlier.

Default Value:	0 (Normal)	**Parameter Type:**	Selection
Parameter Number:	5334	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Normal	During staging/destaging, the drive speed ramps down/up until an impact in the feedback signal is observed, signaling that a fixed-speed pump is started/stopped, and then changes to process control again.
1	Rapid Staging	During staging/destaging, the drive speed ramps to the staging/destaging speed (defined by the Staging/Destaging threshold) and then changes to process control again.

P 5.31.2.4.2 Staging Bandwidth

Set the bandwidth within which the pressure is allowed to operate before staging or destaging the fixed-speed pumps.

Default Value:	0.2	**Parameter Type:**	Range (0 — 100000)
Parameter Number:	5326	**Unit:**	CustomProcessUnit
Data Type:	REAL	**Access Type:**	Read/Write

P 5.31.2.4.3 Fault Staging Bandwidth

Set the staging bandwidth that is applied when the variable-speed pump is halted due to a fault. A wider staging bandwidth is needed to avoid frequent staging and destaging.

Default Value:	0.4	**Parameter Type:**	Range (0 — 200000)
Parameter Number:	5355	**Unit:**	CustomProcessUnit
Data Type:	REAL	**Access Type:**	Read/Write

P 5.31.2.4.4 Staging Delay

Set the time for which the system feedback must remain below the operating range before a fixed-speed pump is turned on.

Default Value:	15	**Parameter Type:**	Range (0 — 3000)
Parameter Number:	5327	**Unit:**	s
Data Type:	UDINT	**Access Type:**	Read/Write

P 5.31.2.4.5 Destaging Delay

Set the time for which the system feedback must remain above the operating range before a fixed-speed pump is turned off.

Default Value:	15	**Parameter Type:**	Range (0 — 3000)
Parameter Number:	5328	**Unit:**	s
Data Type:	UDINT	**Access Type:**	Read/Write

P 5.31.2.4.6 Staging Threshold

Set a percentage between the maximum and minimum speed limits to determine the speed at which the fixed-speed pump is staged.

Default Value:	0.9	**Parameter Type:**	Range (0 — 1)
Parameter Number:	5333	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read/Write

P 5.31.2.4.7 Destaging Threshold

Set a percentage between the maximum and minimum speed limits to determine the speed at which the fixed-speed pump is destaged.

Default Value:	0.5	**Parameter Type:**	Range (0 — 1)
Parameter Number:	5332	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read/Write

P 5.31.2.4.8 Override Bandwidth

Set the bandwidth within which the pressure is allowed to operate before an immediate staging or destaging of fixed-speed pumps.

Default Value:	10	**Parameter Type:**	Range (0 — 10000)
Parameter Number:	5329	**Unit:**	CustomProcessUnit
Data Type:	REAL	**Access Type:**	Read/Write

P 5.31.2.4.9 Override Stabilization Time

Set the timer for allowing the system pressure to stabilize after staging a fixed-speed pump.

Default Value:	10	**Parameter Type:**	Range (0 — 300)
Parameter Number:	5330	**Unit:**	s
Data Type:	UDINT	**Access Type:**	Read/Write

P 5.31.2.4.10 Softstarter Ramp Up Delay

Set the delay between staging a softstarter and ramping down the lead pump. This can help eliminate any pressure surges.

Default Value:	2	**Parameter Type:**	Range (0 — 200)
Parameter Number:	5364	**Unit:**	s
Data Type:	UDINT	**Access Type:**	Read/Write

P 5.31.2.4.11 Softstarter Ramp Down Delay

Set the delay between destaging a softstarter and ramping up the lead pump. This can help eliminate any pressure surges.

Default Value:	10	**Parameter Type:**	Range (0 — 200)
Parameter Number:	5365	**Unit:**	s
Data Type:	UDINT	**Access Type:**	Read/Write

6.7.15 Auxiliary Device Control (Menu Index 5.33)

P 5.33.1 Motor and Cabinet Heater Ctrl. Output

Select an output to control the motor and cabinet heaters.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	220	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.33.2 Motor Fan Ctrl. Output

Select an output to control the motor fan.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	221	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.33.3 Cabinet Cooling Fan Ctrl. Output

Select an output to control the cabinet cooling fan.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	222	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

6.7.16 Auxiliary PID Controller (Menu Index 5.34)

6.7.16.1 Auxiliary PID Ctrl. Status (Menu Index 5.34.1)

P 5.34.1.1 Auxiliary PID Controller Output

Shows the actual output of the auxiliary PID controller.

Default Value:	NA	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6182	**Unit:**	%
Data Type:	REAL	**Access Type:**	Read Only

P 5.34.1.2 Auxiliary PID Reference

Shows the auxiliary PID reference.

Default Value:	NA	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6180	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read Only

P 5.34.1.3 Auxiliary PID Feedback

Shows the auxiliary PID feedback.

Default Value:	NA	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6179	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read Only

P 5.34.1.4 On Reference

Indicates if the controlled process is operating on the current reference.

Default Value:	NA	**Parameter Type:**	Range (False — True)
Parameter Number:	6187	**Unit:**	–
Data Type:	BOOL	**Access Type:**	Read Only

P 5.34.1.5 Auxiliary PID On Reference Output

Select an output for indicating if the auxiliary process is operating on the current reference.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	6557	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

6.7.16.2 General Settings (Menu Index 5.34.2)

P 5.34.2.1 Enable Auxiliary PID Controller

Enable the auxiliary PID controller.

Default Value:	False	**Parameter Type:**	Selection
Parameter Number:	6172	**Unit:**	–
Data Type:	BOOL	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Disabled	Disables the function.
1	Enabled	Enables the function.

P 5.34.2.2 On Reference Tolerance

Set the tolerance of the On Reference indicator. When the control error (the difference between the reference and the feedback) is less than the defined percentage of the reference, the On Reference flag is True.

Default Value:	0.01	**Parameter Type:**	Range (0 — 1)
Parameter Number:	6185	**Unit:**	PercentageFromFraction
Data Type:	REAL	**Access Type:**	Read/Write

P 5.34.2.3 Analog Output Terminal

Select the output terminal for the auxiliary PID controller.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	6181	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.34.2.4 Controller Input Max.

Sets the maximum value used for normalization of Reference and Feedback.

Default Value:	10	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6183	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 5.34.2.5 Controller Input Min.

Sets the minimum value used for normalization of Reference and Feedback.

Default Value:	–	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6184	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

6.7.16.3 Reference (Menu Index 5.34.3)

P 5.34.3.1 Reference Source

Select the source of the reference.

Default Value:	0 (Analog Reference Input)	**Parameter Type:**	Selection
Parameter Number:	6169	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Analog Reference Input	Use the reference from I/O.
1	Preset Reference	Set a preset as the reference.
2	Fieldbus reference	Use reference from the fieldbus.

P 5.34.3.2 Preset Reference

Set the value of the preset reference.

Default Value:	1	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6170	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 5.34.3.3 Analog Input Reference

Select the input or a predefined fixed value for the setpoint.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	6165	**Unit:**	–

Data Type:	UINT	**Access Type:**	Read/Write

P 5.34.3.4 Analog Input Reference Max.

Set the maximum reference for the analog input.

Default Value:	10	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6167	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 5.34.3.5 Analog Input Reference Min.

Set the minimum reference for the analog input.

Default Value:	–	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6168	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 5.34.3.6 Reference Lowpass Filter Tc

Set the time constant of the reference filter. Setting it to 0 disables the filter. Relevant if the reference signal fluctuates or is noisy.

Default Value:	–	**Parameter Type:**	Range (0.00 — 30000.00)
Parameter Number:	6171	**Unit:**	ms
Data Type:	REAL	**Access Type:**	Read/Write

6.7.16.4 Feedback (Menu Index 5.34.4)

P 5.34.4.1 Feedback Type

Select the type of feedback.

Default Value:	0 (Analog Feedback Terminal)	**Parameter Type:**	Selection
Parameter Number:	6174	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Analog Feedback Terminal	
1	Fieldbus Feedback	Use feedback value from the fieldbus.

P 5.34.4.2 Analog Input Feedback

Select the input or a predefined fixed value for the feedback.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	6173	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.34.4.3 Analog Input Feedback Max.

Set the maximum scaling value of the feedback.

Default Value:	10	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6175	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 5.34.4.4 Analog Input Feedback Min.

Set the minimum scaling value of the feedback.

Default Value:	–	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6176	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 5.34.4.6 Feedback Filter Tc

Set the time constant of the feedback filter. Relevant if the feedback signal is fluctuates or is noisy.

Default Value:	100.00	**Parameter Type:**	Range (0.00 — 30000.00)
Parameter Number:	6178	**Unit:**	ms
Data Type:	REAL	**Access Type:**	Read/Write

6.7.16.5 PID (Menu Index 5.34.5)

P 5.34.5.1 Proportional Gain

Set the propoportional gain of the PID controller.

Default Value:	1	**Parameter Type:**	Range (0 — 100000)
Parameter Number:	6190	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 5.34.5.2 Integral Time

Set the integral time of the PID controller. Values above 10000 deactivate the I part of the controller.

Default Value:	1	**Parameter Type:**	Range (0 — 1000000)
Parameter Number:	6192	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

P 5.34.5.3 Derivative Time

Set the derivative time of the PID controller. The differentiator does not react to a constant error, but provides a gain only when the error changes. The shorter the PID differentiation time, the stronger the gain from the differentiator. When set to 0 the derivative part is disabled.

Default Value:	–	**Parameter Type:**	Range (0 — 1000)
Parameter Number:	6188	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

P 5.34.5.4 Derivative Gain

Set a limit for the differentiator gain. If there is no limit, the differentiator gain increases when there are fast changes. To obtain a pure differentiator gain at slow changes and a constant differentiator gain where fast changes occur, limit the differentiator gain.

Default Value:	5	**Parameter Type:**	Range (1 — 100)
Parameter Number:	6189	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 5.34.5.5 PID Inverted

Inverts the output of the PID controller.

Default Value:	False	**Parameter Type:**	Range (False — True)
Parameter Number:	6191	**Unit:**	–
Data Type:	BOOL	**Access Type:**	Read/Write

6.7.16.6 Auto Tuning (Menu Index 5.34.6)

P 5.34.6.1 Auxiliary PID Controller Auto Tuning

Enable the auto tuning procedure of the auxiliary PID controller.

Default Value:	0 (Disabled)	**Parameter Type:**	Selection
Parameter Number:	6194	**Unit:**	–
Data Type:	BOOL	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Disabled	Disables the function.
1	Enabled	Enables the function.

P 5.34.6.2 Auto Tuning Reference

Set the reference point where the auto tuning is executed. Values are entered in process units.

Default Value:	0	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6195	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 5.34.6.3 Closed Loop Type

Selects the time constant "tau" of your system. It should be set up like this: <10s - FAST PRESSURE, 10-30s - SLOW PRESSURE, 30-600s - FAST TEMPERATURE, >600s - SLOW TEMPERATURE.

Default Value:	10 (Fast Pressure)	**Parameter Type:**	Selection
Parameter Number:	6196	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
10	Fast Pressure	
30	Slow Pressure	
600	Fast Temperature	
1800	Slow Temperature	

6.7.17 Signal Converter (Menu Index 5.35)

6.7.17.1 Signal Converter Status (Menu Index 5.35.1)

P 5.35.1.1 Converted Signal 1

Readout from Signal Converter 1.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	6700	**Unit:**	SigConvOutputUnit
Data Type:	REAL	**Access Type:**	Read Only

P 5.35.1.2 Converted Signal 2

Readout from Signal Converter 2.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	6701	**Unit:**	SigConvOutputUnit
Data Type:	REAL	**Access Type:**	Read Only

P 5.35.1.3 Converted Signal 3

Readout from Signal Converter 3.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	6702	**Unit:**	SigConvOutputUnit
Data Type:	REAL	**Access Type:**	Read Only

6.7.17.2 Signal Converter 1 (Menu Index 5.35.2)

P 5.35.2.1 Signal 1 Input Terminal

Set the input for the signal conversion.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	6703	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.35.2.2 Signal Converter 1 Min. Scaling

Set the minimum scaling value of the input signal.

Default Value:	0	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6709	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 5.35.2.3 Signal Converter 1 Max. Scaling

Set the maximum scaling value of the input signal.

Default Value:	10	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6706	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 5.35.2.4 Signal Converter 1 Method

Select the conversion method for Signal Converter 1.

Default Value:	0 (K-factor Pressure to Flow)	**Parameter Type:**	Selection
Parameter Number:	6712	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	K-factor Pressure to Flow	
1	Pressure to Temperature	This function is relevant for compressor and refrigeration systems. Converting pressure to temperature is considered a stable and reliable method to acquire the temperature of the system.

6.7.17.3 Signal Converter 2 (Menu Index 5.35.3)

P 5.35.3.1 Signal 2 Input Terminal

Set the input for the signal conversion.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	6704	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.35.3.2 Signal Converter 2 Min. Scaling

Set the minimum scaling value of the input signal.

Default Value:	0	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6710	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 5.35.3.3 Signal Converter 2 Max. Scaling

Set the maximum scaling value of the input signal.

Default Value:	10	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6707	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 5.35.3.4 Signal Converter 2 Method

Select the conversion method for Signal Converter 2.

Default Value:	0 (K-factor Pressure to Flow)	**Parameter Type:**	Selection
Parameter Number:	6713	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	K-factor Pressure to Flow	
1	Pressure to Temperature	This function is relevant for compressor and refrigeration systems. Converting pressure to temperature is considered a stable and reliable method to acquire the temperature of the system.

6.7.17.4 Signal Converter 3 (Menu Index 5.35.4)

P 5.35.4.1 Signal 3 Input Terminal

Set the input for the signal conversion.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	6705	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 5.35.4.2 Signal Converter 3 Min. Scaling

Set the minimum scaling value of the input signal.

Default Value:	0	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6711	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 5.35.4.3 Signal Converter 3 Max. Scaling

Set the maximum scaling value of the input signal.

Default Value:	10	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6708	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 5.35.4.4 Signal Converter 3 Method

Select the conversion method for Signal Converter 3.

Default Value:	0 (K-factor Pressure to Flow)	**Parameter Type:**	Selection
Parameter Number:	6714	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	K-factor Pressure to Flow	
1	Pressure to Temperature	This function is relevant for compressor and refrigeration systems. Converting pressure to temperature is considered a stable and reliable method to acquire the temperature of the system.

6.7.17.5 Pressure to Flow Conversion (Menu Index 5.35.5)

P 5.35.5.1 Fan K-factor

Set the K-factor value to use for Pressure to Flow Conversions. Refer to the fan manufacturer's datasheet or product label.

Default Value:	1000	**Parameter Type:**	Range (0 — 100000)
Parameter Number:	6715	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 5.35.5.2 Fan K-factor manufacturer

Select the method for using the K-factor value from the fan manufacturer's datasheet. Fan manufacturers use the K-factor in different ways. Refer to the Application Guide.

Default Value:	3 (Danfoss, Gebhardt, Rosenberg, Comefri, Nicotra-Gebhardt)	**Parameter Type:**	Selection
Parameter Number:	6719	**Unit:**	–
Data Type:	USINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
1	Ebm-Papst, Ziehl-Abbeg, Ziehl, Nicotra	Unit In: 'Pa' | Unit Out: 'm³/h' | Formula: 'q = k * sqrt(Δp)'.
2	Ziehl-Abbeg	Unit In: 'Pa' | Unit Out: 'm³/h' | Formula: 'q = sqrt(ρ_20 / ρ) * k * sqrt(Δp)'.
3	Danfoss, Gebhardt, Rosenberg, Comefri, Nicotra-Gebhardt	Unit In: 'Pa' | Unit Out: 'm³/h' | Formula: 'q = k * sqrt(2 / ρ * Δp)'.
4	Fläkt Woods	Unit In: 'Pa' | Unit Out: 'm³/s' | Formula: 'q = 1 / k * sqrt(Δp)'.
5	NOVENCO	Unit In: 'Pa' | Unit Out: 'm³/s' | Formula: 'q = k * sqrt(Δp)'.
6	Greenheck	Unit In: 'in WG' | Unit Out: 'ft³/min' | Formula: 'q = k * sqrt(Δp / ρ)' with ρ in unit 'lb / ft³ * °F'.

P 5.35.5.3 Air Density

Set the air density for Pressure to Flow Conversions.

Default Value:	1.2	**Parameter Type:**	Range (0.1 — 100000)
Parameter Number:	6716	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 5.35.5.4 Signal Unit

Set the unit of the signal provided to the conversion.

Default Value:	2 (Pa)	**Parameter Type:**	Selection
Parameter Number:	6717	**Unit:**	–
Data Type:	USINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	mbar	Pressure in millibars.
1	bar	Pressure in bars.
2	Pa	Pressure in pascals.
3	kPa	Pressure in kilopascals.
19	m WG	Meter water gauge.
20	mm Hg	Millimeters of mercury.
32	psi	lb/in^2.
33	in WG	Inches of water.
34	in Hg	Inches of mercury.
35	ft WG	Feet of water.

P 5.35.5.5 Flow Unit

Set the output unit of the flow conversion.

Default Value:	9 (m^3/h)	**Parameter Type:**	Selection
Parameter Number:	6718	**Unit:**	–
Data Type:	USINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
9	m^3/h	Cubic meters per hour.
7	m^3/s	Cubic meters per second.
17	ft^3/min	Cubic feet per minute.

6.7.17.6 Pressure to Temperature (Menu Index 5.35.6)

P 5.35.6.1 Refrigerant

Choose the type of refrigerant, or apply custom coefficients.

Default Value:	4 (R22)	**Parameter Type:**	Selection
Parameter Number:	6351	**Unit:**	–
Data Type:	USINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Customized	
1	R12	
2	R13	
3	R13B1	
4	R22	
5	R23	
6	R32	
7	R114	
8	R123	
9	R125	
10	R134a	
11	R142b	
12	R152a	
13	R170	
14	R227ea	
15	R236ea	
16	R236fa	
17	R245fa	
18	R290	
19	R401A	
20	R401B	
21	R402A	
22	R402B	
23	R403B	
24	R404A	
25	R406A	
26	R407A	
27	R407B	
28	R407C	
29	R407D	
30	R407F	
31	R407H	
32	R408A	
33	R409A	
34	R409B	
35	R410A	
36	R413A	

Selection Number	Selection Name	Selection Description
37	R414B	
38	R416A	
39	R417A	
40	R417C	
41	R420A	
42	R421A	
43	R422A	
44	R422B	
45	R422C	
46	R422D	
47	R424A	
48	R427A	
49	R434A	
50	R438A	
51	R442A	
52	R443A	
53	R444A	
54	R444B	
55	R445A	
56	R447A	
57	R448A	
58	R449A	
59	449B	
60	R449C	
61	R450A	
62	R452A	
63	R452B	
64	R453A	
65	R454A	
66	R454B	
67	R454C	
68	R455A	
69	R463A	
70	R469A	
71	R500	
72	R502	
73	R503	

Selection Number	Selection Name	Selection Description
74	R507A	
75	R508B	
76	R511A	
77	R513A	
78	R516A	
79	R600	
80	R600a	
81	R601	
82	R601a	
83	R717	
84	R744	
85	R744A	
86	R1150	
87	R1224yd(Z)	
88	R1233zdE	
89	R1234yf	
90	R1234zeE	
91	R1234zeZ	
92	R1270	
93	R1336mzz(Z)	

P 5.35.6.2 Temperature Unit

Select the unit for temperature.

Default Value:	21 (°C)	**Parameter Type:**	Selection
Parameter Number:	6350	**Unit:**	–
Data Type:	USINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
21	°C	Degrees Celcius.
22	°F	Degrees Fahrenheit.

P 5.35.6.3 Signal Unit

Set the unit of the signal provided to the conversion.

Default Value:	1 (bar)	**Parameter Type:**	Selection
Parameter Number:	6720	**Unit:**	–
Data Type:	USINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	mbar	Pressure in millibars.
1	bar	Pressure in bars.
2	Pa	Pressure in pascals.
3	kPa	Pressure in kilopascals.
19	m WG	Meter water gauge.
20	mm Hg	Millimeters of mercury.
32	psi	lb/in^2.
33	in WG	Inches of water.
34	in Hg	Inches of mercury.
35	ft WG	Feet of water.

P 5.35.6.4 Refrigerant Const. A1

Displays the value of refrigerant constant A1. Modifying the displayed value will change the refrigerant type to "Customized".

Default Value:	0	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6352	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 5.35.6.5 Refrigerant Const. A2

Displays the value of refrigerant constant A2. Modifying the displayed value will change the refrigerant type to "Customized".

Default Value:	0	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6353	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 5.35.6.6 Refrigerant Const. A3

Displays the value of refrigerant constant A3. Modifying the displayed value will change the refrigerant type to "Customized".

Default Value:	0	**Parameter Type:**	Range (-1000000 — 1000000)
Parameter Number:	6354	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

6.7.18 Bypass Panel (Menu Index 5.36)

P 5.36.1 Bypass Panel Status

Shows the current active unit of the bypass panel.

Default Value:	NA	**Parameter Type:**	Selection
Parameter Number:	6800	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read Only

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	None	
1	Drive	Control the motor with the variable frequency converter.
2	Bypass	Bypass drive control and connect the motor directly to the grid.

P 5.36.2 Bypass Mode Change

Select the requested mode for bypass panel.

Default Value:	0 (Drive)	**Parameter Type:**	Selection
Parameter Number:	6801	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Drive	Control the motor with the variable frequency converter.
1	Bypass	Bypass drive control and connect the motor directly to the grid.

P 5.36.3 Bypass Auto Switch Delay

Set the time delay before the automatically switching to bypass mode when the drive unit reports a fault.

Default Value:	Parameter Type:	**Selection**	
Parameter Number:	6802	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Off	The feature is disabled.
5	5 s	Fixed value: 5 s.
10	10 s	Fixed value: 10 s.
30	30 s	Fixed value: 30 s.

6.7.19 Logic (Menu Index 5.40)

6.7.19.1 Logic Status (Menu Index 5.40.1)

P 5.40.1.1 Logic Running Mode

Select the running mode for Logic.

Default Value:	2 (Disabled)	**Parameter Type:**	Selection
Parameter Number:	21091	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Running	Logic is is in execution mode.
1	Programming	Logic is in programming mode.
2	Disabled	Logic is disabled.

P 5.40.1.2 Logic State

Shows the current active state in Logic.

Default Value:	NA	**Parameter Type:**	Selection
Parameter Number:	21094	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	No State	No state active.
1	State 1	State 1 active.
2	State 2	State 2 active.
3	State 3	State 3 active.
4	State 4	State 4 active.
5	State 5	State 5 active.

P 5.40.1.3 Logic Time In Current State

Shows the time that the current state in Logic has been active.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	21095	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

P 5.40.1.10 Logic Speed Reference

Shows Logic speed reference.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	21110	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 5.40.1.12 Logic Process Reference

Shows Logic process reference.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	21112	**Unit:**	CustomProcessUnit
Data Type:	REAL	**Access Type:**	Read/Write

6.7.19.2 User Parameters (Menu Index 5.40.2)

P 5.40.2.1 Logic User Process Parameter 1

User parameter providing data sharing with Logic to Fieldbus, HMI etc. Will not be saved over a powercycle.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	360	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 5.40.2.2 Logic User Process Parameter 2

User parameter providing data sharing with Logic to Fieldbus, HMI etc. Will not be saved over a powercycle.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	361	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 5.40.2.3 Logic User Process Parameter 3

User parameter providing data sharing with Logic to Fieldbus, HMI etc. Will not be saved over a powercycle.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	362	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 5.40.2.4 Logic User Process Parameter 4

User parameter providing data sharing with Logic to Fieldbus, HMI etc. Will not be saved over a powercycle.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	363	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 5.40.2.5 Logic User Process Parameter 5

User parameter providing data sharing with Logic to Fieldbus, HMI etc. Will not be saved over a powercycle.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	364	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 5.40.2.6 Logic User Process Parameter 6

User parameter providing data sharing with Logic to Fieldbus, HMI etc. Will not be saved over a powercycle.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	365	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 5.40.2.7 Logic User Process Parameter 7

User parameter providing data sharing with Logic to Fieldbus, HMI etc. Will not be saved over a powercycle.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	366	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 5.40.2.8 Logic User Process Parameter 8

User parameter providing data sharing with Logic to Fieldbus, HMI etc. Will not be saved over a powercycle.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	367	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 5.40.2.10 Logic User Config Parameter 1

User parameter providing configuration value for Logic that will be saved over a powercycle. This may not be written continuously.

Default Value:	0	**Parameter Type:**	Range (* — *)
Parameter Number:	370	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 5.40.2.11 Logic User Config Parameter 2

User parameter providing configuration value for Logic that will be saved over a powercycle. This may not be written continuously.

Default Value:	0	**Parameter Type:**	Range (* — *)
Parameter Number:	371	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 5.40.2.12 Logic User Config Parameter 3

User parameter providing configuration value for Logic that will be saved over a powercycle. This may not be written continuously.

Default Value:	0	**Parameter Type:**	Range (* — *)
Parameter Number:	372	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 5.40.2.13 Logic User Config Parameter 4

User parameter providing configuration value for Logic that will be saved over a powercycle. This may not be written continuously.

Default Value:	0	**Parameter Type:**	Range (* — *)
Parameter Number:	373	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 5.40.2.14 Logic User Config Parameter 5

User parameter providing configuration value for Logic that will be saved over a powercycle. This may not be written continuously.

Default Value:	0	**Parameter Type:**	Range (* — *)
Parameter Number:	374	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 5.40.2.15 Logic User Config Parameter 6

User parameter providing configuration value for Logic that will be saved over a powercycle. This may not be written continuously.

Default Value:	0	**Parameter Type:**	Range (* — *)
Parameter Number:	375	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 5.40.2.16 Logic User Config Parameter 7

User parameter providing configuration value for Logic that will be saved over a powercycle. This may not be written continuously.

Default Value:	0	**Parameter Type:**	Range (* — *)
Parameter Number:	376	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 5.40.2.17 Logic User Config Parameter 8

User parameter providing configuration value for Logic that will be saved over a powercycle. This may not be written continuously.

Default Value:	0	**Parameter Type:**	Range (* — *)
Parameter Number:	377	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

6.8 Maintenance & Service (Menu Index 6)

6.8.1 Maintenance & Service Overview

This parameter group contains parameters exclusively related to status, events, and backup and restore.

6.8.2 Status (Menu Index 6.1)

6.8.2.1 Maintenance & Service (Menu Index 6.1.1)

P 6.1.1.1 Last Fault Number

Shows the number of the most recent active fault.

Default Value:	NA	**Parameter Type:**	Range (0 — 65535)
Parameter Number:	1610	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read Only

P 6.1.1.2 Last Warning Number

Shows the number of the most recent active warning.

Default Value:	NA	**Parameter Type:**	Range (0 — 65535)
Parameter Number:	1609	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read Only

P 6.1.1.3 Control Unit Temperature

Shows the temperature of the control unit.

Default Value:	NA	**Parameter Type:**	Range (-50 — 200)
Parameter Number:	2952	**Unit:**	°C
Data Type:	REAL	**Access Type:**	Read Only

6.8.3 Software Information (Menu Index 6.2)

P 6.2.1 Application Version

Shows the version of the application software.

Default Value:	–	**Parameter Type:**	Range (* — *)
Parameter Number:	151	**Unit:**	–
Data Type:	STRING	**Access Type:**	–

S 6.2.4 Manifest

6.8.4 Events (Menu Index 6.4)

S 6.4.1 Active Events

S 6.4.2 All Events

6.8.4.1 Event Simulation (Menu Index 6.4.3)

P 6.4.3.1 Simulate Event

Select a response to trigger a simulated event.

Default Value:	0 (No Action)	**Parameter Type:**	Selection
Parameter Number:	1400	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	No Action	No event is triggered.
1	Response 1	Activate event response 1.
2	Response 2	Activate event response 2.
3	Response 3	Activate event response 3.
4	Response 4	Activate event response 4.
5	Response 5	Activate event response 5.
6	Response 6	Activate event response 6.
7	Response 7	Activate event response 7.
8	Response 8	Activate event response 8.

Selection Number	Selection Name	Selection Description
9	Response 9	Activate event response 9.
10	Response 10	Activate event response 10.

P 6.4.3.2 Simulate Persisting Event

Select a response to trigger a persisting simulated event. Set back to 0 to allow a reset.

Default Value:	0 (No Action)	**Parameter Type:**	Selection
Parameter Number:	1401	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	No Action	No event is triggered.
1	Response 1	Activate event response 1.
2	Response 2	Activate event response 2.
3	Response 3	Activate event response 3.
4	Response 4	Activate event response 4.
5	Response 5	Activate event response 5.
6	Response 6	Activate event response 6.
7	Response 7	Activate event response 7.
8	Response 8	Activate event response 8.
9	Response 9	Activate event response 9.
10	Response 10	Activate event response 10.

P 6.4.3.3 Simulate Event Number

Set the number of the event to be simulated.

Default Value:	5260	**Parameter Type:**	Range (0 — 65535)
Parameter Number:	1402	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

6.8.4.2 Auto Reset (Menu Index 6.4.4)

The automatic reset function enables the resetting of events without the need for a manual reset operation. This function is enabled with parameter ***6.4.4.1 Auto Reset***.

When the function is enabled, a timer starts when an event requiring a reset is first triggered. An automatic reset is attempted at the end of each time interval. If any event requiring a reset is still active, the automatic reset attempt does not succeed, and the timer continues running. Once the maximum number of automatic reset attempts is reached, the automatic reset function stops, and a manual reset is required to clear the events.

If all events are reset (through either an automatic or manual reset), the function resets the number of attempts and stops the timer. The next event to trigger will begin a new cycle.

NOTICE
Before activating any automatic fault reset functions or changing limit values, make sure that no dangerous situations can occur after restart. If the auto reset function is activated, the device connected to the drive output starts automatically after an automatic fault reset.

NOTICE
A small set of events cannot be reset by the auto reset functionality, either because of safety reasons or because the events are critical for the lifetime of the drive.

P 6.4.4.1 Auto Reset

Enable the automatic resetting of faults.

Default Value:	False	**Parameter Type:**	Selection
Parameter Number:	1405	**Unit:**	–
Data Type:	BOOL	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Disabled	Disables the function.
1	Enabled	Enables the function.

P 6.4.4.2 Auto Reset Max Attempts

Set the maximum number of automatic resets that is allowed before a manual reset is required. 0 means the drive will auto reset infinite times. Some events can not be auto reset due to hardware protection or for safety reasons.

Default Value:	3	**Parameter Type:**	Range (0 — 20)
Parameter Number:	1406	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 6.4.4.3 Auto Reset Time Interval

Set the time interval from when an event happens to when it is automatically reset.

Default Value:	10	**Parameter Type:**	Range (1 — 600)
Parameter Number:	1407	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

6.8.5 Operational Counters (Menu Index 6.5)

P 6.5.1 Control Unit On Time

Shows the total operating time for the control unit.

Default Value:	0	**Parameter Type:**	Range (0 — 4294967295)
Parameter Number:	2000	**Unit:**	h
Data Type:	UDINT	**Access Type:**	Read Only

P 6.5.2 Power Unit On Time

Shows the total operating time for the power unit. The counter only increments if the DC link is powered.

Default Value:	0	**Parameter Type:**	Range (0 — 4294967295)
Parameter Number:	2001	**Unit:**	h
Data Type:	UDINT	**Access Type:**	Read Only

P 6.5.3 Energy Consumption

Shows the energy consumed.

Default Value:	0	**Parameter Type:**	Range (0 — 18446744073709600000)
Parameter Number:	2002	**Unit:**	kWh
Data Type:	ULINT	**Access Type:**	Read Only

P 6.5.4 Ground Faults

Shows the total number of ground faults.

Default Value:	0	**Parameter Type:**	Range (0 — 50000)
Parameter Number:	2004	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read Only

P 6.5.5 Overvoltage Faults

Shows the total number of overvoltage faults.

Default Value:	0	**Parameter Type:**	Range (0 — 50000)
Parameter Number:	2005	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read Only

P 6.5.6 Overcurrent Faults

Shows the total number of overcurrent faults.

Default Value:	0	**Parameter Type:**	Range (0 — 50000)
Parameter Number:	2006	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read Only

P 6.5.7 Short Circuit Faults

Shows the total number of short-circuit faults.

Default Value:	0	**Parameter Type:**	Range (0 — 50000)
Parameter Number:	2007	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read Only

P 6.5.8 Number Of Starts

Shows the number of starts of the motor.

Default Value:	0	**Parameter Type:**	Range (0 — 4294967295)
Parameter Number:	2008	**Unit:**	–
Data Type:	UDINT	**Access Type:**	Read Only

P 6.5.9 Active Running Hours

Shows the total number of active running hours of the motor.

Default Value:	0	**Parameter Type:**	Range (0 — 4294967295)
Parameter Number:	2009	**Unit:**	h
Data Type:	UDINT	**Access Type:**	Read Only

P 6.5.10 Motor Operation Below 10 Hz

Shows the number of hours of running below 10 Hz output frequency. Low speed operation with full load may decrease motor lifetime.

Default Value:	0	**Parameter Type:**	Range (0 — 4294967295)
Parameter Number:	2010	**Unit:**	h
Data Type:	UDINT	**Access Type:**	Read Only

6.8.6 Backup & Restore (Menu Index 6.7)

S 6.7.1 Backup

Create a backup of parameters.

For instructions on how to create a backup using the control panel, see 3.2.13.1 Making a System Backup Using the Control Panel.

For instructions on how to create a backup using MyDrive® Insight, see .

S 6.7.2 Restore

Restore parameters from a backup or to factory settings.

For instructions on how to restore the system configuration using the control panel, see 3.2.13.2 Restoring the System Configuration Using the Control Panel.

For instructions on how to restore the system configuration using MyDrive® Insight, see .

S 6.7.3 Existing Backups

Shows the existing backups of the parameters.

6.8.7 Preventive Maintenance (Menu Index 6.8)

6.8.7.1 Setting Up Preventive Maintenance

When setting up the parameters with the control panel or MyDrive Insight, the parameters are grouped in screens as shown in the following picture.

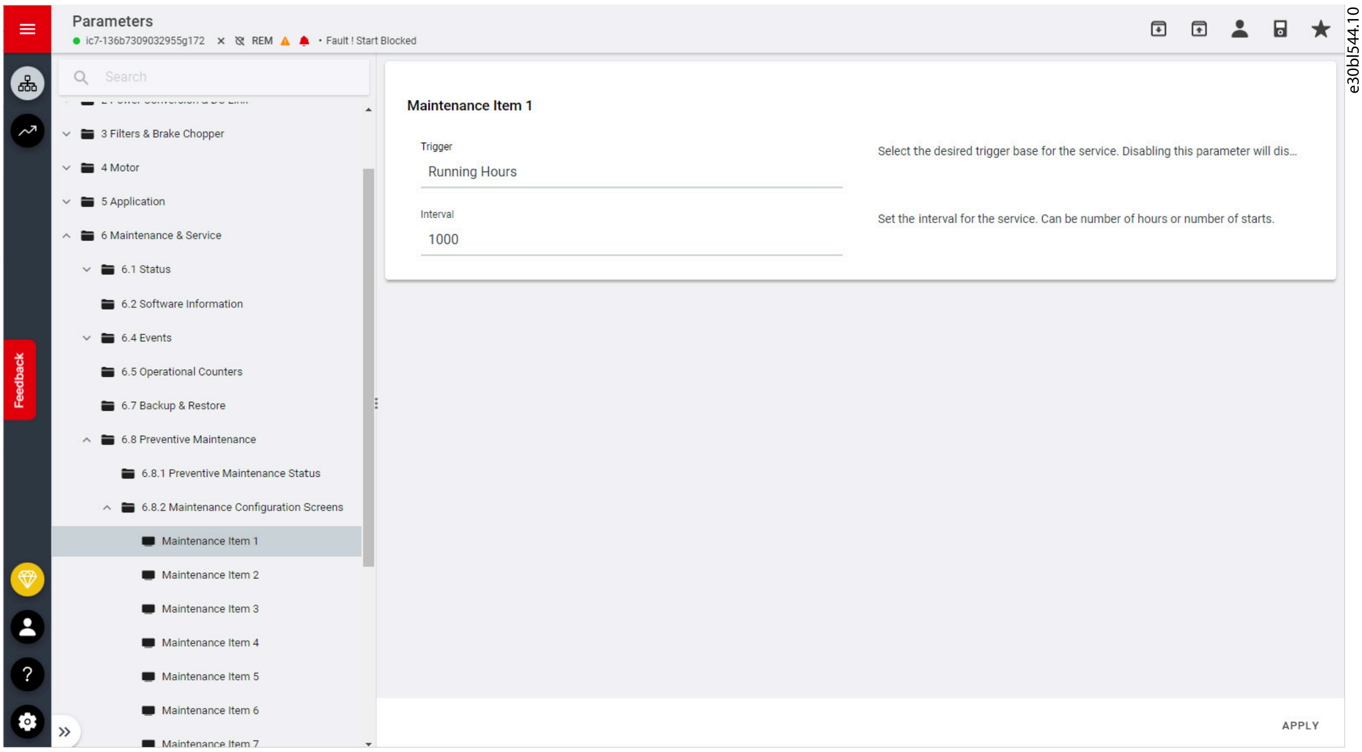


Figure 75: Preventive Maintenance Parameters in MyDrive Insight

1. Define the maintenance *Trigger Type*.

   Select how the need for maintenance is determined. There are 4 trigger types:

   - Disabled (default)
   - Running Hours (the running hours of the motor)
   - Operation Hours (the running hours of the drive)
   - Number of Starts

2. Define the maintenance *Interval*. The interval is the number of hours or number of motor starts after which maintenance is called for.
3. Press *Apply* to finish setting the parameters.

When a need for maintenance is triggered, the drive issues a warning and shows the maintenance request in MyDrive Insight and on the control panel.

To remove the maintenance request, the notification must be acknowledged by clicking *OK* in MyDrive Insight or pressing the *OK* button on the control panel. Acknowledging removes the warning and schedules a new service trigger with the same values (for example 1000 running hours).

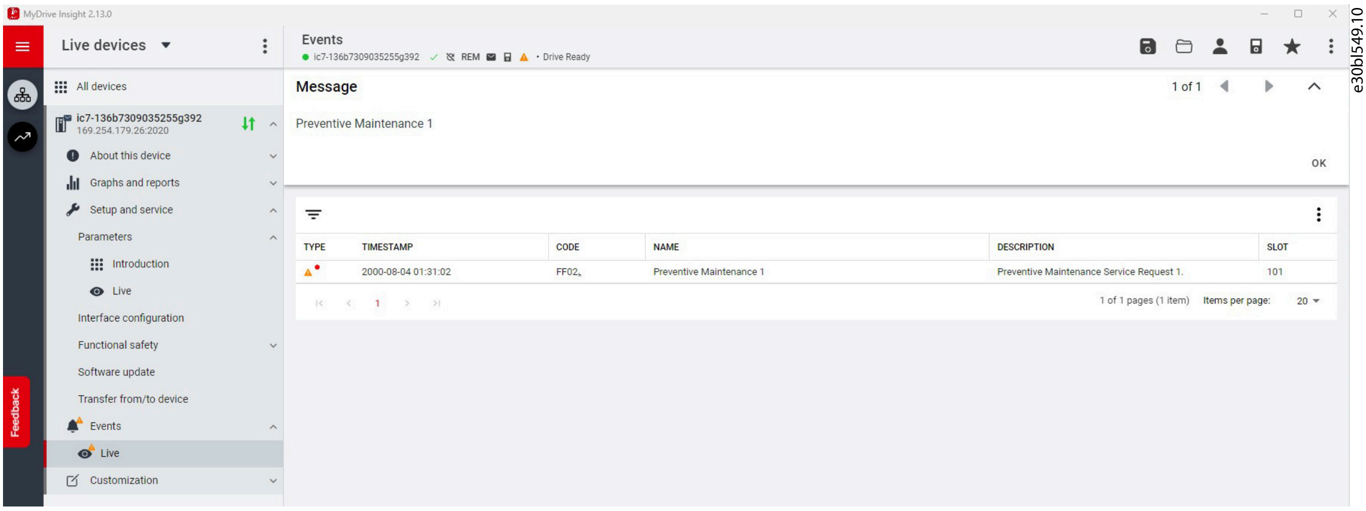


Figure 76: Maintenance Warning in MyDrive Insight

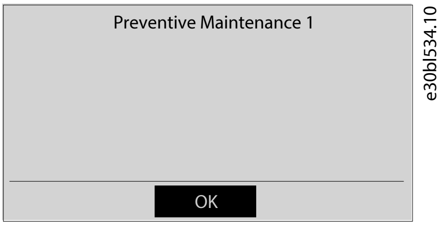


Figure 77: Maintenance Warning on the Control Panel

6.8.7.2 Preventive Maintenance Status (Menu Index 6.8.1)

P 6.8.1.1 Preventive Maintenance status word

Shows the current status of the preventive maintenance services. Bit 0 represents item 1, bit 1 represents item 2, and so on.

Default Value:	NA	**Parameter Type:**	Range (0 — 65535)
Parameter Number:	7042	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read Only

P 6.8.1.2 Preventive Maintenance acknowledge word

Acknowledge a preventive maintenance service request. To acknowledge request 1, set bit 0, for request 2, set bit 1, and so on. The bits are automatically reset.

Default Value:	0	**Parameter Type:**	Range (0 — 65535)
Parameter Number:	7043	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

6.8.7.3 Maintenance Request Notification and Acknowledging by Fieldbus

Preventive maintenance triggers and maintenance interval parameters can be set via the fieldbus with these parameters:

Table 35: Fieldbus Trigger Parameters

Parameter name	Parameter number
Preventive Maintenance Trigger 1	7002
Preventive Maintenance Trigger 2	7026

Table 35: Fieldbus Trigger Parameters - (continued)

Parameter name	Parameter number
Preventive Maintenance Trigger 3	7013
Preventive Maintenance Trigger 4	7014
Preventive Maintenance Trigger 5	7029
Preventive Maintenance Trigger 6	7031
Preventive Maintenance Trigger 7	7032
Preventive Maintenance Trigger 8	7033
Preventive Maintenance Trigger 9	7034
Preventive Maintenance Trigger 10	7035

Table 36: Fieldbus Maintenance Interval Parameters

Parameter name	Parameter number
Preventive Maintenance Interval 1	7003
Preventive Maintenance Interval 2	7025
Preventive Maintenance Interval 3	7017
Preventive Maintenance Interval 4	7018
Preventive Maintenance Interval 5	7019
Preventive Maintenance Interval 6	7037
Preventive Maintenance Interval 7	7038
Preventive Maintenance Interval 8	7039
Preventive Maintenance Interval 9	7040
Preventive Maintenance Interval 10	7041

The maintenance request can also be read via the fieldbus with the ***Preventive Maintenance Status Word (No. 7042)*** parameter. The bits of the word represent each of the 10 maintenance items.

Table 37: Preventive Maintenance Status Word Parameter

Bit	Description
0	Service request item 1
1	Service request item 2
2	Service request item 3
3	Service request item 4
4	Service request item 5
5	Service request item 6
6	Service request item 7
7	Service request item 8
8	Service request item 9
9	Service request item 10

The requests can be acknowledged via the fieldbus with the ***Preventive Maintenance Acknowledge Word (No. 7043)*** parameter. The bits of the word in the parameter represent each of the 10 maintenance items in the same way.

6.9 Functional Safety (Menu Index 7)

6.9.1 Functional Safety Overview

NOTICE

Select and apply the components in the safety control system appropriately to achieve the required level of operational safety. Before integrating and using STO in an installation, carry out a thorough risk analysis on the installation to determine whether the STO functionality and safety levels are appropriate and sufficient.

This parameter group contains non-safety-related parameters. They are used to configure the behavior of the drive after a functional safety event (for example, STO). Refer to the *Functional Safety Operating Guide* for more information.

6.9.2 Status (Menu Index 7.1)

P 7.1.1 Functional Safety Status Word

Shows the functional safety status word.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	4024	**Unit:**	–
Data Type:	WORD	**Access Type:**	Read Only

6.9.3 Safe Torque Off (STO)

The Safe Torque Off (STO) function is a component in a safety control system. STO prevents the unit from generating the power required to rotate the motor. The iC7 drives are available with:

- Safe Torque Off (STO), as defined by EN IEC 61800-5-2.
- Stop category 0, as defined in EN 60204-1.

STO Activation

The STO function is activated by removing the voltages at the STO inputs of the drive. By connecting the frequency converter to external safety devices providing a safe delay, an installation for a Safe Stop 1 can be obtained. External safety devices must fulfill the required Cat./PL or SIL when connected to STO inputs.

With default settings, the drive issues a fault, trips the unit, and coasts the motor to a stop when the STO function is activated. A manual restart is required to continue operation. Use the STO function to stop the drive when a safety function is required. In normal operating mode when STO is not required, use the standard stop function instead.

6.9.4 STO (Menu Index 7.3)

P 7.3.1 Safe Torque Off Response

Select the response and the restart behavior of the drive when safe torque off (STO) is activated. In all cases the motor is coasted and an unintended restart is prevented during the STO request.

Default Value:	14 (Fault)	**Parameter Type:**	Selection
Parameter Number:	9910	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
15	Warning	The drive issues a warning.
14	Fault	The drive issues a fault and coasts the motor.

P 7.3.2 Safe Torque Off Output

Select an output for signaling the activation of Safe Torque Off.

Default Value:	–	**Parameter Type:**	Selection
Parameter Number:	9911	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

6.9.5 Terminating STO and Resuming Normal Operation

1. Reapply the 24 V DC supply to safe inputs.
2. Give a reset signal (via fieldbus, digital I/0, or the control panel).

> Set the STO function to restart automatically by setting the value of parameter ***7.3.1 Safe Torque Off Response*** from the default value ***Fault (Manual reset)*** to the value ***Warning (Automatic reset)***. Automatic reset means that STO is terminated and normal operation is resumed when the 24 V DC is applied to STO inputs. No reset signal is required.

6.10 Customization (Menu Index 8)

6.10.1 Customization Overview

This parameter group contains parameters for customizing and adapting the behavior of the drive and user interface design.

6.10.2 Status (Menu Index 8.1)

P 8.1.1 Date & Time

Shows the current system time and date.

Default Value:	–	**Parameter Type:**	Range (* — *)
Parameter Number:	2799	**Unit:**	–
Data Type:	DATE_AND_TIME	**Access Type:**	Read/Write

P 8.1.2 Active NTP Server

Shows the active network time protocol (NTP) server.

Default Value:	–	**Parameter Type:**	Range (* — *)
Parameter Number:	6230	**Unit:**	–
Data Type:	STRING	**Access Type:**	Read Only

P 8.1.3 Last Time Received (NTP)

Shows the last time received from a network time protocol server.

Default Value:	–	**Parameter Type:**	Range (* — *)
Parameter Number:	6235	**Unit:**	–

Data Type:	DATE_AND_TIME	**Access Type:**	Read Only

6.10.3 Units (Menu Index 8.2)

P 8.2.2 Unit Selection

Select the unit system used.

Default Value:	*	**Parameter Type:**	Selection
Parameter Number:	2801	**Unit:**	–
Data Type:	USINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	SI (metric units)	International system of units.
1	USCS (United States customary units)	United States customary units.

P 8.2.3 Speed Unit

Select the speed unit.

Default Value:	0 (Hz)	**Parameter Type:**	Selection
Parameter Number:	2813	**Unit:**	–
Data Type:	USINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Hz	Use Hz as speed unit.
1	RPM	Use RPM as speed unit.

6.10.4 Control Panel (Menu Index 8.3)

S 8.3.1.1 Language

S 8.3.1.2 Brightness & Contrast

S 8.3.1.3 Time & Date Settings

General control panel date and time settings.

6.10.4.1 General Settings (Menu Index 8.3.1)

S 8.3.1.2 Time & Date Settings

General control panel date and time settings.

Set the system time zone, and select the date and time format to be shown on the control panel.

6.10.4.2 Status Line (Menu Index 8.3.2)

P 8.3.2.1 Status Line Left

Select the parameter for the left field in the status line.

Default Value:	65001 (Actual Output Value)	**Parameter Type:**	Selection
Parameter Number:	4332	**Unit:**	–
Data Type:	UDINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	None	Nothing selected.
65001	Actual Output Value	Shows the actual output value depending on the operation mode.
65002	Actual Reference Value	Shows the actual setpoint value depending on the operation mode.
9011	Motor Electrical Speed	Shows the motor shaft speed in electrical domain.
9000	Motor Current	Shows the actual motor current.
9010	Motor Shaft Speed	Shows the shaft speed in RPM.
9009	Motor Torque	Shows the actual motor torque.
1708	Relative Motor Torque	Shows the motor torque in % of the nominal motor torque.
9005	Motor Voltage	Shows the actual motor voltage.
9008	Motor Shaft Power	Shows the actual power at the motor shaft.
9042	Motor Shaft Power Filtered	Shows the filtered power at the motor shaft with a filter time of 1 second.
6075	Process Controller Output	Shows the output speed of the process controller, used as the speed reference for the speed controller.
6090	Process Controller Feedback	Shows the process controller feedback.
1718	Speed Reference	Shows the speed reference.
6092	Process Controller Setpoint	Readout of the process controller setpoint.
6151	Final Speed Reference	Shows the value of the speed reference before feeding it to the speed controller.
6153	Control Panel Speed Reference	Shows the value of the speed reference given from the control panel.
9044	DC-link Voltage	Shows the actual DC-link voltage.
9041	Grid Frequency	Shows the actual grid frequency.
9040	Line-To-Line Voltage (RMS)	Shows the average line-to-line voltage (RMS).
9048	L1-L2 Line Voltage (RMS)	Shows the L1-L2 line voltage (RMS).
9049	L2-L3 Line Voltage (RMS)	Shows the L2-L3 line voltage (RMS).
9050	L3-L1 Line Voltage (RMS)	Shows the L3-L1 line voltage (RMS).
9047	Grid Voltage Imbalance	Shows the grid voltage imbalance in %. A value greater than 3% may indicate grid problems.
6179	Auxiliary PID Feedback	Shows the auxiliary PID feedback.

Selection Number	Selection Name	Selection Description
6180	Auxiliary PID Reference	Shows the auxiliary PID reference.
6700	Signal Converter 1	
6701	Signal Converter 2	
6702	Signal Converter 3	
21094	Logic State	Shows the current active state in Logic.
21095	Logic Time In Current State	Shows the time that the current state in Logic has been active.
9015	Output Frequency	Shows the output frequency.
2009	Active Running Hours	Shows the total number of active running hours of the motor.
2002	Energy Consumption	Shows the energy consumed.
6547	Drive Thermal Load	Shows the actual counter number for the thermal load on the inverter.
5889	Asset Location	Specify the location of the drive to help identify it.
5890	Contact	Specify the contacts for this asset. Can be a name together with information on how to contact this person.
5891	Asset ID	Assign a unique ID to the drive to help identify it in a larger network.
5892	Asset Name	Define a name for this specific asset. If this is empty, the application name is used.
5362	MPC Status	Shows the status of the Multi Pump Controller.
5331	Number Of Fixed-Speed Pumps Running	Shows the number of fixed-speed pumps that are running.

P 8.3.2.2 Status Line Right

Select the parameter for the right field in the status line.

Default Value:	65002 (Actual Reference Value)	**Parameter Type:**	Selection
Parameter Number:	4331	**Unit:**	–
Data Type:	UDINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	None	Nothing selected.
65001	Actual Output Value	Shows the actual output value depending on the operation mode.
65002	Actual Reference Value	Shows the actual setpoint value depending on the operation mode.
9011	Motor Electrical Speed	Shows the motor shaft speed in electrical domain.
9000	Motor Current	Shows the actual motor current.
9010	Motor Shaft Speed	Shows the shaft speed in RPM.
9009	Motor Torque	Shows the actual motor torque.
1708	Relative Motor Torque	Shows the motor torque in % of the nominal motor torque.
9005	Motor Voltage	Shows the actual motor voltage.

Selection Number	Selection Name	Selection Description
9008	Motor Shaft Power	Shows the actual power at the motor shaft.
9042	Motor Shaft Power Filtered	Shows the filtered power at the motor shaft with a filter time of 1 second.
6075	Process Controller Output	Shows the output speed of the process controller, used as the speed reference for the speed controller.
6090	Process Controller Feedback	Shows the process controller feedback.
1718	Speed Reference	Shows the speed reference.
6092	Process Controller Setpoint	Readout of the process controller setpoint.
6151	Final Speed Reference	Shows the value of the speed reference before feeding it to the speed controller.
6153	Control Panel Speed Reference	Shows the value of the speed reference given from the control panel.
9044	DC-link Voltage	Shows the actual DC-link voltage.
9041	Grid Frequency	Shows the actual grid frequency.
9040	Line-To-Line Voltage (RMS)	Shows the average line-to-line voltage (RMS).
9048	L1-L2 Line Voltage (RMS)	Shows the L1-L2 line voltage (RMS).
9049	L2-L3 Line Voltage (RMS)	Shows the L2-L3 line voltage (RMS).
9050	L3-L1 Line Voltage (RMS)	Shows the L3-L1 line voltage (RMS).
9047	Grid Voltage Imbalance	Shows the grid voltage imbalance in %. A value greater than 3% may indicate grid problems.
6179	Auxiliary PID Feedback	Shows the auxiliary PID feedback.
6180	Auxiliary PID Reference	Shows the auxiliary PID reference.
6700	Signal Converter 1	
6701	Signal Converter 2	
6702	Signal Converter 3	
21094	Logic State	Shows the current active state in Logic.
21095	Logic Time In Current State	Shows the time that the current state in Logic has been active.
9015	Output Frequency	Shows the output frequency.
2009	Active Running Hours	Shows the total number of active running hours of the motor.
2002	Energy Consumption	Shows the energy consumed.
6547	Drive Thermal Load	Shows the actual counter number for the thermal load on the inverter.
5889	Asset Location	Specify the location of the drive to help identify it.
5890	Contact	Specify the contacts for this asset. Can be a name together with information on how to contact this person.
5891	Asset ID	Assign a unique ID to the drive to help identify it in a larger network.
5892	Asset Name	Define a name for this specific asset. If this is empty, the application name is used.

Selection Number	Selection Name	Selection Description
5362	MPC Status	Shows the status of the Multi Pump Controller.
5331	Number Of Fixed-Speed Pumps Running	Shows the number of fixed-speed pumps that are running.

P 8.3.2.3 Status Line Center

Select the parameter for the center field in the status line.

Default Value:	9008 (Motor Shaft Power)	**Parameter Type:**	Selection
Parameter Number:	4333	**Unit:**	–
Data Type:	UDINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	None	Nothing selected.
65001	Actual Output Value	Shows the actual output value depending on the operation mode.
65002	Actual Reference Value	Shows the actual setpoint value depending on the operation mode.
9011	Motor Electrical Speed	Shows the motor shaft speed in electrical domain.
9000	Motor Current	Shows the actual motor current.
9010	Motor Shaft Speed	Shows the shaft speed in RPM.
9009	Motor Torque	Shows the actual motor torque.
1708	Relative Motor Torque	Shows the motor torque in % of the nominal motor torque.
9005	Motor Voltage	Shows the actual motor voltage.
9008	Motor Shaft Power	Shows the actual power at the motor shaft.
9042	Motor Shaft Power Filtered	Shows the filtered power at the motor shaft with a filter time of 1 second.
6075	Process Controller Output	Shows the output speed of the process controller, used as the speed reference for the speed controller.
6090	Process Controller Feedback	Shows the process controller feedback.
1718	Speed Reference	Shows the speed reference.
6092	Process Controller Setpoint	Readout of the process controller setpoint.
6151	Final Speed Reference	Shows the value of the speed reference before feeding it to the speed controller.
6153	Control Panel Speed Reference	Shows the value of the speed reference given from the control panel.
9044	DC-link Voltage	Shows the actual DC-link voltage.
9041	Grid Frequency	Shows the actual grid frequency.
9040	Line-To-Line Voltage (RMS)	Shows the average line-to-line voltage (RMS).
9048	L1-L2 Line Voltage (RMS)	Shows the L1-L2 line voltage (RMS).
9049	L2-L3 Line Voltage (RMS)	Shows the L2-L3 line voltage (RMS).
9050	L3-L1 Line Voltage (RMS)	Shows the L3-L1 line voltage (RMS).

Selection Number	Selection Name	Selection Description
9047	Grid Voltage Imbalance	Shows the grid voltage imbalance in %. A value greater than 3% may indicate grid problems.
6179	Auxiliary PID Feedback	Shows the auxiliary PID feedback.
6180	Auxiliary PID Reference	Shows the auxiliary PID reference.
6700	Signal Converter 1	
6701	Signal Converter 2	
6702	Signal Converter 3	
21094	Logic State	Shows the current active state in Logic.
21095	Logic Time In Current State	Shows the time that the current state in Logic has been active.
9015	Output Frequency	Shows the output frequency.
2009	Active Running Hours	Shows the total number of active running hours of the motor.
2002	Energy Consumption	Shows the energy consumed.
6547	Drive Thermal Load	Shows the actual counter number for the thermal load on the inverter.
5889	Asset Location	Specify the location of the drive to help identify it.
5890	Contact	Specify the contacts for this asset. Can be a name together with information on how to contact this person.
5891	Asset ID	Assign a unique ID to the drive to help identify it in a larger network.
5892	Asset Name	Define a name for this specific asset. If this is empty, the application name is used.
5362	MPC Status	Shows the status of the Multi Pump Controller.
5331	Number Of Fixed-Speed Pumps Running	Shows the number of fixed-speed pumps that are running.

6.10.4.3 Status Screen 1 (Menu Index 8.3.3)

P 8.3.3.1 Status Value 1.1

Select the parameter for status value 1.1.

Default Value:	65001 (Actual Output Value)	**Parameter Type:**	Selection
Parameter Number:	300	**Unit:**	–
Data Type:	UDINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	None	Nothing selected.
65001	Actual Output Value	Shows the actual output value depending on the operation mode.
65002	Actual Reference Value	Shows the actual setpoint value depending on the operation mode.
9011	Motor Electrical Speed	Shows the motor shaft speed in electrical domain.
9000	Motor Current	Shows the actual motor current.

Selection Number	Selection Name	Selection Description
9010	Motor Shaft Speed	Shows the shaft speed in RPM.
9009	Motor Torque	Shows the actual motor torque.
1708	Relative Motor Torque	Shows the motor torque in % of the nominal motor torque.
9005	Motor Voltage	Shows the actual motor voltage.
9008	Motor Shaft Power	Shows the actual power at the motor shaft.
9042	Motor Shaft Power Filtered	Shows the filtered power at the motor shaft with a filter time of 1 second.
6075	Process Controller Output	Shows the output speed of the process controller, used as the speed reference for the speed controller.
6090	Process Controller Feedback	Shows the process controller feedback.
1718	Speed Reference	Shows the speed reference.
6092	Process Controller Setpoint	Readout of the process controller setpoint.
6151	Final Speed Reference	Shows the value of the speed reference before feeding it to the speed controller.
6153	Control Panel Speed Reference	Shows the value of the speed reference given from the control panel.
9044	DC-link Voltage	Shows the actual DC-link voltage.
9041	Grid Frequency	Shows the actual grid frequency.
9040	Line-To-Line Voltage (RMS)	Shows the average line-to-line voltage (RMS).
9048	L1-L2 Line Voltage (RMS)	Shows the L1-L2 line voltage (RMS).
9049	L2-L3 Line Voltage (RMS)	Shows the L2-L3 line voltage (RMS).
9050	L3-L1 Line Voltage (RMS)	Shows the L3-L1 line voltage (RMS).
9047	Grid Voltage Imbalance	Shows the grid voltage imbalance in %. A value greater than 3% may indicate grid problems.
6179	Auxiliary PID Feedback	Shows the auxiliary PID feedback.
6180	Auxiliary PID Reference	Shows the auxiliary PID reference.
6700	Signal Converter 1	
6701	Signal Converter 2	
6702	Signal Converter 3	
21094	Logic State	Shows the current active state in Logic.
21095	Logic Time In Current State	Shows the time that the current state in Logic has been active.
9015	Output Frequency	Shows the output frequency.
2009	Active Running Hours	Shows the total number of active running hours of the motor.
2002	Energy Consumption	Shows the energy consumed.
6547	Drive Thermal Load	Shows the actual counter number for the thermal load on the inverter.
5889	Asset Location	Specify the location of the drive to help identify it.
5890	Contact	Specify the contacts for this asset. Can be a name together with information on how to contact this person.

Selection Number	Selection Name	Selection Description
5891	Asset ID	Assign a unique ID to the drive to help identify it in a larger network.
5892	Asset Name	Define a name for this specific asset. If this is empty, the application name is used.
5362	MPC Status	Shows the status of the Multi Pump Controller.
5331	Number Of Fixed-Speed Pumps Running	Shows the number of fixed-speed pumps that are running.

P 8.3.3.2 Status Value 1.2

Select the parameter for status value 1.2.

Default Value:	0 (None)	**Parameter Type:**	Selection
Parameter Number:	301	**Unit:**	–
Data Type:	UDINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	None	Nothing selected.
9011	Motor Electrical Speed	Shows the motor shaft speed in electrical domain.
9000	Motor Current	Shows the actual motor current.
9010	Motor Shaft Speed	Shows the shaft speed in RPM.
9009	Motor Torque	Shows the actual motor torque.
1708	Relative Motor Torque	Shows the motor torque in % of the nominal motor torque.
9005	Motor Voltage	Shows the actual motor voltage.
9008	Motor Shaft Power	Shows the actual power at the motor shaft.
9042	Motor Shaft Power Filtered	Shows the filtered power at the motor shaft with a filter time of 1 second.
6075	Process Controller Output	Shows the output speed of the process controller, used as the speed reference for the speed controller.
6090	Process Controller Feedback	Shows the process controller feedback.
1718	Speed Reference	Shows the speed reference.
6092	Process Controller Setpoint	Readout of the process controller setpoint.
6151	Final Speed Reference	Shows the value of the speed reference before feeding it to the speed controller.
6153	Control Panel Speed Reference	Shows the value of the speed reference given from the control panel.
9044	DC-link Voltage	Shows the actual DC-link voltage.
9041	Grid Frequency	Shows the actual grid frequency.
9040	Line-To-Line Voltage (RMS)	Shows the average line-to-line voltage (RMS).
9048	L1-L2 Line Voltage (RMS)	Shows the L1-L2 line voltage (RMS).
9049	L2-L3 Line Voltage (RMS)	Shows the L2-L3 line voltage (RMS).

Selection Number	Selection Name	Selection Description
9050	L3-L1 Line Voltage (RMS)	Shows the L3-L1 line voltage (RMS).
9047	Grid Voltage Imbalance	Shows the grid voltage imbalance in %. A value greater than 3% may indicate grid problems.
6179	Auxiliary PID Feedback	Shows the auxiliary PID feedback.
6180	Auxiliary PID Reference	Shows the auxiliary PID reference.
6700	Signal Converter 1	
6701	Signal Converter 2	
6702	Signal Converter 3	
21094	Logic State	Shows the current active state in Logic.
21095	Logic Time In Current State	Shows the time that the current state in Logic has been active.
9015	Output Frequency	Shows the output frequency.
2009	Active Running Hours	Shows the total number of active running hours of the motor.
2002	Energy Consumption	Shows the energy consumed.
6547	Drive Thermal Load	Shows the actual counter number for the thermal load on the inverter.
5889	Asset Location	Specify the location of the drive to help identify it.
5890	Contact	Specify the contacts for this asset. Can be a name together with information on how to contact this person.
5891	Asset ID	Assign a unique ID to the drive to help identify it in a larger network.
5892	Asset Name	Define a name for this specific asset. If this is empty, the application name is used.
5362	MPC Status	Shows the status of the Multi Pump Controller.
5331	Number Of Fixed-Speed Pumps Running	Shows the number of fixed-speed pumps that are running.

P 8.3.3.3 Status Value 1.3

Select the parameter for status value 1.3.

Default Value:	0 (None)	**Parameter Type:**	Selection
Parameter Number:	302	**Unit:**	–
Data Type:	UDINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	None	Nothing selected.
9011	Motor Electrical Speed	Shows the motor shaft speed in electrical domain.
9000	Motor Current	Shows the actual motor current.
9010	Motor Shaft Speed	Shows the shaft speed in RPM.
9009	Motor Torque	Shows the actual motor torque.
1708	Relative Motor Torque	Shows the motor torque in % of the nominal motor torque.

Selection Number	Selection Name	Selection Description
9005	Motor Voltage	Shows the actual motor voltage.
9008	Motor Shaft Power	Shows the actual power at the motor shaft.
9042	Motor Shaft Power Filtered	Shows the filtered power at the motor shaft with a filter time of 1 second.
6075	Process Controller Output	Shows the output speed of the process controller, used as the speed reference for the speed controller.
6090	Process Controller Feedback	Shows the process controller feedback.
1718	Speed Reference	Shows the speed reference.
6092	Process Controller Setpoint	Readout of the process controller setpoint.
6151	Final Speed Reference	Shows the value of the speed reference before feeding it to the speed controller.
6153	Control Panel Speed Reference	Shows the value of the speed reference given from the control panel.
9044	DC-link Voltage	Shows the actual DC-link voltage.
9041	Grid Frequency	Shows the actual grid frequency.
9040	Line-To-Line Voltage (RMS)	Shows the average line-to-line voltage (RMS).
9048	L1-L2 Line Voltage (RMS)	Shows the L1-L2 line voltage (RMS).
9049	L2-L3 Line Voltage (RMS)	Shows the L2-L3 line voltage (RMS).
9050	L3-L1 Line Voltage (RMS)	Shows the L3-L1 line voltage (RMS).
9047	Grid Voltage Imbalance	Shows the grid voltage imbalance in %. A value greater than 3% may indicate grid problems.
6179	Auxiliary PID Feedback	Shows the auxiliary PID feedback.
6180	Auxiliary PID Reference	Shows the auxiliary PID reference.
6700	Signal Converter 1	
6701	Signal Converter 2	
6702	Signal Converter 3	
21094	Logic State	Shows the current active state in Logic.
21095	Logic Time In Current State	Shows the time that the current state in Logic has been active.
9015	Output Frequency	Shows the output frequency.
2009	Active Running Hours	Shows the total number of active running hours of the motor.
2002	Energy Consumption	Shows the energy consumed.
6547	Drive Thermal Load	Shows the actual counter number for the thermal load on the inverter.
5889	Asset Location	Specify the location of the drive to help identify it.
5890	Contact	Specify the contacts for this asset. Can be a name together with information on how to contact this person.
5891	Asset ID	Assign a unique ID to the drive to help identify it in a larger network.

Selection Number	Selection Name	Selection Description
5892	Asset Name	Define a name for this specific asset. If this is empty, the application name is used.
5362	MPC Status	Shows the status of the Multi Pump Controller.
5331	Number Of Fixed-Speed Pumps Running	Shows the number of fixed-speed pumps that are running.

P 8.3.3.4 Status Value 1.4

Select the parameter for status value 1.4.

Default Value:	0 (None)	**Parameter Type:**	Selection
Parameter Number:	303	**Unit:**	–
Data Type:	UDINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	None	Nothing selected.
9011	Motor Electrical Speed	Shows the motor shaft speed in electrical domain.
9000	Motor Current	Shows the actual motor current.
9010	Motor Shaft Speed	Shows the shaft speed in RPM.
9009	Motor Torque	Shows the actual motor torque.
1708	Relative Motor Torque	Shows the motor torque in % of the nominal motor torque.
9005	Motor Voltage	Shows the actual motor voltage.
9008	Motor Shaft Power	Shows the actual power at the motor shaft.
9042	Motor Shaft Power Filtered	Shows the filtered power at the motor shaft with a filter time of 1 second.
6075	Process Controller Output	Shows the output speed of the process controller, used as the speed reference for the speed controller.
6090	Process Controller Feedback	Shows the process controller feedback.
1718	Speed Reference	Shows the speed reference.
6092	Process Controller Setpoint	Readout of the process controller setpoint.
6151	Final Speed Reference	Shows the value of the speed reference before feeding it to the speed controller.
6153	Control Panel Speed Reference	Shows the value of the speed reference given from the control panel.
9044	DC-link Voltage	Shows the actual DC-link voltage.
9041	Grid Frequency	Shows the actual grid frequency.
9040	Line-To-Line Voltage (RMS)	Shows the average line-to-line voltage (RMS).
9048	L1-L2 Line Voltage (RMS)	Shows the L1-L2 line voltage (RMS).
9049	L2-L3 Line Voltage (RMS)	Shows the L2-L3 line voltage (RMS).
9050	L3-L1 Line Voltage (RMS)	Shows the L3-L1 line voltage (RMS).

Selection Number	Selection Name	Selection Description
9047	Grid Voltage Imbalance	Shows the grid voltage imbalance in %. A value greater than 3% may indicate grid problems.
6179	Auxiliary PID Feedback	Shows the auxiliary PID feedback.
6180	Auxiliary PID Reference	Shows the auxiliary PID reference.
6700	Signal Converter 1	
6701	Signal Converter 2	
6702	Signal Converter 3	
21094	Logic State	Shows the current active state in Logic.
21095	Logic Time In Current State	Shows the time that the current state in Logic has been active.
9015	Output Frequency	Shows the output frequency.
2009	Active Running Hours	Shows the total number of active running hours of the motor.
2002	Energy Consumption	Shows the energy consumed.
6547	Drive Thermal Load	Shows the actual counter number for the thermal load on the inverter.
5889	Asset Location	Specify the location of the drive to help identify it.
5890	Contact	Specify the contacts for this asset. Can be a name together with information on how to contact this person.
5891	Asset ID	Assign a unique ID to the drive to help identify it in a larger network.
5892	Asset Name	Define a name for this specific asset. If this is empty, the application name is used.
5362	MPC Status	Shows the status of the Multi Pump Controller.
5331	Number Of Fixed-Speed Pumps Running	Shows the number of fixed-speed pumps that are running.

P 8.3.3.5 Status Value 1.5

Select the parameter for status value 1.5.

Default Value:	0 (None)	**Parameter Type:**	Selection
Parameter Number:	304	**Unit:**	–
Data Type:	UDINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	None	Nothing selected.
9011	Motor Electrical Speed	Shows the motor shaft speed in electrical domain.
9000	Motor Current	Shows the actual motor current.
9010	Motor Shaft Speed	Shows the shaft speed in RPM.
9009	Motor Torque	Shows the actual motor torque.
1708	Relative Motor Torque	Shows the motor torque in % of the nominal motor torque.
9005	Motor Voltage	Shows the actual motor voltage.

Selection Number	Selection Name	Selection Description
9008	Motor Shaft Power	Shows the actual power at the motor shaft.
9042	Motor Shaft Power Filtered	Shows the filtered power at the motor shaft with a filter time of 1 second.
6075	Process Controller Output	Shows the output speed of the process controller, used as the speed reference for the speed controller.
6090	Process Controller Feedback	Shows the process controller feedback.
1718	Speed Reference	Shows the speed reference.
6092	Process Controller Setpoint	Readout of the process controller setpoint.
6151	Final Speed Reference	Shows the value of the speed reference before feeding it to the speed controller.
6153	Control Panel Speed Reference	Shows the value of the speed reference given from the control panel.
9044	DC-link Voltage	Shows the actual DC-link voltage.
9041	Grid Frequency	Shows the actual grid frequency.
9040	Line-To-Line Voltage (RMS)	Shows the average line-to-line voltage (RMS).
9048	L1-L2 Line Voltage (RMS)	Shows the L1-L2 line voltage (RMS).
9049	L2-L3 Line Voltage (RMS)	Shows the L2-L3 line voltage (RMS).
9050	L3-L1 Line Voltage (RMS)	Shows the L3-L1 line voltage (RMS).
9047	Grid Voltage Imbalance	Shows the grid voltage imbalance in %. A value greater than 3% may indicate grid problems.
6179	Auxiliary PID Feedback	Shows the auxiliary PID feedback.
6180	Auxiliary PID Reference	Shows the auxiliary PID reference.
6700	Signal Converter 1	
6701	Signal Converter 2	
6702	Signal Converter 3	
21094	Logic State	Shows the current active state in Logic.
21095	Logic Time In Current State	Shows the time that the current state in Logic has been active.
9015	Output Frequency	Shows the output frequency.
2009	Active Running Hours	Shows the total number of active running hours of the motor.
2002	Energy Consumption	Shows the energy consumed.
6547	Drive Thermal Load	Shows the actual counter number for the thermal load on the inverter.
5889	Asset Location	Specify the location of the drive to help identify it.
5890	Contact	Specify the contacts for this asset. Can be a name together with information on how to contact this person.
5891	Asset ID	Assign a unique ID to the drive to help identify it in a larger network.
5892	Asset Name	Define a name for this specific asset. If this is empty, the application name is used.

Selection Number	Selection Name	Selection Description
5362	MPC Status	Shows the status of the Multi Pump Controller.
5331	Number Of Fixed-Speed Pumps Running	Shows the number of fixed-speed pumps that are running.

6.10.4.4 Status Screen 2 (Menu Index 8.3.4)

P 8.3.4.1 Status Value 2.1

Select the parameter for status value 2.1.

Default Value:	9015 (Output Frequency)	**Parameter Type:**	Selection
Parameter Number:	310	**Unit:**	–
Data Type:	UDINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	None	Nothing selected.
9011	Motor Electrical Speed	Shows the motor shaft speed in electrical domain.
9000	Motor Current	Shows the actual motor current.
9010	Motor Shaft Speed	Shows the shaft speed in RPM.
9009	Motor Torque	Shows the actual motor torque.
1708	Relative Motor Torque	Shows the motor torque in % of the nominal motor torque.
9005	Motor Voltage	Shows the actual motor voltage.
9008	Motor Shaft Power	Shows the actual power at the motor shaft.
9042	Motor Shaft Power Filtered	Shows the filtered power at the motor shaft with a filter time of 1 second.
6075	Process Controller Output	Shows the output speed of the process controller, used as the speed reference for the speed controller.
6090	Process Controller Feedback	Shows the process controller feedback.
1718	Speed Reference	Shows the speed reference.
6092	Process Controller Setpoint	Readout of the process controller setpoint.
6151	Final Speed Reference	Shows the value of the speed reference before feeding it to the speed controller.
6153	Control Panel Speed Reference	Shows the value of the speed reference given from the control panel.
9044	DC-link Voltage	Shows the actual DC-link voltage.
9041	Grid Frequency	Shows the actual grid frequency.
9040	Line-To-Line Voltage (RMS)	Shows the average line-to-line voltage (RMS).
9048	L1-L2 Line Voltage (RMS)	Shows the L1-L2 line voltage (RMS).
9049	L2-L3 Line Voltage (RMS)	Shows the L2-L3 line voltage (RMS).
9050	L3-L1 Line Voltage (RMS)	Shows the L3-L1 line voltage (RMS).

Selection Number	Selection Name	Selection Description
9047	Grid Voltage Imbalance	Shows the grid voltage imbalance in %. A value greater than 3% may indicate grid problems.
6179	Auxiliary PID Feedback	Shows the auxiliary PID feedback.
6180	Auxiliary PID Reference	Shows the auxiliary PID reference.
6700	Signal Converter 1	
6701	Signal Converter 2	
6702	Signal Converter 3	
21094	Logic State	Shows the current active state in Logic.
21095	Logic Time In Current State	Shows the time that the current state in Logic has been active.
9015	Output Frequency	Shows the output frequency.
2009	Active Running Hours	Shows the total number of active running hours of the motor.
2002	Energy Consumption	Shows the energy consumed.
6547	Drive Thermal Load	Shows the actual counter number for the thermal load on the inverter.
5889	Asset Location	Specify the location of the drive to help identify it.
5890	Contact	Specify the contacts for this asset. Can be a name together with information on how to contact this person.
5891	Asset ID	Assign a unique ID to the drive to help identify it in a larger network.
5892	Asset Name	Define a name for this specific asset. If this is empty, the application name is used.
5362	MPC Status	Shows the status of the Multi Pump Controller.
5331	Number Of Fixed-Speed Pumps Running	Shows the number of fixed-speed pumps that are running.

P 8.3.4.2 Status Value 2.2

Select the parameter for status value 2.2.

Default Value:	9009 (Motor Torque)	**Parameter Type:**	Selection
Parameter Number:	311	**Unit:**	–
Data Type:	UDINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	None	Nothing selected.
9011	Motor Electrical Speed	Shows the motor shaft speed in electrical domain.
9000	Motor Current	Shows the actual motor current.
9010	Motor Shaft Speed	Shows the shaft speed in RPM.
9009	Motor Torque	Shows the actual motor torque.
1708	Relative Motor Torque	Shows the motor torque in % of the nominal motor torque.
9005	Motor Voltage	Shows the actual motor voltage.

Selection Number	Selection Name	Selection Description
9008	Motor Shaft Power	Shows the actual power at the motor shaft.
9042	Motor Shaft Power Filtered	Shows the filtered power at the motor shaft with a filter time of 1 second.
6075	Process Controller Output	Shows the output speed of the process controller, used as the speed reference for the speed controller.
6090	Process Controller Feedback	Shows the process controller feedback.
1718	Speed Reference	Shows the speed reference.
6092	Process Controller Setpoint	Readout of the process controller setpoint.
6151	Final Speed Reference	Shows the value of the speed reference before feeding it to the speed controller.
6153	Control Panel Speed Reference	Shows the value of the speed reference given from the control panel.
9044	DC-link Voltage	Shows the actual DC-link voltage.
9041	Grid Frequency	Shows the actual grid frequency.
9040	Line-To-Line Voltage (RMS)	Shows the average line-to-line voltage (RMS).
9048	L1-L2 Line Voltage (RMS)	Shows the L1-L2 line voltage (RMS).
9049	L2-L3 Line Voltage (RMS)	Shows the L2-L3 line voltage (RMS).
9050	L3-L1 Line Voltage (RMS)	Shows the L3-L1 line voltage (RMS).
9047	Grid Voltage Imbalance	Shows the grid voltage imbalance in %. A value greater than 3% may indicate grid problems.
6179	Auxiliary PID Feedback	Shows the auxiliary PID feedback.
6180	Auxiliary PID Reference	Shows the auxiliary PID reference.
6700	Signal Converter 1	
6701	Signal Converter 2	
6702	Signal Converter 3	
21094	Logic State	Shows the current active state in Logic.
21095	Logic Time In Current State	Shows the time that the current state in Logic has been active.
9015	Output Frequency	Shows the output frequency.
2009	Active Running Hours	Shows the total number of active running hours of the motor.
2002	Energy Consumption	Shows the energy consumed.
6547	Drive Thermal Load	Shows the actual counter number for the thermal load on the inverter.
5889	Asset Location	Specify the location of the drive to help identify it.
5890	Contact	Specify the contacts for this asset. Can be a name together with information on how to contact this person.
5891	Asset ID	Assign a unique ID to the drive to help identify it in a larger network.
5892	Asset Name	Define a name for this specific asset. If this is empty, the application name is used.

Selection Number	Selection Name	Selection Description
5362	MPC Status	Shows the status of the Multi Pump Controller.
5331	Number Of Fixed-Speed Pumps Running	Shows the number of fixed-speed pumps that are running.

P 8.3.4.3 Status Value 2.3

Select the parameter for status value 2.3.

Default Value:	9008 (Motor Shaft Power)	**Parameter Type:**	Selection
Parameter Number:	312	**Unit:**	–
Data Type:	UDINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	None	Nothing selected.
9011	Motor Electrical Speed	Shows the motor shaft speed in electrical domain.
9000	Motor Current	Shows the actual motor current.
9010	Motor Shaft Speed	Shows the shaft speed in RPM.
9009	Motor Torque	Shows the actual motor torque.
1708	Relative Motor Torque	Shows the motor torque in % of the nominal motor torque.
9005	Motor Voltage	Shows the actual motor voltage.
9008	Motor Shaft Power	Shows the actual power at the motor shaft.
9042	Motor Shaft Power Filtered	Shows the filtered power at the motor shaft with a filter time of 1 second.
6075	Process Controller Output	Shows the output speed of the process controller, used as the speed reference for the speed controller.
6090	Process Controller Feedback	Shows the process controller feedback.
1718	Speed Reference	Shows the speed reference.
6092	Process Controller Setpoint	Readout of the process controller setpoint.
6151	Final Speed Reference	Shows the value of the speed reference before feeding it to the speed controller.
6153	Control Panel Speed Reference	Shows the value of the speed reference given from the control panel.
9044	DC-link Voltage	Shows the actual DC-link voltage.
9041	Grid Frequency	Shows the actual grid frequency.
9040	Line-To-Line Voltage (RMS)	Shows the average line-to-line voltage (RMS).
9048	L1-L2 Line Voltage (RMS)	Shows the L1-L2 line voltage (RMS).
9049	L2-L3 Line Voltage (RMS)	Shows the L2-L3 line voltage (RMS).
9050	L3-L1 Line Voltage (RMS)	Shows the L3-L1 line voltage (RMS).
9047	Grid Voltage Imbalance	Shows the grid voltage imbalance in %. A value greater than 3% may indicate grid problems.
6179	Auxiliary PID Feedback	Shows the auxiliary PID feedback.

Selection Number	Selection Name	Selection Description
6180	Auxiliary PID Reference	Shows the auxiliary PID reference.
6700	Signal Converter 1	
6701	Signal Converter 2	
6702	Signal Converter 3	
21094	Logic State	Shows the current active state in Logic.
21095	Logic Time In Current State	Shows the time that the current state in Logic has been active.
9015	Output Frequency	Shows the output frequency.
2009	Active Running Hours	Shows the total number of active running hours of the motor.
2002	Energy Consumption	Shows the energy consumed.
6547	Drive Thermal Load	Shows the actual counter number for the thermal load on the inverter.
5889	Asset Location	Specify the location of the drive to help identify it.
5890	Contact	Specify the contacts for this asset. Can be a name together with information on how to contact this person.
5891	Asset ID	Assign a unique ID to the drive to help identify it in a larger network.
5892	Asset Name	Define a name for this specific asset. If this is empty, the application name is used.
5362	MPC Status	Shows the status of the Multi Pump Controller.
5331	Number Of Fixed-Speed Pumps Running	Shows the number of fixed-speed pumps that are running.

P 8.3.4.4 Status Value 2.4

Select the parameter for status value 2.4.

Default Value:	0 (None)	**Parameter Type:**	Selection
Parameter Number:	313	**Unit:**	–
Data Type:	UDINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	None	Nothing selected.
9011	Motor Electrical Speed	Shows the motor shaft speed in electrical domain.
9000	Motor Current	Shows the actual motor current.
9010	Motor Shaft Speed	Shows the shaft speed in RPM.
9009	Motor Torque	Shows the actual motor torque.
1708	Relative Motor Torque	Shows the motor torque in % of the nominal motor torque.
9005	Motor Voltage	Shows the actual motor voltage.
9008	Motor Shaft Power	Shows the actual power at the motor shaft.
9042	Motor Shaft Power Filtered	Shows the filtered power at the motor shaft with a filter time of 1 second.

Selection Number	Selection Name	Selection Description
6075	Process Controller Output	Shows the output speed of the process controller, used as the speed reference for the speed controller.
6090	Process Controller Feedback	Shows the process controller feedback.
1718	Speed Reference	Shows the speed reference.
6092	Process Controller Setpoint	Readout of the process controller setpoint.
6151	Final Speed Reference	Shows the value of the speed reference before feeding it to the speed controller.
6153	Control Panel Speed Reference	Shows the value of the speed reference given from the control panel.
9044	DC-link Voltage	Shows the actual DC-link voltage.
9041	Grid Frequency	Shows the actual grid frequency.
9040	Line-To-Line Voltage (RMS)	Shows the average line-to-line voltage (RMS).
9048	L1-L2 Line Voltage (RMS)	Shows the L1-L2 line voltage (RMS).
9049	L2-L3 Line Voltage (RMS)	Shows the L2-L3 line voltage (RMS).
9050	L3-L1 Line Voltage (RMS)	Shows the L3-L1 line voltage (RMS).
9047	Grid Voltage Imbalance	Shows the grid voltage imbalance in %. A value greater than 3% may indicate grid problems.
6179	Auxiliary PID Feedback	Shows the auxiliary PID feedback.
6180	Auxiliary PID Reference	Shows the auxiliary PID reference.
6700	Signal Converter 1	
6701	Signal Converter 2	
6702	Signal Converter 3	
21094	Logic State	Shows the current active state in Logic.
21095	Logic Time In Current State	Shows the time that the current state in Logic has been active.
9015	Output Frequency	Shows the output frequency.
2009	Active Running Hours	Shows the total number of active running hours of the motor.
2002	Energy Consumption	Shows the energy consumed.
6547	Drive Thermal Load	Shows the actual counter number for the thermal load on the inverter.
5889	Asset Location	Specify the location of the drive to help identify it.
5890	Contact	Specify the contacts for this asset. Can be a name together with information on how to contact this person.
5891	Asset ID	Assign a unique ID to the drive to help identify it in a larger network.
5892	Asset Name	Define a name for this specific asset. If this is empty, the application name is used.
5362	MPC Status	Shows the status of the Multi Pump Controller.
5331	Number Of Fixed-Speed Pumps Running	Shows the number of fixed-speed pumps that are running.

P 8.3.4.5 Status Value 2.5

Select the parameter for status value 2.5.

Default Value:	0 (None)	**Parameter Type:**	Selection
Parameter Number:	314	**Unit:**	–
Data Type:	UDINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	None	Nothing selected.
9011	Motor Electrical Speed	Shows the motor shaft speed in electrical domain.
9000	Motor Current	Shows the actual motor current.
9010	Motor Shaft Speed	Shows the shaft speed in RPM.
9009	Motor Torque	Shows the actual motor torque.
1708	Relative Motor Torque	Shows the motor torque in % of the nominal motor torque.
9005	Motor Voltage	Shows the actual motor voltage.
9008	Motor Shaft Power	Shows the actual power at the motor shaft.
9042	Motor Shaft Power Filtered	Shows the filtered power at the motor shaft with a filter time of 1 second.
6075	Process Controller Output	Shows the output speed of the process controller, used as the speed reference for the speed controller.
6090	Process Controller Feedback	Shows the process controller feedback.
1718	Speed Reference	Shows the speed reference.
6092	Process Controller Setpoint	Readout of the process controller setpoint.
6151	Final Speed Reference	Shows the value of the speed reference before feeding it to the speed controller.
6153	Control Panel Speed Reference	Shows the value of the speed reference given from the control panel.
9044	DC-link Voltage	Shows the actual DC-link voltage.
9041	Grid Frequency	Shows the actual grid frequency.
9040	Line-To-Line Voltage (RMS)	Shows the average line-to-line voltage (RMS).
9048	L1-L2 Line Voltage (RMS)	Shows the L1-L2 line voltage (RMS).
9049	L2-L3 Line Voltage (RMS)	Shows the L2-L3 line voltage (RMS).
9050	L3-L1 Line Voltage (RMS)	Shows the L3-L1 line voltage (RMS).
9047	Grid Voltage Imbalance	Shows the grid voltage imbalance in %. A value greater than 3% may indicate grid problems.
6179	Auxiliary PID Feedback	Shows the auxiliary PID feedback.
6180	Auxiliary PID Reference	Shows the auxiliary PID reference.
6700	Signal Converter 1	
6701	Signal Converter 2	
6702	Signal Converter 3	

Selection Number	Selection Name	Selection Description
21094	Logic State	Shows the current active state in Logic.
21095	Logic Time In Current State	Shows the time that the current state in Logic has been active.
9015	Output Frequency	Shows the output frequency.
2009	Active Running Hours	Shows the total number of active running hours of the motor.
2002	Energy Consumption	Shows the energy consumed.
6547	Drive Thermal Load	Shows the actual counter number for the thermal load on the inverter.
5889	Asset Location	Specify the location of the drive to help identify it.
5890	Contact	Specify the contacts for this asset. Can be a name together with information on how to contact this person.
5891	Asset ID	Assign a unique ID to the drive to help identify it in a larger network.
5892	Asset Name	Define a name for this specific asset. If this is empty, the application name is used.
5362	MPC Status	Shows the status of the Multi Pump Controller.
5331	Number Of Fixed-Speed Pumps Running	Shows the number of fixed-speed pumps that are running.

6.10.5 Date & Time (Menu Index 8.4)

P 8.4.1 Time Mode

Select the time mode. Auto enables NTP.

Default Value:	1 (Auto (NTP))	**Parameter Type:**	Selection
Parameter Number:	6232	**Unit:**	–
Data Type:	USINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Manual	Disables NTP.
1	Auto (NTP)	

P 8.4.2 Date and Time

Set the actual time and date. The format is YYYY-MM-DD and HH:MM:SS.

Default Value:	–	**Parameter Type:**	Range (* — *)
Parameter Number:	2800	**Unit:**	–
Data Type:	DATE_AND_TIME	**Access Type:**	Read/Write

P 8.4.3 NTP Server 1

Set the IPv4 address of the requested NTP server 1.

Default Value:	–	**Parameter Type:**	Range (* — *)

Parameter Number:	6233	**Unit:**	–
Data Type:	STRING	**Access Type:**	Read/Write

P 8.4.4 NTP Server 2

Set the IPv4 address of the requested NTP server 2.

Default Value:	–	**Parameter Type:**	Range (* — *)
Parameter Number:	6234	**Unit:**	–
Data Type:	STRING	**Access Type:**	Read/Write

P 8.4.5 RTC Battery Monitor

This parameter disables the battery flat warning if the battery is not present. This monitor is automatically enabled when a battery is mounted.

Default Value:	False	**Parameter Type:**	Selection
Parameter Number:	2812	**Unit:**	–
Data Type:	BOOL	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Disabled	
1	Enabled	Enables the function.

6.10.6 Asset Management (Menu Index 8.7)

P 8.7.1 Asset Name

Define a name for this specific asset. If this is empty, the application name is used.

Default Value:	*	**Parameter Type:**	Range (* — *)
Parameter Number:	5892	**Unit:**	–
Data Type:	STRING	**Access Type:**	Read/Write

P 8.7.2 Asset Location

Specify the location of the drive to help identify it.

Default Value:	–	**Parameter Type:**	Range (* — *)
Parameter Number:	5889	**Unit:**	–
Data Type:	STRING	**Access Type:**	Read/Write

P 8.7.3 Asset ID

Assign a unique ID to the drive to help identify it in a larger network.

Default Value:	*	**Parameter Type:**	Range (* — *)
Parameter Number:	5891	**Unit:**	–
Data Type:	STRING	**Access Type:**	Read/Write

P 8.7.4 Contact

Specify the contacts for this asset. Can be a name together with information on how to contact this person.

Default Value:	–	**Parameter Type:**	Range (* — *)
Parameter Number:	5890	**Unit:**	–
Data Type:	STRING	**Access Type:**	Read/Write

6.11 I/O (Menu Index 9)

6.11.1 I/O Overview

The ***I/O*** parameter group (***Menu Index 9***) contains the parameters for the hardware configuration of the I/Os, such as terminal modes, filtering of the electrical signals, and signal ranges.

This application guide contains only the parameter descriptions for the Integrated I/O. The parameter information for option boards such as the Encoder/Resolver Option OC7M0 can be found in the *iC7 Functional Extensions Operating Guide*.

6.11.2 Integrated I/O Status (Menu Index 9.3)

P 9.3.1 Digital Input Status

Shows the digital input I/O word. Each bit represents the status of a digital input.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	1614	**Unit:**	–
Data Type:	WORD	**Access Type:**	Read Only

Table 38: I/O Digital Input Status Bits

Bit	Description
00	DigIn13
01	DigIn14
02	DigIn15
03	DigIn16
04	DigIn17
05	DigIn18
06–15	Not used

P 9.3.2 Digital Output Status

Shows the digital output I/O word. Each bit represents a requested value assigned to a digital output.

Default Value:	NA	**Parameter Type:**	Range (* — *)
Parameter Number:	1615	**Unit:**	–
Data Type:	WORD	**Access Type:**	Read Only

Table 39: I/O Digital Output Status Bits

Bit	Description
00–01	Not used
02	DigOut15
03	DigOut16
04–11	Not used
12	Relay02
13	Relay05
14–15	Not used

P 9.3.3 T31 Analog Output Value

Shows the requested value assigned to the terminal.

Default Value:	NA	**Parameter Type:**	Range (0 — 20)
Parameter Number:	1613	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read Only

P 9.3.4 T33 Analog Input Value

Shows the actual value of the terminal.

Default Value:	NA	**Parameter Type:**	Range (0 — 20)
Parameter Number:	1611	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read Only

P 9.3.5 T34 Analog Input Value

Shows the actual value of the terminal.

Default Value:	NA	**Parameter Type:**	Range (0 — 20)
Parameter Number:	1612	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read Only

P 9.3.6 T34 Temperature Value

Shows the measured temperature of the terminal.

Default Value:	NA	**Parameter Type:**	Range (-1000 — 1000)
Parameter Number:	1616	**Unit:**	°C
Data Type:	REAL	**Access Type:**	Read Only

6.11.3 Digital Inputs/Outputs (Menu Index 9.4)

6.11.3.1 General Settings (Menu Index 9.4.1)

P 9.4.1.1 Digital Input Logic

Set the operating logic for all digital inputs.

Default Value:	2 (PNP mode)	**Parameter Type:**	Selection
Parameter Number:	2261	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
1	NPN mode	Open collector sink (NPN).
2	PNP mode	Open collector source (PNP).

6.11.3.2 Input T13 (Menu Index 9.4.2)

P 9.4.2.1 T13 Terminal Mode

Select the mode for the terminal.

Default Value:	3 (Digital input)	**Parameter Type:**	Selection
Parameter Number:	2015	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Inactive	
3	Digital input	The terminal is configured as boolean input (true/false).
4	Pulse input	The terminal is configured as pulse input. The frequency represents an analog value.

P 9.4.2.2 T13 Signal Inversion

Select whether the signal of the terminal is inverted.

Default Value:	0 (Non-Inverted)	**Parameter Type:**	Selection
Parameter Number:	2291	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Non-Inverted	The signal is not inverted.
1	Inverted	The signal is logically inverted.

P 9.4.2.3 T13 Fast Debounce Filtering Time

Set the fast debounce filtering time for the terminal.

Default Value:	–	**Parameter Type:**	Range (0.00 — 63.50)
Parameter Number:	2285	**Unit:**	µs
Data Type:	REAL	**Access Type:**	Read/Write

P 9.4.2.4 T13 Standard Debounce Filtering Time

Set the standard debounce filtering time for the terminal.

Default Value:	5.00	**Parameter Type:**	Range (0.00 — 127.00)
Parameter Number:	2024	**Unit:**	ms
Data Type:	REAL	**Access Type:**	Read/Write

P 9.4.2.5 T13 Reaction Time

Select the reaction time for the debounce filter.

Default Value:	0 (Standard reaction time (1ms tick))	**Parameter Type:**	Selection
Parameter Number:	2025	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Standard reaction time (1ms tick)	Use the digital input in the same way as other inputs.
1	Fast reaction time (0.5μs tick)	Enables a fast reaction time for a certain event via digital input.

P 9.4.2.6 T13 Trigger Mode

Select the trigger mode for the digital input.

Default Value:	0 (None)	**Parameter Type:**	Selection
Parameter Number:	2026	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	None	No event trigger.
1	Rising Edge	Trigger an event at the rising edge.
2	Falling Edge	Trigger an event at the falling edge.
3	Both Edges	Trigger an event at both the rising and falling edges.

P 9.4.2.7 T13 Pulse Min. Frequency

Set the frequency representing 0% of the signal.

Default Value:	–	**Parameter Type:**	Range (0 — 110000)
Parameter Number:	2027	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 9.4.2.8 T13 Pulse Max. Frequency

Set the frequency representing 100% of the signal.

Default Value:	110000	**Parameter Type:**	Range (0 — 110000)

Parameter Number:	2028	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

6.11.3.3 Input T14 (Menu Index 9.4.3)

P 9.4.3.1 T14 Terminal Mode

Select the mode for the terminal.

Default Value:	3 (Digital input)	**Parameter Type:**	Selection
Parameter Number:	2016	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Inactive	
3	Digital input	The terminal is configured as boolean input (true/false).
4	Pulse input	The terminal is configured as pulse input. The frequency represents an analog value.

P 9.4.3.2 T14 Signal Inversion

Select whether the signal of the terminal is inverted.

Default Value:	0 (Non-Inverted)	**Parameter Type:**	Selection
Parameter Number:	2292	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Non-Inverted	The signal is not inverted.
1	Inverted	The signal is logically inverted.

P 9.4.3.3 T14 Fast Debounce Filtering Time

Set the fast debounce filtering time for the terminal.

Default Value:	–	**Parameter Type:**	Range (0.00 — 63.50)
Parameter Number:	2286	**Unit:**	µs
Data Type:	REAL	**Access Type:**	Read/Write

P 9.4.3.4 T14 Standard Debounce Filtering Time

Set the standard debounce filtering time for the terminal.

Default Value:	5.00	**Parameter Type:**	Range (0.00 — 127.00)
Parameter Number:	2029	**Unit:**	ms
Data Type:	REAL	**Access Type:**	Read/Write

P 9.4.3.5 T14 Reaction Time

Select the reaction time for the debounce filter.

Default Value:	0 (Standard reaction time (1ms tick))	**Parameter Type:**	Selection
Parameter Number:	2030	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Standard reaction time (1ms tick)	Use the digital input in the same way as other inputs.
1	Fast reaction time (0.5μs tick)	Enables a fast reaction time for a certain event via digital input.

P 9.4.3.6 T14 Trigger Mode

Select the trigger mode for the digital input.

Default Value:	0 (None)	**Parameter Type:**	Selection
Parameter Number:	2031	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	None	No event trigger.
1	Rising Edge	Trigger an event at the rising edge.
2	Falling Edge	Trigger an event at the falling edge.
3	Both Edges	Trigger an event at both the rising and falling edges.

P 9.4.3.7 T14 Pulse Min. Frequency

Set the frequency representing 0% of the signal.

Default Value:	–	**Parameter Type:**	Range (0 — 110000)
Parameter Number:	2032	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 9.4.3.8 T14 Pulse Max. Frequency

Set the frequency representing 100% of the signal.

Default Value:	110000	**Parameter Type:**	Range (0 — 110000)
Parameter Number:	2033	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

6.11.3.4 Input/Output T15 (Menu Index 9.4.4)

P 9.4.4.1 T15 Terminal Mode

Select the mode for the terminal.

Default Value:	3 (Digital input)	**Parameter Type:**	Selection
Parameter Number:	2022	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Inactive	
1	Digital Output	Configures the terminal as boolean output true/false.
2	Pulse Output	Configures the terminal as analog output based on pulse frequency.
3	Digital input	The terminal is configured as boolean input (true/false).
4	Pulse input	The terminal is configured as pulse input. The frequency represents an analog value.

P 9.4.4.2 T15 Signal Inversion

Select whether the signal of the terminal is inverted.

Default Value:	0 (Non-Inverted)	**Parameter Type:**	Selection
Parameter Number:	2295	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Non-Inverted	The signal is not inverted.
1	Inverted	The signal is logically inverted.

P 9.4.4.3 T15 Fast Debounce Filtering Time

Set the fast debounce filtering time for the terminal.

Default Value:	–	**Parameter Type:**	Range (0.00 — 63.50)
Parameter Number:	2289	**Unit:**	µs
Data Type:	REAL	**Access Type:**	Read/Write

P 9.4.4.4 T15 Standard Debounce Filtering Time

Set the standard debounce filtering time for the terminal.

Default Value:	5.00	**Parameter Type:**	Range (0.00 — 127.00)
Parameter Number:	2297	**Unit:**	ms
Data Type:	REAL	**Access Type:**	Read/Write

P 9.4.4.5 T15 Reaction Time

Select the reaction time for the debounce filter.

Default Value:	0 (Standard reaction time (1ms tick))	**Parameter Type:**	Selection

Parameter Number:	2299	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Standard reaction time (1ms tick)	Use the digital input in the same way as other inputs.
1	Fast reaction time (0.5µs tick)	Enables a fast reaction time for a certain event via digital input.

P 9.4.4.6 T15 Trigger Mode

Select the trigger mode for the digital input.

Default Value:	0 (None)	**Parameter Type:**	Selection
Parameter Number:	2044	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	None	No event trigger.
1	Rising Edge	Trigger an event at the rising edge.
2	Falling Edge	Trigger an event at the falling edge.
3	Both Edges	Trigger an event at both the rising and falling edges.

P 9.4.4.7 T15 Pulse Min. Frequency

Set the frequency representing 0% of the signal.

Default Value:	–	**Parameter Type:**	Range (0 — 110000)
Parameter Number:	2045	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 9.4.4.8 T15 Pulse Max. Frequency

Set the frequency representing 100% of the signal.

Default Value:	110000	**Parameter Type:**	Range (0 — 110000)
Parameter Number:	2046	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 9.4.4.9 T15 Digital Output Logic

Select the operating logic for the digital output.

Default Value:	0 (Tri state)	**Parameter Type:**	Selection
Parameter Number:	2047	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Tri state	Disable output (high impedance).
1	Open collector sink (NPN)	Open collector sink (NPN).
2	Open collector source (PNP)	Open collector source (PNP).
3	Push pull	Terminal can both sink and source.

P 9.4.4.10 T15 Pulse Out Min. Frequency

Set the frequency representing 0% of the signal.

Default Value:	–	**Parameter Type:**	Range (0 — 100000)
Parameter Number:	2048	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 9.4.4.11 T15 Pulse Out Max. Frequency

Set the frequency representing 100% of the signal.

Default Value:	100000	**Parameter Type:**	Range (0 — 100000)
Parameter Number:	2049	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

6.11.3.5 Input/Output T16 (Menu Index 9.4.5)

P 9.4.5.1 T16 Terminal Mode

Select the mode for the terminal.

Default Value:	3 (Digital input)	**Parameter Type:**	Selection
Parameter Number:	2298	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Inactive	
1	Digital Output	Configures the terminal as boolean output true/false.
2	Pulse Output	Configures the terminal as analog output based on pulse frequency.
3	Digital input	The terminal is configured as boolean input (true/false).
4	Pulse input	The terminal is configured as pulse input. The frequency represents an analog value.

P 9.4.5.2 T16 Signal Inversion

Select whether the signal of the terminal is inverted.

Default Value:	0 (Non-Inverted)	**Parameter Type:**	Selection
Parameter Number:	2296	**Unit:**	–

Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Non-Inverted	The signal is not inverted.
1	Inverted	The signal is logically inverted.

P 9.4.5.3 T16 Fast Debounce Filtering Time

Set the fast debounce filtering time for the terminal.

Default Value:	–	**Parameter Type:**	Range (0.00 — 63.50)
Parameter Number:	2290	**Unit:**	µs
Data Type:	REAL	**Access Type:**	Read/Write

P 9.4.5.4 T16 Standard Debounce Filtering Time

Set the standard debounce filtering time for the terminal.

Default Value:	5.00	**Parameter Type:**	Range (0.00 — 127.00)
Parameter Number:	2260	**Unit:**	ms
Data Type:	REAL	**Access Type:**	Read/Write

P 9.4.5.5 T16 Reaction Time

Select the reaction time for the debounce filter.

Default Value:	0 (Standard reaction time (1ms tick))	**Parameter Type:**	Selection
Parameter Number:	2052	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Standard reaction time (1ms tick)	Use the digital input in the same way as other inputs.
1	Fast reaction time (0.5µs tick)	Enables a fast reaction time for a certain event via digital input.

P 9.4.5.6 T16 Trigger Mode

Select the trigger mode for the digital input.

Default Value:	0 (None)	**Parameter Type:**	Selection
Parameter Number:	2053	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	None	No event trigger.
1	Rising Edge	Trigger an event at the rising edge.
2	Falling Edge	Trigger an event at the falling edge.
3	Both Edges	Trigger an event at both the rising and falling edges.

P 9.4.5.7 T16 Pulse Min. Frequency

Set the frequency representing 0% of the signal.

Default Value:	–	**Parameter Type:**	Range (0 — 110000)
Parameter Number:	2054	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 9.4.5.8 T16 Pulse Max. Frequency

Set the frequency representing 100% of the signal.

Default Value:	110000	**Parameter Type:**	Range (0 — 110000)
Parameter Number:	2055	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 9.4.5.9 T16 Digital Output Logic

Select the operating logic for the digital output.

Default Value:	0 (Tri state)	**Parameter Type:**	Selection
Parameter Number:	2056	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Tri state	Disable output (high impedance).
1	Open collector sink (NPN)	Open collector sink (NPN).
2	Open collector source (PNP)	Open collector source (PNP).
3	Push pull	Terminal can both sink and source.

P 9.4.5.10 T16 Pulse Out Min. Frequency

Set the frequency representing 0% of the signal.

Default Value:	–	**Parameter Type:**	Range (0 — 100000)
Parameter Number:	2051	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 9.4.5.11 T16 Pulse Out Max. Frequency

Set the frequency representing 100% of the signal.

Default Value:	100000	**Parameter Type:**	Range (0 — 100000)
Parameter Number:	2050	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

6.11.3.6 Input T17 (Menu Index 9.4.6)

P 9.4.6.1 T17 Terminal Mode

Select the mode for the terminal.

Default Value:	3 (Digital input)	**Parameter Type:**	Selection
Parameter Number:	2017	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Inactive	
3	Digital input	The terminal is configured as boolean input (true/false).
4	Pulse input	The terminal is configured as pulse input. The frequency represents an analog value.

P 9.4.6.2 T17 Signal Inversion

Select whether the signal of the terminal is inverted.

Default Value:	0 (Non-Inverted)	**Parameter Type:**	Selection
Parameter Number:	2293	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Non-Inverted	The signal is not inverted.
1	Inverted	The signal is logically inverted.

P 9.4.6.3 T17 Fast Debounce Filtering Time

Set the fast debounce filtering time for the terminal.

Default Value:	–	**Parameter Type:**	Range (0.00 — 63.50)
Parameter Number:	2287	**Unit:**	µs
Data Type:	REAL	**Access Type:**	Read/Write

P 9.4.6.4 T17 Standard Debounce Filtering Time

Set the standard debounce filtering time for the terminal.

Default Value:	5.00	**Parameter Type:**	Range (0.00 — 127.00)
Parameter Number:	2034	**Unit:**	ms

Data Type:	REAL	**Access Type:**	Read/Write

P 9.4.6.5 T17 Reaction Time

Select the reaction time for the debounce filter.

Default Value:	0 (Standard reaction time (1ms tick))	**Parameter Type:**	Selection
Parameter Number:	2035	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Standard reaction time (1ms tick)	Use the digital input in the same way as other inputs.
1	Fast reaction time (0.5µs tick)	Enables a fast reaction time for a certain event via digital input.

P 9.4.6.6 T17 Trigger Mode

Select the trigger mode for the digital input.

Default Value:	0 (None)	**Parameter Type:**	Selection
Parameter Number:	2036	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	None	No event trigger.
1	Rising Edge	Trigger an event at the rising edge.
2	Falling Edge	Trigger an event at the falling edge.
3	Both Edges	Trigger an event at both the rising and falling edges.

P 9.4.6.7 T17 Pulse Min. Frequency

Set the frequency representing 0% of the signal.

Default Value:	–	**Parameter Type:**	Range (0 — 110000)
Parameter Number:	2037	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 9.4.6.8 T17 Pulse Max. Frequency

Set the frequency representing 100% of the signal.

Default Value:	110000	**Parameter Type:**	Range (0 — 110000)
Parameter Number:	2038	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

6.11.3.7 Input T18 (Menu Index 9.4.7)

P 9.4.7.1 T18 Terminal Mode

Select the mode for the terminal.

Default Value:	3 (Digital input)	**Parameter Type:**	Selection
Parameter Number:	2018	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Inactive	
3	Digital input	The terminal is configured as boolean input (true/false).
4	Pulse input	The terminal is configured as pulse input. The frequency represents an analog value.

P 9.4.7.2 T18 Signal Inversion

Select whether the signal of the terminal is inverted.

Default Value:	0 (Non-Inverted)	**Parameter Type:**	Selection
Parameter Number:	2294	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Non-Inverted	The signal is not inverted.
1	Inverted	The signal is logically inverted.

P 9.4.7.3 T18 Fast Debounce Filtering Time

Set the fast debounce filtering time for the terminal.

Default Value:	–	**Parameter Type:**	Range (0.00 — 63.50)
Parameter Number:	2288	**Unit:**	µs
Data Type:	REAL	**Access Type:**	Read/Write

P 9.4.7.4 T18 Standard Debounce Filtering Time

Set the standard debounce filtering time for the terminal.

Default Value:	5.00	**Parameter Type:**	Range (0.00 — 127.00)
Parameter Number:	2039	**Unit:**	ms
Data Type:	REAL	**Access Type:**	Read/Write

P 9.4.7.5 T18 Reaction Time

Select the reaction time for the debounce filter.

Default Value:	0 (Standard reaction time (1ms tick))	**Parameter Type:**	Selection
Parameter Number:	2040	**Unit:**	–

Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Standard reaction time (1ms tick)	Use the digital input in the same way as other inputs.
1	Fast reaction time (0.5µs tick)	Enables a fast reaction time for a certain event via digital input.

P 9.4.7.6 T18 Trigger Mode

Select the trigger mode for the digital input.

Default Value:	0 (None)	**Parameter Type:**	Selection
Parameter Number:	2041	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	None	No event trigger.
1	Rising Edge	Trigger an event at the rising edge.
2	Falling Edge	Trigger an event at the falling edge.
3	Both Edges	Trigger an event at both the rising and falling edges.

P 9.4.7.7 T18 Pulse Min. Frequency

Set the frequency representing 0% of the signal.

Default Value:	–	**Parameter Type:**	Range (0 — 110000)
Parameter Number:	2042	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

P 9.4.7.8 T18 Pulse Max. Frequency

Set the frequency representing 100% of the signal.

Default Value:	110000	**Parameter Type:**	Range (0 — 110000)
Parameter Number:	2043	**Unit:**	Hz
Data Type:	REAL	**Access Type:**	Read/Write

6.11.4 Analog Inputs/Outputs (Menu Index 9.5)

6.11.4.1 Output T31 (Menu Index 9.5.1)

P 9.5.1.1 T31 Terminal Mode

Select the mode for the terminal.

Default Value:	5 (Analog Output)	**Parameter Type:**	Selection
Parameter Number:	2019	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Inactive	
5	Analog Output	Configures the terminal as an analog output.

P 9.5.1.2 T31 Terminal Type

Select the type of the terminal. If voltage is selected, the unit is V. If current is selected, the unit is mA.

Default Value:	0 (Off)	**Parameter Type:**	Selection
Parameter Number:	2284	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Off	
1	Voltage	Terminal set to voltage mode.
2	Current	Terminal set to current mode.

P 9.5.1.3 T31 Minimum Value

Set the voltage or current representing 0% of the signal.

Default Value:	–	**Parameter Type:**	Range (0 — 20)
Parameter Number:	2283	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 9.5.1.4 T31 Maximum Value

Set the voltage or current representing 100% of the signal.

Default Value:	10	**Parameter Type:**	Range (0 — 20)
Parameter Number:	2282	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

6.11.4.2 Input T33 (Menu Index 9.5.2)

P 9.5.2.1 T33 Terminal Mode

Select the mode for the terminal.

Default Value:	6 (Analog Input)	**Parameter Type:**	Selection
Parameter Number:	2020	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Inactive	
6	Analog Input	Configures the terminal as analog input.

P 9.5.2.2 T33 Terminal Type

Select the type of the terminal. If voltage is selected, the unit is V. If current is selected, the unit is mA.

Default Value:	1 (Voltage)	**Parameter Type:**	Selection
Parameter Number:	2273	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
1	Voltage	Terminal set to voltage mode.
2	Current	Terminal set to current mode.

P 9.5.2.3 T33 Minimum Value

Set the voltage or current representing 0% of the signal.

Default Value:	–	**Parameter Type:**	Range (0 — 20)
Parameter Number:	2272	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 9.5.2.4 T33 Maximum Value

Set the voltage or current representing 100% of the signal.

Default Value:	10	**Parameter Type:**	Range (0 — 20)
Parameter Number:	2271	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 9.5.2.5 T33 Filter Time

Set the filter time for the terminal.

Default Value:	–	**Parameter Type:**	Range (0.00 — 60000.00)
Parameter Number:	2270	**Unit:**	ms
Data Type:	REAL	**Access Type:**	Read/Write

P 9.5.2.6 T33 Live Zero Threshold Value

Set the live zero threshold value for the terminal.

Default Value:	–	**Parameter Type:**	Range (0 — 10)
Parameter Number:	2274	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 9.5.2.7 T33 Live Zero Timeout Value

Set the live zero timeout value for the terminal.

Default Value:	–	**Parameter Type:**	Range (0 — 60)
Parameter Number:	2275	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

6.11.4.3 Input T34 (Menu Index 9.5.3)

P 9.5.3.1 T34 Terminal Mode

Select the mode for the terminal.

Default Value:	6 (Analog Input)	**Parameter Type:**	Selection
Parameter Number:	2021	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Inactive	
6	Analog Input	Configures the terminal as analog input.
7	Temperature input	Configures the terminal as temperature sensor input.

P 9.5.3.2 T34 Terminal Type

Select the type of the terminal. If voltage is selected, the unit is V. If current is selected, the unit is mA.

Default Value:	2 (Current)	**Parameter Type:**	Selection
Parameter Number:	2279	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
1	Voltage	Terminal set to voltage mode.
2	Current	Terminal set to current mode.

P 9.5.3.3 T34 Minimum Value

Set the voltage or current representing 0% of the signal.

Default Value:	4	**Parameter Type:**	Range (0 — 20)
Parameter Number:	2278	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 9.5.3.4 T34 Maximum Value

Set the voltage or current representing 100% of the signal.

Default Value:	20	**Parameter Type:**	Range (0 — 20)
Parameter Number:	2277	**Unit:**	–

Data Type:	REAL	**Access Type:**	Read/Write

P 9.5.3.5 T34 Filter Time

Set the filter time for the terminal.

Default Value:	–	**Parameter Type:**	Range (0.00 — 60000.00)
Parameter Number:	2276	**Unit:**	ms
Data Type:	REAL	**Access Type:**	Read/Write

P 9.5.3.6 T34 Live Zero Threshold Value

Set the live zero threshold value for the terminal.

Default Value:	–	**Parameter Type:**	Range (0 — 10)
Parameter Number:	2280	**Unit:**	–
Data Type:	REAL	**Access Type:**	Read/Write

P 9.5.3.7 T34 Live Zero Timeout Value

Set the live zero timeout value for the terminal.

Default Value:	–	**Parameter Type:**	Range (0 — 60)
Parameter Number:	2281	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

P 9.5.3.8 T34 Temperature Sensor Type

Select which type of temperature sensor is connected to the terminal.

Default Value:	0 (No sensor)	**Parameter Type:**	Selection
Parameter Number:	1617	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	No sensor	No sensor selected.
1	Pt100	Pt100 temperature sensor (100 Ω at 0°C ambient).
4	Pt1000	Pt1000 temperature sensor (1kΩ at 0°C ambient).
5	Ni1000Tk5000	Ni1000Tk5000 TC5 standard temperature sensor (1kΩ at 0°C ambient).
6	Ni1000Tk6180	Ni1000Tk6180 DIN43760 standard temperature sensor (1kΩ at 0°C ambient).
7	KTY84-1x0	KTY84-1x0 temperature sensor (1kΩ at 100°C ambient).
8	KTY84-151	KTY84-151 temperature sensor (950-1000 Ω at 100°C ambient).
9	KTY84-152	KTY84-152 temperature sensor (1000-1050 Ω at 100°C ambient).
10	KTY81/82-1x0	KTY81/82-1x0 temperature sensor (1kΩ at 25°C ambient).

Selection Number	Selection Name	Selection Description
11	KTY81/82-121	KTY81/82-121 temperature sensor (980-1000 Ω at 25°C ambient).
12	KTY81/82-122	KTY81/82-122 temperature sensor (1000-1020 Ω at 25°C ambient).
13	KTY81/82-151	KTY81/82-151 temperature sensor (950-1000 Ω at 25°C ambient).
14	KTY81/82-152	KTY81/82-152 temperature sensor (1000-1050 Ω at 25°C ambient).
15	KTY81/82-2x0	KTY81/82-2x0 temperature sensor (2kΩ at 25°C ambient).
16	KTY81/82-221	KTY81/82-221 temperature sensor (1960-2000 Ω at 25°C ambient).
17	KTY81/82-222	KTY81/82-222 temperature sensor (2000-2040 Ω at 25°C ambient).
18	KTY81/82-251	KTY81/82-251 temperature sensor (1900-2000 Ω at 25°C ambient).
19	KTY81/82-252	KTY81/82-252 temperature sensor (2000-2100 Ω at 25°C ambient).

P 9.5.3.9 T34 Temperature Connection Type

Type of connection for the sensor.

Default Value:	0 (No sensor)	**Parameter Type:**	Selection
Parameter Number:	1618	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	No sensor	No sensor selected.
2	2-wire	2-wire connection to sensor.

P 9.5.3.10 T34 Temperature Calibration Offset

Sets the calibration offset for temperature input 34.

Default Value:	–	**Parameter Type:**	Range (-50 — 50)
Parameter Number:	6587	**Unit:**	°C
Data Type:	REAL	**Access Type:**	Read/Write

6.11.5 Relay Delays (Menu Index 9.6)

Delays can be configured to the activation and deactivation of the relays. A delay is useful when there are several panels made up of discrete components, or as a filter to ensure that the signal that triggers the relay is stable before the relay responds. The trigger signal must be active for the duration of the on delay before the relay activates, and inactive for the duration of the off delay before the relay deactivates.

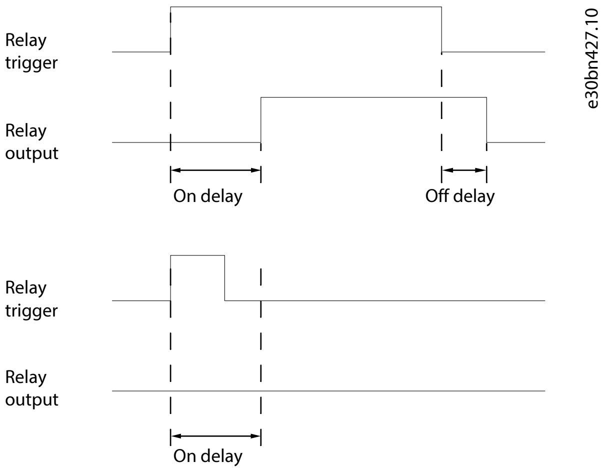


Figure 78: Relay On Delay

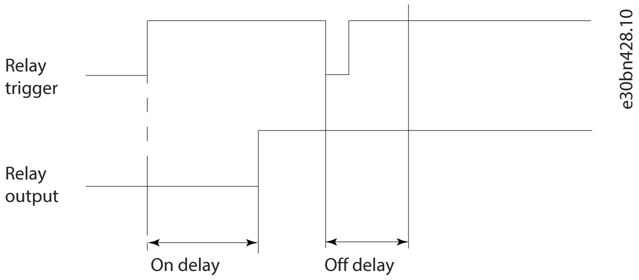


Figure 79: Relay Off Delay

6.11.5.1 Relay T2 Delays (Menu Index 9.6.1)

P 9.6.1.1 Relay T2 Turn-on Delay

Set the turn-on delay for Relay T2. This parameter sets the time the relay takes to turn on after the turn-on signal is sent by switching the Ready Output.

Default Value:	0	**Parameter Type:**	Range (0 — 3600)
Parameter Number:	1634	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

P 9.6.1.2 Relay T2 Turn-off Delay

Set the turn-off delay for Relay T2. This parameter sets the time the relay takes to turn off after the turn-off signal is sent by switching the Ready Output.

Default Value:	0	**Parameter Type:**	Range (0 — 3600)
Parameter Number:	1635	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

6.11.5.2 Relay T5 Delays (Menu Index 9.6.2)

P 9.6.2.1 Relay T5 Turn-on Delay

Set the turn-on delay for Relay T5. This parameter sets the time the relay takes to turn on after the turn-on signal is sent by switching the Ready Output.

Default Value:	0	**Parameter Type:**	Range (0 — 3600)

Parameter Number:	1636	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

P 9.6.2.2 Relay T5 Turn-off Delay

Set the turn-off delay for Relay T5. This parameter sets the time the relay takes to turn off after the turn-off signal is sent by switching the Ready Output.

Default Value:	0	**Parameter Type:**	Range (0 — 3600)
Parameter Number:	1637	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

6.12 Connectivity (Menu Index 10)

6.12.1 Connectivity Overview

This section provides information about configuring and monitoring all types of communication interfaces as well as the communication and fieldbus protocols available. Following are the available interfaces:

- Communication interface X0
- Communication interface X1/X2

The following are the available network management protocol and fieldbus protocols:

- SNMP
- PROFINET
- MODBUS TCP
- EtherNet/IP
- EtherCAT
- OPC UA

For more information, refer to the related fieldbus guide.

6.12.2 Communication interfaces (Menu Index 10.2)

6.12.2.1 Host Settings (Menu Index 10.2.1)

P 10.2.1.1 Fully Qualified Domain Name

Fully Qualified Domain Name. Consists of a host name label and at least 1 higher-level domain separated by the symbol "." with up to 240 characters in total. Each label contains upto 63 characters and starts with a lowercase letter and ends with alphanumeric lowercase character and have as interior characters only alphanumeric lowercase characters and '-'.

Default Value:	*	**Parameter Type:**	Range (* — *)
Parameter Number:	7036	**Unit:**	–
Data Type:	STRING	**Access Type:**	Read/Write

6.12.2.2 Ethernet Interface X0 (Menu Index 10.2.2)

S 10.2.2.1 IPv4 Settings

This menu enables IP configuration of the interface.

S 10.2.2.2 IPv4 Status

This menu contains information about the IP configuration of the interface.

6.12.2.2.1 Interface X0 IPv4 Settings

The Ethernet Interface X0 IPv4 settings view contains the following fields:

- Interface X0 MAC address
- IPv4 addressing method
- Requested IPv4 address
- Requested IPv4 SUBNET mask
- Requested IPv4 gateway address
- Enable ACD
- DNS server 1
- DNS server 2

> IMPORTANT:
>
> To ensure that outgoing IP packets are routed correctly, configure the IP address of the X1/X2 interfaces to a different subnet than the IP address of the X0 interface.

6.12.2.2.2 Interface X0 IPv4 Status

The Ethernet Interface X0 IPv4 status view contains the following fields:

- Interface X0 MAC address
- IPv4 addressing method
- Actual IPv4 address
- Actual IPv4 SUBNET mask
- Actual IPv4 gateway address
- DHCP server
- Actual DNS server 1
- Actual DNS server 2
- ACD activity

6.12.2.3 Ethernet Interface X1/X2 Settings (Menu Index 10.2.3)

S 10.2.3.1 IPv4 Settings

This menu enables IP configuration of the interface.

S 10.2.3.2 IPv4 Status

This menu contains information about the IP configuration of the interface.

6.12.2.3.1 Interface X1/X2 IPv4 Settings

The Ethernet Interface X1/X2 IPv4 settings view contains the following fields:

- Interface X1 MAC address
- IPv4 addressing method
- Requested IPv4 address
- Requested IPv4 SUBNET mask
- Requested IPv4 gateway address

- Enable ACD
- DNS server 1
- DNS server 2

> IMPORTANT:
>
> To ensure that outgoing IP packets are routed correctly, configure the IP address of the X1/X2 interfaces to a different subnet than the IP address of the X0 interface.

6.12.2.3.2 Interface X1/X2 IPv4 Status

The Ethernet Interface X1/X2 IPv4 status view contains the following fields:

- Interface X1 MAC address
- IPv4 addressing method
- Actual IPv4 address
- Actual IPv4 SUBNET mask
- Actual IPv4 gateway address
- DHCP server
- Actual DNS server 1
- Actual DNS server 2
- ACD activity

6.12.2.4 Ethernet port X0 (Menu Index 10.2.4)

6.12.2.4.1 X0 Settings (Menu Index 10.2.4.2)

P 10.2.4.2.5 Link Configuration X0

Select the configuration of the Ethernet link parameters.

Default Value:	0 (Auto negotiation)	**Parameter Type:**	Selection
Parameter Number:	7047	**Unit:**	–
Data Type:	USINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Auto negotiation	The drive handles the speed and duplex settings.
1	10 Mbps full duplex	10 Mbps with full duplex.
2	10 Mbps half duplex	10 Mbps with half duplex.
3	100 Mbps full duplex	100 Mbps with full duplex.
4	100 Mbps half duplex	100 Mbps with half duplex.

6.12.2.5 Ethernet port X1 (Menu Index 10.2.5)

6.12.2.5.1 X1 Settings (Menu Index 10.2.5.2)

P 10.2.5.2.5 Link Configuration X1

Select the configuration of the Ethernet link parameters.

Default Value:	0 (Auto negotiation)	**Parameter Type:**	Selection
Parameter Number:	7048	**Unit:**	–
Data Type:	USINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Auto negotiation	The drive handles the speed and duplex settings.
1	10 Mbps full duplex	10 Mbps with full duplex.
2	10 Mbps half duplex	10 Mbps with half duplex.
3	100 Mbps full duplex	100 Mbps with full duplex.
4	100 Mbps half duplex	100 Mbps with half duplex.

6.12.2.6 Ethernet port X2 (Menu Index 10.2.6)

6.12.2.6.1 X2 Settings (Menu Index 10.2.6.2)

P 10.2.6.2.5 Link Configuration X2

Select the configuration of the Ethernet link parameters.

Default Value:	0 (Auto negotiation)	**Parameter Type:**	Selection
Parameter Number:	7049	**Unit:**	–
Data Type:	USINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Auto negotiation	The drive handles the speed and duplex settings.
1	10 Mbps full duplex	10 Mbps with full duplex.
2	10 Mbps half duplex	10 Mbps with half duplex.
3	100 Mbps full duplex	100 Mbps with full duplex.
4	100 Mbps half duplex	100 Mbps with half duplex.

6.12.2.7 Port Mirroring (Menu Index 10.2.7)

S 10.2.7 Port Mirroring

Enable/disable the port-mirroring function for network troubleshooting with a network analyzer tool.

6.12.2.8 RS485 Port X4 (Menu Index 10.2.8)

S Screen Not Found. ID = 9801414

6.12.3 Protocols (Menu Index 10.3)

6.12.3.1 General Settings (Menu Index 10.3.1)

P 10.3.1.2 Fieldbus Profile

Select the fieldbus profile. The selection affects the interpretation of the control word and status word.

Default Value:	101;401	**Parameter Type:**	Selection
Parameter Number:	1301	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
101	iC Speed Profile	The fieldbus control word and status word are interpreted according the iC Speed Profile definition.
201	PROFIdrive Standard Telegram 1	The fieldbus control word and status word are interpreted according to the PROFIdrive Standard Telegram 1 standard.
401	BACnet Profile	Select this profile when using BACnet.

P 10.3.1.3 Fieldbus Fault Response

Select the behavior when a fieldbus fault occurs.

Default Value:	1 (Info)	**Parameter Type:**	Selection
Parameter Number:	1303	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
1	Info	The event is logged in the event log.
3	Warning	The drive issues a warning.
9	Fault, ramp to coast	Issues a fault, ramps down, and coast.
10	Fault	The drive issues a fault and coasts the motor.

P 10.3.1.4 No Fieldbus Connection Response

Select the response in case there is no fieldbus connection.

Default Value:	1 (Info)	**Parameter Type:**	Selection
Parameter Number:	1327	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
1	Info	The event is logged in the event log.
3	Warning	The drive issues a warning.
9	Fault, ramp to coast	Issues a fault, ramps down, and coast.
10	Fault	The drive issues a fault and coasts the motor.

P 10.3.1.6 Process Data Timeout Time

Set the timeout time. If process data is not received within the time set, a process data timeout is triggered.

Default Value:	60	**Parameter Type:**	Range (0 — 18000)
Parameter Number:	1340	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

P 10.3.1.12 Process Data Timeout Response

Select the response to a process data timeout.

Default Value:	1 (Info)	**Parameter Type:**	Selection
Parameter Number:	1341	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
1	Info	The event is logged in the event log.
3	Warning	The drive issues a warning.
5	Warning - Change Control Place	The drive issues a warning, and the control place changes to the selected alternative while the timeout warning is active. The control place will change back to the original one when the fieldbus process data returns.
6	Warning - Change Control Place - Persistent	The drive issues a warning, and the control place changes to the selected alternative while the timeout warning is active. The control place requires a reset command to change back to the original one after the fieldbus process data returns.
9	Fault, ramp to coast	Issues a fault, ramps down, and coast.
10	Fault	The drive issues a fault and coasts the motor.

P 10.3.1.13 Process Data Timeout Control Place

Select the alternative control place to be used in case of filedbus timeout. This is only valid in case of timeout warning or info.

Default Value:	1 (Local control)	**Parameter Type:**	Selection
Parameter Number:	112	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
1	Local control	The drive is controlled by a connected control panel.
2	Fieldbus control	The drive is controlled via a fieldbus.
3	I/O control	The drive is controlled via I/O.
4	Advanced control	The drive is controlled via a combination of I/O and fieldbus.

6.12.3.2 PROFINET (Menu Index 10.3.2)

6.12.3.2.1 Status (Menu Index 10.3.2.1)

S 10.3.2.1.1 PROFINET Report

6.12.3.2.2 Configuration (Menu Index 10.3.2.2)

P 10.3.2.2.1 Name of Station

Set the name of station. The PROFINET device is identified by its name of station. Each name must be unique in the network.

Default Value:	–	**Parameter Type:**	Range (* — *)
Parameter Number:	7080	**Unit:**	–
Data Type:	STRING	**Access Type:**	Read/Write

6.12.3.2.3 Diagnosis (Menu Index 10.3.2.3)

P 10.3.2.3.1 Diagnostic Fault

Enables diagnostic fault. When disabled the device will not send any PROFINET diagnosis message with severity "Fault" when a fault is present on device.

Default Value:	1 (Enabled)	**Parameter Type:**	Selection
Parameter Number:	7081	**Unit:**	–
Data Type:	BOOL	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Disabled	Disables the function.
1	Enabled	Enables the function.

P 10.3.2.3.2 Diagnostic Warning

Enables diagnostic warning. When disabled the device will not send any PROFINET diagnosis message with severity "Maintenance required" when a warning is present on device.

Default Value:	1 (Enabled)	**Parameter Type:**	Selection
Parameter Number:	7083	**Unit:**	–
Data Type:	BOOL	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Disabled	Disables the function.
1	Enabled	Enables the function.

6.12.3.3 Modbus (Menu Index 10.3.3)

6.12.3.3.1 Configuration (Menu Index 10.3.3.2)

P 10.3.3.2.1 Persistent Storage

Select if persistent storage is active for Modbus writes.

Default Value:	0 (Disabled)	**Parameter Type:**	Selection
Parameter Number:	7061	**Unit:**	–
Data Type:	BOOL	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Disabled	Modbus writings are not written to persistent storage.
1	Enabled	Modbus writings are written to persistent storage.

P 10.3.3.2.3 Byte Order

Select the byte order.

Default Value:	0 (Big Endian)	**Parameter Type:**	Selection
Parameter Number:	7062	**Unit:**	–
Data Type:	USINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Big Endian	Byte order is defined as big-endian - The most significant value to the left.
1	Little Endian	Byte order is defined as little-endian - The least significant value to the left.

P 10.3.3.2.4 Word Order

Select the word order.

Default Value:	1 (Little Endian)	**Parameter Type:**	Selection
Parameter Number:	7063	**Unit:**	–
Data Type:	USINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Big Endian	Byte order is defined as big-endian - The most significant value to the left.
1	Little Endian	Byte order is defined as little-endian - The least significant value to the left.

6.12.3.4 EtherNet/IP (Menu Index 10.3.4)

6.12.3.4.1 Status (Menu Index 10.3.4.1)

S 10.3.4.1.1 EtherNet/IP Report

6.12.3.5 EtherCAT (Menu Index 10.3.5)

6.12.3.5.1 Status (Menu Index 10.3.5.1)

S 10.3.5.2.1 EtherCAT Report

6.12.3.5.2 Configuration (Menu Index 10.3.5.2)

P 10.3.5.2.1 Device ID

The EtherCAT Explicit Device Identification is an optional feature for identifying an EtherCAT slave explictly. If set, the value must be unique within a network configuration.

Default Value:	0	**Parameter Type:**	Range (0 — 65535)
Parameter Number:	7084	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

6.12.3.6 BACnet (Menu Index 10.3.7)

6.12.3.6.1 Status (Menu Index 10.3.7.1)

P 10.3.7.1.1 Total Messages

For every message, whether it is transmitted or received, this counter increments by 1.

Default Value:	0	**Parameter Type:**	Range (0 — 4294967295)
Parameter Number:	6250	**Unit:**	–
Data Type:	UDINT	**Access Type:**	Read/Write

P 10.3.7.1.2 Transmitted Messages

For every transmitted message this counter increments by 1.

Default Value:	0	**Parameter Type:**	Range (0 — 4294967295)
Parameter Number:	6251	**Unit:**	–
Data Type:	UDINT	**Access Type:**	Read/Write

P 10.3.7.1.3 Received Messages

For every received message this counter increments by 1, whether or not the message is valid.

Default Value:	0	**Parameter Type:**	Range (0 — 4294967295)
Parameter Number:	6252	**Unit:**	–
Data Type:	UDINT	**Access Type:**	Read/Write

P 10.3.7.1.4 Valid Received Messages

For every received valid message this counter increments by 1.

Default Value:	0	**Parameter Type:**	Range (0 — 4294967295)
Parameter Number:	6253	**Unit:**	–
Data Type:	UDINT	**Access Type:**	Read/Write

P 10.3.7.1.5 Invalid Received Messages

For every received invalid message this counter increments by 1.

Default Value:	0	**Parameter Type:**	Range (0 — 4294967295)
Parameter Number:	6254	**Unit:**	–
Data Type:	UDINT	**Access Type:**	Read/Write

6.12.3.6.2 Configuration (Menu Index 10.3.7.2)

P 10.3.7.2.1 Device Instance

Device instance for BACnet.

Default Value:	1	**Parameter Type:**	Range (1 — 4194303)
Parameter Number:	7100	**Unit:**	–
Data Type:	UDINT	**Access Type:**	Read/Write

P 10.3.7.2.2 Max Manager

The maximum number of managers that can be configured in the BACnet network.

Default Value:	127	**Parameter Type:**	Range (0 — 127)
Parameter Number:	7101	**Unit:**	–
Data Type:	USINT	**Access Type:**	Read/Write

P 10.3.7.2.3 Max Info Frames

The maximum number of information frames that a BACnet device can send or receive in a single transmission.

Default Value:	1	**Parameter Type:**	Range (1 — 255)
Parameter Number:	7102	**Unit:**	–
Data Type:	USINT	**Access Type:**	Read/Write

P 10.3.7.2.4 "I-AM" Service

Select whether the device sends the "I-Am" service message only at powerup or continuously with an interval of approximately 1 min.

Default Value:	0 (Send at Power-up)	**Parameter Type:**	Selection
Parameter Number:	7103	**Unit:**	–
Data Type:	USINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	Send at Power-up	Sending the BACnet I am service message at power-up.
1	Continuously	Sending the BACnet I am service message continuously.

P 10.3.7.2.6 APDU Segment Timeout

Enter the wait time for a device to acknowledge the transmitted segment.

Default Value:	5000	**Parameter Type:**	Range (3000 — 10000)
Parameter Number:	7105	**Unit:**	ms
Data Type:	UINT	**Access Type:**	Read/Write

P 10.3.7.2.7 APDU Timeout

Set the wait time for a device to receive a response after a message sent.

Default Value:	6000	**Parameter Type:**	Range (5000 — 65535)
Parameter Number:	7106	**Unit:**	ms
Data Type:	UINT	**Access Type:**	Read/Write

P 10.3.7.2.8 Number Of APDU Retries

Set the maximum number of times the system attempts to resend an APDU if an acknowledge is not received.

Default Value:	3	**Parameter Type:**	Range (0 — 255)
Parameter Number:	7109	**Unit:**	–
Data Type:	USINT	**Access Type:**	Read/Write

P 10.3.7.2.9 Daylight Saving Status

Indicates whether daylight savings time is in effect at the BACnet device location.

Default Value:	False	**Parameter Type:**	Range (False — True)
Parameter Number:	7107	**Unit:**	–
Data Type:	BOOL	**Access Type:**	Read/Write

P 10.3.7.2.10 UTC Offset

Set time zone adjustment from Coordinated Universal Time (UTC). The adjustment is measured in minutes.

Default Value:	0	**Parameter Type:**	Range (-1440 — 1440)
Parameter Number:	7110	**Unit:**	min
Data Type:	INT	**Access Type:**	Read/Write

P 10.3.7.2.11 Character Format

Represents the character format of BACnet. The only supported values are 0 = ANSI_X34/UTF8 and 5 =ISO8859.

Default Value:	0 (ANSI_X3.4/UTF8)	**Parameter Type:**	Selection
Parameter Number:	7111	**Unit:**	–
Data Type:	USINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
0	ANSI_X3.4/UTF8	
5	ISO8859	

P 10.3.7.2.12 BACnet Password

Set the password needed to control the drive.

Default Value:	–	**Parameter Type:**	Range (* — *)
Parameter Number:	7112	**Unit:**	–
Data Type:	STRING	**Access Type:**	Read/Write

P 10.3.7.2.13 BACnet/IP UDP Port

Set the UDP port for BACnet/IP. It is recommended to use a port number in the range of 47808-47823 or 49152-65535.

Default Value:	47808	**Parameter Type:**	Range (47808 — 65535)
Parameter Number:	7113	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

P 10.3.7.2.14 BACnet Connection Timeout

Set the BACnet timeout time. If BACnet data is not received within the time set, a BACnet connection timeout is triggered.

Default Value:	60	**Parameter Type:**	Range (10 — 18000)
Parameter Number:	6448	**Unit:**	s
Data Type:	REAL	**Access Type:**	Read/Write

P 10.3.7.2.15 BACnet Timeout Control Place

Select the alternative control place to be used in case of BACnet timeout. This setting is only valid in case of a timeout warning or info.

Default Value:	1 (Local control)	**Parameter Type:**	Selection
Parameter Number:	4877	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
1	Local control	The drive is controlled by a connected control panel.
2	Fieldbus control	The drive is controlled via a fieldbus.
3	I/O control	The drive is controlled via I/O.
4	Advanced control	The drive is controlled via a combination of I/O and fieldbus.

P 10.3.7.2.16 BACnet Timeout Response

Select the response to a BACnet data timeout.

Default Value:	1 (Info)	**Parameter Type:**	Selection

Parameter Number:	4587	**Unit:**	–
Data Type:	UINT	**Access Type:**	Read/Write

The following are the selections for the parameter.

Selection Number	Selection Name	Selection Description
1	Info	The event is logged in the event log.
3	Warning	The drive issues a warning.
5	Warning - Change Control Place	The drive issues a warning, and the control place changes to the selected alternative while the timeout warning is active. The control place will change back to the original one when the fieldbus process data returns.
6	Warning - Change Control Place - Persistent	The drive issues a warning, and the control place changes to the selected alternative while the timeout warning is active. The control place requires a reset command to change back to the original one after the fieldbus process data returns.
9	Fault, ramp to coast	Issues a fault, ramps down, and coast.
10	Fault	The drive issues a fault and coasts the motor.

7 Troubleshooting

7.1 Introduction to Events and Fault Handling

During operation, the drive monitors operational conditions, communication, the changes in certain settings, and other conditions. If a change in settings or operational conditions occurs that requires information or other action from the operator, an event is issued. The event can be just a notification, or it can be a request to act. The event details contain information to help the operator to understand the condition, and if required, take relevant actions to analyze and solve the issue.

7.2 Event Categories

The events are categorized in 4 types, with increasing criticality.

Info

Info events are notifications of a specific situation, or they log an event in the history log. Info events are not highlighted by any indicator LEDs. An active info and related details can be viewed in the active events list and the same information is stored in the event history. An info event is automatically reset once the conditions triggering it are no longer active.

Warning

Warning events notify and make the operator aware of situations that can influence the operation of the drive. To avoid a more critical situation (fault), attention to the warning is usually required.

When a warning event occurs, status indicators turn yellow, and a triangular warning symbol appears in MyDrive® Insight. An active warning can be viewed in the active events list and the same information is stored in the event history. The drive remains operational while the warning is active. A warning event is reset automatically once the conditions triggering it are no longer active.

Fault

Fault events are critical to the continuing operation of the drive and require attention and action from the operator. Continuing operation is only possible if the issue causing the event is removed.

When a fault event occurs, status indicators turn red, and a red bell-shaped fault symbol appears in MyDrive® Insight. An active fault can be viewed in the active events list and the same information is stored in the event history. The drive stops operation when a fault occurs. To reset a fault event, the conditions triggering the fault must be removed and a reset command must be given.

Protected fault

A protected fault is comparable to the fault event, with the exception that it requires a power cycling of the drive to be reset. The event type is used for situations that are critical to continued operation and require extra attention before a reset.

Each event is described by a short descriptive heading and info about the event. If the event is a warning or fault, additional information on the possible cause and mitigation is provided as well.

Further details can be found in the following chapters about events and their causes.

7.3 Event Notifications in the Control Panel

Events are shown in the control panel in different ways.

1. Status indicators for warnings and faults

   If a warning or fault becomes active, the status indicators (the Halo and the status LEDs above the Halo) light up.

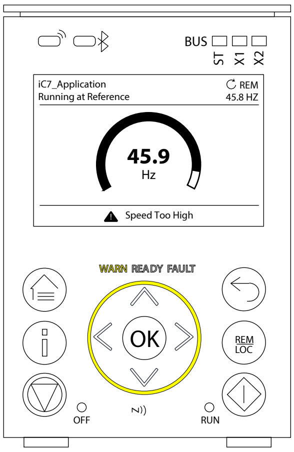
   - The status LED [WARN] and the Halo are yellow when a warning is active.
   - The status LED [FAULT] and the Halo are red when a fault is active.

> NOTE: See Chapter 3 for more information about the control panel elements.

2. Overlay for warnings and faults

   a. Toasts for warnings

      A toast notification is shown in the bottom of the status screens for as long as a warning condition is present.



   b. Fault overlays

      If a fault is triggered, a fault overlay is shown.

      The content of the overlay depends on the fault level (fault or protected fault) and on whether automatic reset has been enabled with parameter group ***6.4.4 Auto Reset***. If auto reset is enabled, the number of reset attempts and the time until the next attempt is shown. If resetting has not been successful, a failure notification is also shown.

      Digital buttons are shown when applicable.

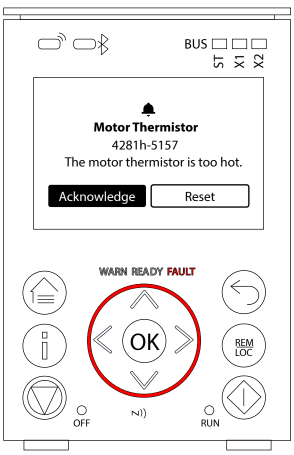


Figure 80: Fault (Auto Reset not Enabled)

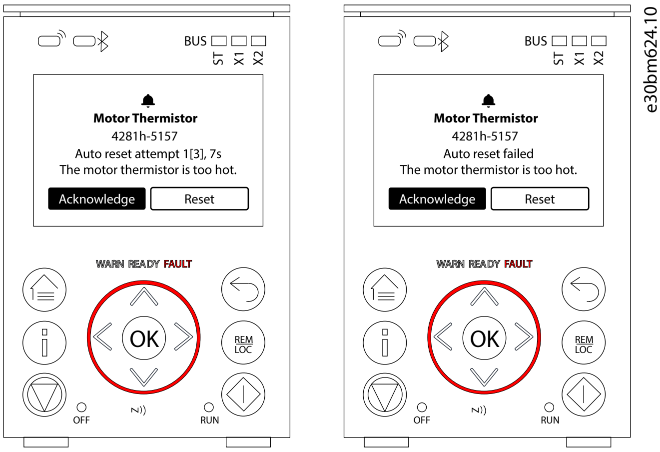


Figure 81: Fault (Auto Reset Enabled)

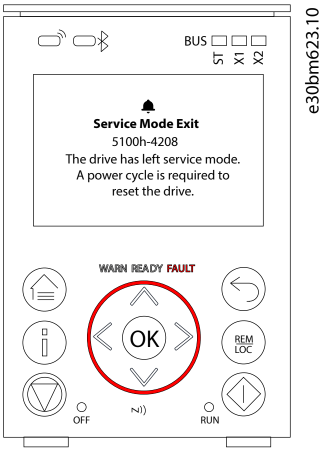


Figure 82: Protected Fault

7.4 Viewing Events

Events can be viewed from the main menu of the control panel.

1. Select *Events*.

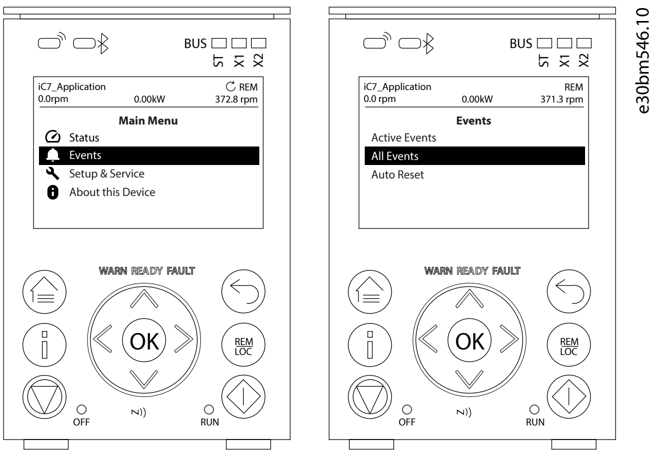


Figure 83: Navigating to Events in the Control Panel

2. Select either *Active Events* or *All Events*.

   – Selecting *Active Events* shows the currently active events on the control panel screen.

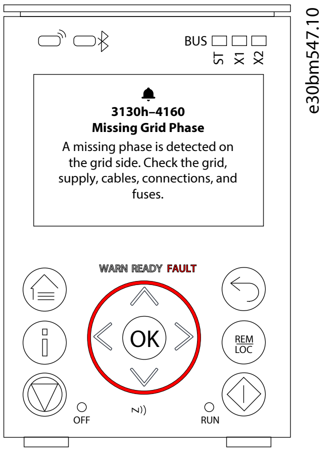


Figure 84: An Active Event

   – Selecting *All Events* shows a list of present and past events, their statuses, and time stamps. A strike through the event symbol indicates that the event is no longer active.

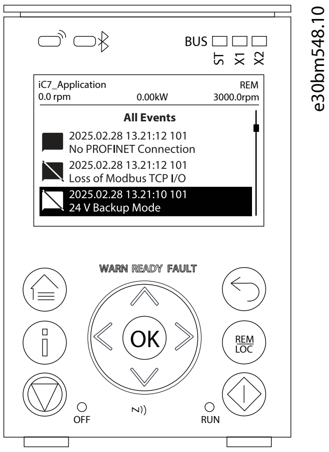
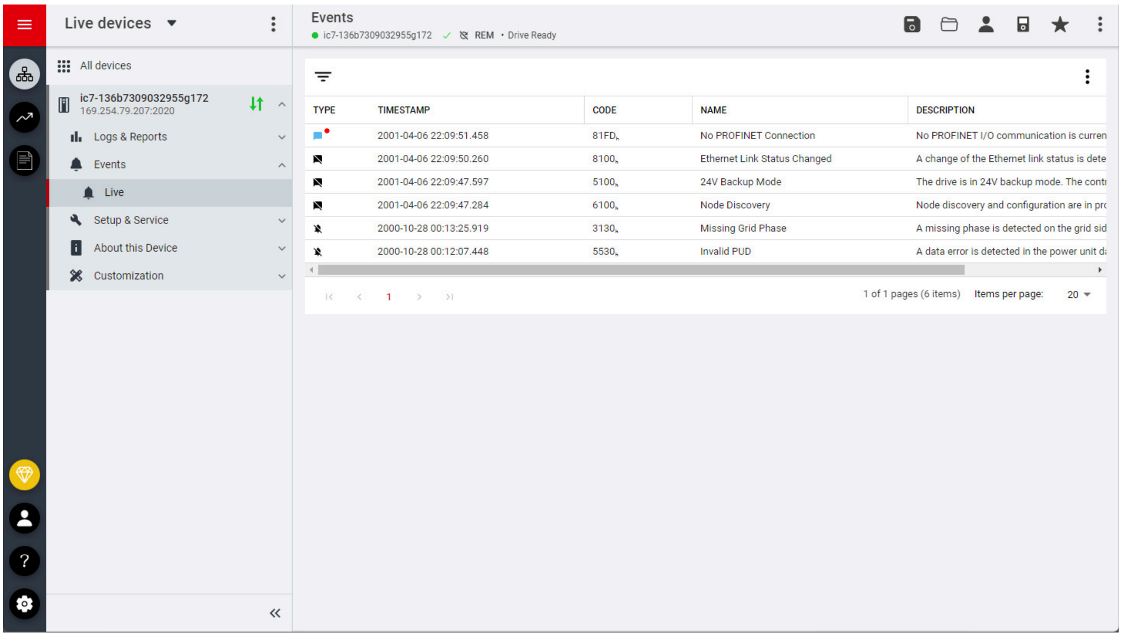


Figure 85: All Events List

   Pressing the *[Info]* button shows the description of the selected event like in Figure 84. Pressing the *[OK]* button shows additional details of the selected event.

The list of events is also available in MyDrive® Insight. It contains the same information as shown in the control panel. Select the specific drive and expand *Events* to show the active event list under *Live*.



e30bm549.10

Figure 86: Events in MyDrive® Insight

7.5 Event Groups

The event group numbers are based on the standardized codes as stated in IEC 61800-7-201 with some additions. The groups cover the following categories:

Table 40: Event Groups

Group number	Category
20FFh	Short term current injection
2110h	Short circuit/earth leakage
2212h	Short circuit
2221h, 2222h	Overcurrent (mains side)
2310h, 2311h	Overcurrent (motor side)
2330h	Earth leakage (motor side)
2340h	Short circuit (motor side)
23FEh	Current imbalance between units
23FFh	Motor disconnected
3110h	Mains undervoltage
3120h	Mains overvoltage
3130h	Mains phase missing
3140h	Mains frequency
3211h, 3212h	DC-link undervoltage
32FFh	DC-link imbalance
4110h	Temperature - Ambient high
4210h, 4220h	Temperature - Brake chopper
4280h, 4281h, 42FFh	Temperature - External component

Table 40: Event Groups - (continued)

Group number	Category
4310h	Temperature - Unit - High
4320h	Temperature - Unit - Low
4380h	Temperature - Cooling module
43FEh	Temperature - Control board
43FFh	Temperature - Imbalance
4480h	Temperature - External filter
5100h	External 24 V supply
5112h, 5114h, 5118h	Supply voltage - Low
51FEh, 51FFh	Gate driver fault
5210h	Measurement circuit
5400h	Power section
5480h	AFE fault
54FEh	STO activated or fault
54FFh	DC link fault
5530h	Hardware memory - EEPROM
6100h	Internal software
6180h	Event simulation
6181h	Unknown I/O selection
61F7h	Low storage space
61FBh	Internal communication error
61FCh	High-speed bus fault
61FFh	Functional safety fault
6320h	Parameter error
7012h	Motor feedback
7080h	Mechanical brake
70FFh	Fan fault
7110h	Brake chopper
7113h	Brake chopper - Protection
7120h	Motor
7122h	Motor - Fault
72FFh	Feedback option fault
7310h	Sensor - Speed
7500h	Communication
7580h	Lost connection
8100h	Fieldbus communication
81FDh	Missing fieldbus connection

Table 40: Event Groups - (continued)

Group number	Category
81FEh	Fieldbus connection lost
81FFh	Fieldbus process data timeout
8331h	Torque fault
8400h	Speed controller
8611h	Positioning controller - Following error
8612h	Positioning controller - Reference limit
9080h	Lost load
F004h	Inertia estimation
FF01h	External exception
FF02h	Preventive maintenance
FF06h	Logic

Multiple fault codes can be assigned in each group. The fault codes are identified with a unique number. More details on each event are found in the events summary table.

7.6 Event Details

Each event has a unique event number, a short descriptive name, and a more detailed description. The events are grouped according to error codes defined in IEC 61800-7-201.

Unlike the individual event number, the groups are not unique, since multiple errors can be related to each other. As an example, different motor side ground faults share the same group number 0x2330.

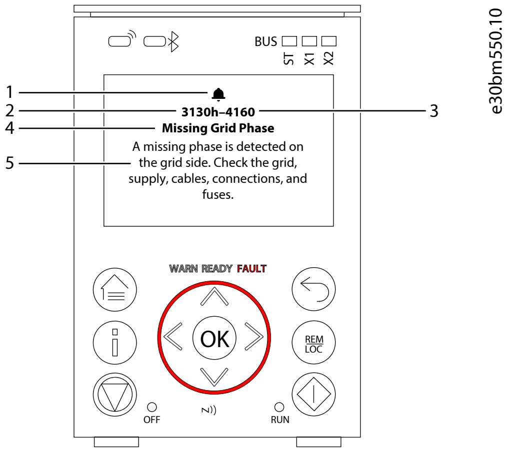


Figure 87: Parts of the Event Notification in the Control Panel

Number	Explanation
1	An icon indicating the event type.
2	An event group number (hexadecimal).
3	A unique event number.

Number	Explanation
4	A short descriptive headline.
5	A detailed description split in 1–3 elements: • A description of the event. • For warnings and faults: ◆ A description of the potential cause of the event. ◆ A short description of mitigating actions to avoid or clear the event.

In the example picture Figure 87:

- The bell icon indicates that the event is a fault.
- The event group is 3130h, and the event number is 4160.
- The event headline is ***Missing Grid Phase***.
- The detailed description indicates that the fault is due to a missing grid phase, and instructs to check the grid supply, cabling, and connections.

7.7 Events Summary for iC7 Application Software

The following table lists the events that can occur in the iC7 application software. The table is structured in the following columns:

- Group number (Column 1)

  The event group number in hexadecimal format
- Event number (Column 2)

  The unique event number
- Display name (Column 3)

  The short descriptive name of the event
- Description (Column 4)

  A detailed description of the event, and if applicable, potential causes and mitigating actions to eliminate the problem.
- Type of event (Columns 5-8)

  The type of event: I - Info, W - Warning, F - Fault, PF - Protected Fault
- Inverter/brake chopper action (Columns 9-10)

  The reaction of the inverter (drive output) and the brake chopper: C - Coasts the motor, RC - Ramps down and coasts the motor

Table 41: Summary Table

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
0x20FF	4372	Short term current injection	Short Term Current Injection has started. The Grid Converter might trip if the time limit is exceeded.		X	X		C	
0x2110	4379	CM Current High	An excessive common mode current is detected in the LCL-filter.		X	X		C	

Table 41: Summary Table - (continued)

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
0x2110	4701	Input Current High 1	The input current of the drive has exceeded its normal range.		X	X		C	
0x2212	4374	DC-link Resonance	A resonance on the DC link with excessive RMS current values is detected.		X	X		C	
0x2221	4384	Thermal Overload Rectifier	The rectifier is thermally overloaded. Mission profile is too demanding.		X	X		C	
0x2222	4373	DC-link Overcurrent	An overcurrent on the main DC-link capacitors is detected.		X	X		C	
0x2310	5170	Current Limit Timeout	The drive has exceeded the allowed time in current limit.			X		C	
0x2311	4097	Inverter Overload	Thermal overload is detected in the inverter of the drive. Reduce the output load.		X	X		C	
0x2311	4367	ImaxUse r	User configured inverter output overcurrent.		X	X		C	
0x2311	4368	Output Current High 0	The output current of the drive has exceeded its normal range at low speed. Shock load or too fast acceleration with high-inertia loads can cause this fault. Check that the motor size matches the drive and the motor data is correct. Check that the motor shaft can be turned.		X	X		C	
0x2311	4369	Output Current High 1	The output current of the drive has exceeded its normal range. Shock load or too fast acceleration with high-inertia loads can cause this fault. Check that the motor size matches the drive and the motor data is correct. Check that the motor shaft can be turned.		X	X		C	
0x2311	4375	Excessive Current Limiting	The output current of the drive has exceeded the current limit multiple times. Check that the motor size matches the drive and the motor data is correct. Check that the motor shaft can be turned.		X	X		C	
0x2311	4377	Smart Derating Fault	A Smart Derating fault is detected. The load is too demanding for the current derating level. Lower the switching frequency if possible.		X	X		C	

Table 41: Summary Table - (continued)

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
0x2311	4380	Current Limit Setting Fault	The actual current limit setting is too high relative to the selected constant control frequency level. Reduce the control frequency setting or reduce the current limit setting.			X		C	C
0x2330	4352	Ground Fault 0	A high-impedance ground fault is detected on the output. Check the insulation of motor cable and motor.		X	X		C	
0x2330	4353	Ground Fault 1	A high-impedance ground fault is detected on the output. Check the insulation of motor cable and motor.		X	X		C	
0x2330	4354	Ground Fault 2	A low-impedance ground fault is detected on the output. Check the insulation of motor cable and motor.		X		X	C	
0x2330	4355	Ground Fault 21	A high or low-impedance ground fault is detected on the output. Check the insulation of motor cable and motor.		X		X	C	
0x2330	4732	Iearth2Sd	Low-impedance earth fault.		X	X		C	C
0x2340	4356	Inverter Short Circuit	A short circuit at the inverter output is detected. Check the motor and motor cable.		X		X	C	
0x2340	4370	Output Current High 2	A critical output overcurrent is detected. Check for short circuits on the output.		X		X	C	
0x2340	4649	Desat Gate Driver	The gate driver has detected a desaturation condition.				X	C	C
0x2340	4731	Imax2GateDriver	Inverter output fast overcurrent.			X		C	C
0x23FE	4371	Current Imbalance	A current imbalance between paralleled power units is detected.		X				
0x23FF	4175	Motor Disconnected	The motor is disconnected.		X	X		C	
0x23FF	4176	Missing Motor Phase	A missing motor phase is detected. Check motor, motor cables, and connections.		X	X		C	
0x3110	4162	Grid Voltage Spikes	Excessive spikes on the grid voltage have been detected.		X	X		C	

Table 41: Summary Table - (continued)

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
0x3110	4164	Grid Voltage High	Grid voltage exceeded the high voltage limit. The limit depends on the configured voltage class in parameter "2.2.1.1 Unit Voltage Class".		X	X		C	C
0x3120	4165	Grid Voltage Low	Grid voltage dropped below the low voltage limit. The limit depends on the configured voltage class in parameter "2.2.1.1 Unit Voltage Class".		X	X		C	
0x3120	4714	Grid Voltage Transient	A grid voltage transient is detected that the drive cannot continue to run through.		X	X		C	
0x3130	4160	Missing Grid Phase	A missing phase is detected on the grid side. Check the grid supply, cables, connections, and fuses.		X	X		C	
0x3130	4163	Grid Imbalance	A large imbalance of the grid voltages is detected. Check for uneven loads on the grid.		X	X		C	
0x3140	4161	Grid Frequency Out of Range	Grid frequency is outside of the operating range.		X	X		C	
0x3140	4166	Grid Synchronization Error	The converter is unable to maintain the synchronization to the grid voltage. This error is only applicable if the converter is in one of the grid following modes.		X	X		C	
0x3140	4716	Grid Synchronization Error	The converter is unable to maintain the synchronization to the grid voltage. Grid frequency out of range can also trigger this fault.		X	X		C	
0x3211	4144	DC-link Voltage High 2	The voltage of the DC link is above the normal operating range and has reached a critical level. Can be caused by too fast motor braking or grid transients. Increase deceleration time, enable the overvoltage controller, use AC brake, or use a brake resistor while braking.		X	X		C	C
0x3211	4710	DC-link Voltage High AFE	The voltage of the DC link, measured by the AFE, is above the normal operating range and has reached a critical level.		X	X		C	C
0x3211	4726	Grid Disturbance Detected	AFE DC-link destruction protection is active due to the detection of grid disturbance when the drive is at coast. AFE is forced to run to prevent excessive boosting of DC-link voltage.		X				

Table 41: Summary Table - (continued)

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
0x3212	4145	DC-link Voltage High 1	The voltage of the DC link is above the normal operating range. Can be caused by too fast motor braking or grid transients. Increase deceleration time, enable the overvoltage controller, use AC brake, or use a brake resistor while braking.		X	X		C	
0x3221	4146	DC-link Voltage Low	The DC-link voltage is below the normal operating range. Try to enable undervoltage protection to keep the drive running as long as possible.		X	X		C	C
0x32FF	4147	DC-link Voltage Ripple	Excessive voltage ripple is detected on the main DC-link capacitors. This can be caused by an imbalance of the grid. Reduce the output power.		X	X		C	
0x32FF	4148	DC-link Imbalance	An imbalance across the DC-link capacitors is detected. The imbalance can be caused by a component fault of the DC link. If the fault remains after resetting the drive, service is required.		X	X		C	
0x4110	4099	Ambient Temp. High	The ambient temperature is too high. Check the temperature and cooling conditions. Lower the temperature or improve the cooling conditions.		X				
0x4210	4107	Brake Chopper Temp. Limit	The temperatute of the brake chopper heat sink is at the upper limit of the normal temperature range. Check cooling and heat sink conditions. Reduce the generated regenerative power.		X				
0x4210	4108	Brake Chopper Temp. High 1	The temperature of the brake chopper heat sink has exceeded the normal temperature range. Check cooling and heat sink conditions. Reduce the generated regenerative power.		X	X		C	C
0x4210	4109	Brake Chopper Temp. High 2	The temperature of the brake chopper heat sink has reached a critical level. Check cooling and heat sink conditions. Reduce the generated regenerative power.		X	X		C	C
0x4220	4106	Brake Chopper Temp. Low	The temperature of the brake chopper heat sink is too low. Check the ambient temperature. Increase the ambient temperature or consider an external heater to increase the temperature around the drive.		X	X		C	C
0x4280	5132	Temp. Protection 1	Temperature protection 1 is triggered. The temperature has exceeded the configured value.		X	X		RC	
0x4280	5133	Temp. Protection 2	Temperature protection 2 is triggered. The temperature has exceeded the configured value.		X	X		RC	

Table 41: Summary Table - (continued)

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
0x4280	5134	Temp. Protection 3	Temperature protection 3 is triggered. The temperature has exceeded the configured value.		X	X		RC	
0x4280	5135	Temp. Protection 4	Temperature protection 4 is triggered. The temperature has exceeded the configured value.		X	X		RC	
0x4280	5136	Temp. Protection 5	Temperature protection 5 is triggered. The temperature has exceeded the configured value.		X	X		RC	
0x4280	5137	Temp. Protection 6	Temperature protection 6 is triggered. The temperature has exceeded the configured value.		X	X		RC	
0x4280	5158	Motor Temperature	The analog temperature sensor has exceeded the configured value.		X	X		RC	C
0x4281	5157	Motor Thermistor	The motor thermistor is too hot.			X		C	
0x42FE	4136	Tmax1Lc l	LCL temperature above normal operating range.		X	X		RC	
0x42FF	4200	Power Option Temp. High 1	The temperature of a power option has exceeded the normal temperature range. Check the cooling conditions. Reduce the load or the ambient temperature.		X	X		RC	C
0x42FF	4201	Power Option Temp. High 2	The temperature of a power option has reached a critical level. Check the cooling conditions. Reduce the load or the ambient temperature.		X	X		RC	C
0x42FF	4202	Power Option Temp. Low	The temperature of a power option component is to low. Check the ambient temperature. Increase the ambient temperature or consider an external heater to increase the temperature around the power option.		X	X		RC	C
0x42FF	4203	Power Option Temp. Limit	The temperature of a power option component is at the upper limit of the normal temperature. Check the cooling conditions. Reduce the load or the ambient temperature.		X				
0x42FF	4204	Power Option Temp. Imbal. 1	The thermal imbalance between the power option components exceeds the normal operating range.		X	X		RC	C

Table 41: Summary Table - (continued)

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
0x42FF	4205	Power Option Temp. Imbal. 2	An excessive thermal imbalance between power option components is detected.		X	X		RC	C
0x42FF	4206	Power Option Temp. Imbal. Limit	The thermal imbalance between the power option components is at the upper limit of the normal operating range.		X				
0x4310	4103	Inverter Temp. Limit	The temperature of the inverter heat sink is at the upper limit of the normal temperature range. Check cooling and heat sink conditions. Reduce the output current or ambient temperature. The drive may derate if the temperature is not lowered.		X				
0x4310	4104	Inverter Temp. High 1	The temperature of the inverter heat sink has exceeded the normal temperature level. Check cooling and heat sink conditions. Reduce the output current or ambient temperature.		X	X		C	C
0x4310	4105	Inverter Temp. High 2	The temperature of the inverter heat sink has reached a critical level. Check cooling and heat sink conditions. Reduce the output current to avoid a protected fault.		X	X		C	C
0x4310	4110	IGBT Temp. High	An inverter IGBT overtemperature is detected. Reduce the ambient temperature, the output current and/or the switching frequency. Check the cooling and the condition of the heat sink.			X		C	C
0x4310	4113	Rectifier Temp. Limit	The temperature of the rectifier heat sink is at the upper limit of the normal temperature range. Check cooling and heat sink conditions. Reduce the output power (torque, speed) or the ambient temperature.		X				
0x4310	4114	Rectifier Temp. High 1	The temperature of the rectifier heat sink has exceeded the normal temperature range. Check cooling and heat sink conditions. Reduce the output power (torque, speed) or the ambient temperature.		X	X		C	C
0x4310	4115	Rectifier Temp. High 2	The temperature of the rectifier heat sink has reached a critical level. Check cooling and heat sink conditions. Reduce the output power (torque, speed) or the ambient temperature.		X	X		C	C
0x4310	4117	Power Unit Temp. Limit	The internal air temperature of the drive is at the upper limit of the normal temperature range. Check cooling and heat sink conditions. Reduce the output power (torque, speed) or the ambient temperature.		X				

Table 41: Summary Table - (continued)

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
0x4310	4118	Power Unit Temp. High 1	The internal air temperature of the drive has exceeded its normal temperature range. Check cooling and heat sink conditions. Reduce the output power (torque, speed) or the ambient temperature.		X	X		C	C
0x4310	4119	Power Unit Temp. High 2	The internal air temperature of the drive has reached a critical value. Check cooling and heat sink conditions. Reduce the output power (torque, speed) or the ambient temperature.		X	X		C	C
0x4310	4125	IGBT Temp. High	An inverter IGBT temperature has reached a critical value. Reduce the output current of the drive if possible to avoid a protected fault.			X		C	C
0x4320	4102	Heat Sink Temperature Low	Heat sink temperature below normal operating range. Check the ambient temperature. Increase the ambient temperature or consider an external heater to increase the temperature around the product.		X	X		C	C
0x4320	4112	Rectifier Temp. Low	The temperature of the rectifier heat sink is too low. Check the ambient temperature. Increase the ambient temperature or consider an external heater to increase the temperature around the drive.		X	X		C	C
0x4320	4116	Power Unit Temp. Low	The internal air temperature of the drive is below the normal operating range. The drive is operated at a too low ambient temperature. Consider an external heater to avoid this warning or fault.		X	X		C	C
0x4380	5240	Cooling Monitor	The cooling signal is missing.		X	X		C	C
0x43FE	4120	Control Board Temp. Low	The temperature of the control board is below the normal temperature range. The drive is operated at a too low ambient temperature. Check the ambient temperature. Increase the ambient temperature or consider an external heater to increase the temperature at the drive.		X	X		C	C
0x43FE	4121	Control Board Temp. Limit	The temperature of the control board is at the upper limit of the normal temperature range. Check cooling conditions and load of the control board. Reduce the load on the control board or the ambient temperature.		X				
0x43FE	4122	Control Board Temp. High 1	The temperature of the control board has exceeded its normal temperature range. Check cooling conditions and load of the control board. Reduce the load on the control board or the ambient temperature.		X	X		C	C

Table 41: Summary Table - (continued)

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
0x43FE	4123	Control Board Temp. High 2	The temperature of the control board has reached a critical level. Check cooling conditions and load of the control board. Reduce the load on the control board or the ambient temperature.		X	X		C	C
0x43FF	4124	Brake Chopper Temperature Imbalance	There is a temperature imbalance between 1 or more brake chopper IGBTs.		X				
0x43FF	4126	IGBT Temperature Imbalance	There is a temperature imbalance between 1 or more IGBTs.		X				
0x43FF	4127	IGBT Temperature Imbalance	An excessive thermal imbalance between the IGBT modules is detected. Check the condition of IGBT modules their connections the cooling and the driver boards.		X				
0x43FF	4131	Temperature Imbalance Brake IGBT	There is a temperature imbalance between 1 or more brake chopper IGBTs.		X	X		C	C
0x43FF	4132	IGBT temperature delta	There is a temperature imbalance between 1 or more IGBTs.		X	X		C	C
0x43FF	4840	Rectifier Temp. Maximum Imbalance	There is an imbalance between one or more of the rectifier power module temperatures.		X	X		C	C
0x43FF	4841	Rectifier Temp. Imbalance	There is an imbalance between one or more of the rectifier power module temperatures.		X				

Table 41: Summary Table - (continued)

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
0x4480	5400	AHF High Temp. Derate	A too high temperature is detected in the connected AHF (Advanced Harmonic Filter). Output is derated to 50%.			X			
0x4480	5401	AHF High Temp. Stop	A too high temperature is detected in the connected AHF (Advanced Harmonic Filter). Operation of the drive is stopped.			X		RC	
0x5100	4208	Service Mode Exit	The drive has left service mode. A power cycle is required to reset the drive.				X	C	C
0x5100	4641	24V Backup Mode	The drive is in 24V backup mode. The control section (including parameter configurations) and installed options are kept operational.	X					
0x5100	4803	Service Mode Active	Drive is in service mode.		X				
0x5112	4640	24V Supply Fault	The 24V supply is outside its normal operating range.				X	C	C
0x5114	4642	3.3V Supply Low	The voltage of the internal 3.3V supply is below its normal operating range.			X		C	C
0x5118	4643	28V Supply Low	The voltage of the internal 28V supply is below its normal operating range.			X		C	C
0x51FE	4644	Gate Driver Voltage Fault	The gate driver supply voltage is outside its normal operating range.				X	C	C
0x51FE	4653	Gate Driver Fault	A gate driver fault is detected or a link to the gate driver is broken.			X		C	C
0x51FF	4645	Power Board Supply Fault	A power supply fault on the power board is detected.				X	C	C
0x51FF	4646	Power Supply Voltage	A power supply voltage is outside its normal operating range.				X	C	C
0x5210	4378	Current Sensor Fault	A defective current sensor or an error in the calibration of the current sensors is detected.			X		C	C

Table 41: Summary Table - (continued)

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
0x5400	5173	Power Limit Timeout Regenerative	The drive has exceeded the allowed time in power limit.			X		C	
0x5400	5174	Power Limit Timeout Motoring	The drive has exceeded the allowed time in power limit.			X		C	
0x5480	4152	Shoot Through Fault In Afe	Converter shoot through detected.			X		C	
0x54FD	4647	Function Disabled	The protection logic keeps the trip active until the configuration of the power unit protection levels is ready.			X		C	C
0x54FE	4628	STO Activated	The Safe Torque-Off (STO) is activated and an unintended restart is prevented until the STO-request is reset.		X			C	
0x54FE	4629	STO Fault Ch. A	The Safe Torque-Off (STO) is activated due to a discrepancy fault: Channel A is not activated, while channel B is activated.			X		C	C
0x54FE	4630	STO Fault Ch. B	The Safe Torque-Off (STO) is activated due to a discrepancy fault: Channel B is not activated, while channel A is activated.			X		C	C
0x54FF	4149	DC-link Short Circuit	An internal short circuit is detected in the DC link. Service is required.				X	C	C
0x54FF	4150	DC Capacitor Short Circuit	A short circuit in a DC-link capacitor is detected. Service is required.			X		C	C
0x54FF	4151	DC-link Short Circuit 2	A short circuit in the DC-link capacitor is detected. Service is required.	X			X	C	
0x5530	4790	Control Data Error	A data error is detected in the control data database EEPROM.	X					
0x5530	4791	Invalid PUD	A data error is detected in the power unit database EEPROM.			X		C	

Table 41: Summary Table - (continued)

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
0x6100	4134	System Time Adjust	System time is adjusted.	X					
0x6100	4135	Real Time Clock Hardware Error	A hardware error is detected in the real time clock.		X				
0x6100	4304	License Missing	A required license is missing.		X				
0x6100	4349	Authenticity Error	Files authenticity verification error occurred.			X		RC	C
0x6100	4351	System Fault	A system fault is detected. See additional information for details.			X		C	C
0x6100	4357	Firmware Crash	A firmware crash occurred and detailed information is provided.			X		C	C
0x6100	4550	An Analog Input selection fails	The selected slot and/or terminal is not valid.		X				
0x6100	4551	An Analog Input data missing	The slot and terminal selected by the input are valid, but the value for the terminal is not yet available.		X				
0x6100	4552	An Analog Input data stopped	The slot and terminal selected by the input are valid and the value for the terminal has previously been received, but the terminal value is no longer being reported. The value is frozen at the last known measurement.		X				
0x6100	4553	An Analog Input unhealthy	The slot and terminal selected by the input are valid, but the value is unreliable (live zero or overload).		X				
0x6100	4555	An Analog Output selection fails	The selected slot and/or terminal is not valid.		X				

Table 41: Summary Table - (continued)

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
0x6100	4556	An Analog Output data missing	The slot and terminal selected by the input are valid, but the terminal is not yet being controlled.		X				
0x6100	4557	An Analog Output data stopped	The slot and terminal selected by the input are valid, and the terminal was previously funtioning, but control has been lost.		X				
0x6100	4558	An Analog Output occupied	An analog output is in use by another function or fieldbus. If a fieldbus has taken control of a terminal, it has priority over parameter selection.		X				
0x6100	4560	A Digital Input selection fails	The selected slot and/or terminal is not valid.		X				
0x6100	4561	A Digital Input data missing	The slot and terminal selected by the input are valid, but the value for the terminal is not yet available.		X				
0x6100	4562	A Digital Input data stopped	The slot and terminal selected by the input are valid and the value for the terminal has previously been received, but the terminal value is no longer being reported. The value is frozen at the last known measurement.		X				
0x6100	4563	A Digital Output selection fails	The selected slot and/or terminal is not valid.		X				
0x6100	4564	A Digital Output data missing	The slot and terminal selected by the input are valid, but the terminal is not yet being controlled.		X				
0x6100	4565	A Digital Output data stopped	The slot and terminal selected by the input are valid, and the terminal was previously funtioning, but control has been lost.		X				
0x6100	4566	A Digital Output occupied	A digital output is in use by an other function or fieldbus. If a fieldbus has taken control of a terminal, it has priority over parameter selection.		X				
0x6100	4567	Restore Status	Provides information about the restore operation of a setting.	X					

Table 41: Summary Table - (continued)

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
0x6100	4568	Automatic Reset	All event conditions have cleared, and the triggered events are automatically reset.	X					
0x6100	4816	PLC Task Overrun	The high CPU load is inhibiting normal operation of the application (PLC task overrun).		X				
0x6100	4817	PLC Runtime Error	The PLC runtime has stopped responding. The application is halted.			X		C	C
0x6100	4832	NodeDiscovery	Node discovery and configuration in progress. Modulation is inhibited.	X				RC	C
0x6100	4833	Node Commissioning	Nodes are being commissioned.		X			C	C
0x6100	4834	Node Missing	A previously commissioned node is no longer available. The drive is waiting for the node to be available. If the node has been removed, recommission the drive.	X					
0x6100	4851	Restart Required	A configuration change requires a soft-cycle or power-cycle to take effect. Modulation is inhibited.		X			C	C
0x6100	4853	StartupOccurrence	This occurrence masks over various occurrences that might be active during startup, that we dont want to show the end user	X					
0x6100	4854	ResetByDemand	Drive reset is requested by user, and will be performed shortly	X				C	
0x6100	4855	Internal Fault	An internal fault is detected. Cycle power, check the wiring if applicable, contact the service provider if the fault persists. Note the event number for further troubleshooting directions.			X		RC	C
0x6100	4856	Internal Fault	An internal fault is detected (connection from controller). Cycle power, check the internal wiring, contact the service provider if the fault persists. Note the event number for further troubleshooting directions.			X		C	C
0x6100	4857	Software Update	The drive is currently performing an update of the software.	X					
0x6180	5260	Event Simulation	The event with the number 5260 is simulated.		X	X		C	C

Table 41: Summary Table - (continued)

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
0x6180	5264	Event Simulation SS2 Inst 1	Event simulation SS2 Instance 1.		X			C	C
0x6180	5265	Event Simulation SS2 Inst 2	Event simulation SS2 Instance 2.		X			C	C
0x6181	4980	A Digital Input terminal is unknown by system	A digital input terminal is selected that is unknown by the system. Maybe an option has been moved or removed.		X				
0x6181	4981	A Digital Output terminal is unknown by system	A digital output terminal is selected that is unknown by the system. Maybe an option has been moved or removed.		X				
0x6181	4982	An Analog Input terminal is unknown by system	An analog input terminal is selected that is unknown by the system. Maybe an option has been moved or removed.		X				
0x6181	4983	An Analog Output terminal is unknown by system	An analog output terminal is selected that is unknown by the system. Maybe an option has been moved or removed.		X				
0x6181	4984	A Digital Output occupied	A digital output is in use by an other function or fieldbus. If a fieldbus has taken control of a terminal, it has priority over parameter selection.		X				

Table 41: Summary Table - (continued)

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
0x6181	4985	An Analog Output occupied	An analog output is in use by another function or fieldbus. If a fieldbus has taken control of a terminal, it has priority over parameter selection.		X				
0x61F7	4800	Low Storage Space	The available storage space for the file system is low.	X					
0x61F7	4801	Data Logger Storage	Volume restriction limits are preventing additional data logger capture files from being stored.		X				
0x61F7	4802	Event Logger Storage	Volume restriction limits are preventing additional event log capture files from being stored.		X				
0x61FB	4600	Option Communication Fault	A fault in the communication with an option is detected. Cycle power, check that the option is properly installed, contact the Danfoss supplier or the service department if the fault persists. Note the event number for further troubleshooting directions.			X		RC	C
0x61FB	4601	Internal Communication Fault	An internal communication fault is detected. Cycle power, check the wiring if applicable, contact the service provider if the fault persists. Note the event number for further troubleshooting directions.			X		RC	C
0x61FB	4602	Option Communication Fault	A fault in the communication with an option is detected. Cycle power, check that the option is properly installed, contact the Danfoss supplier or the service department if the fault persists. Note the event number for further troubleshooting directions.			X		C	C
0x61FB	4607	Internal Communication Fault	An internal communication fault is detected. Cycle power, check the wiring if applicable, contact the Danfoss supplier or the service department if the fault persists. Note the event number for further troubleshooting directions.			X		C	C
0x61FB	4631	Internal Communication Fault	An internal communication fault is detected. Cycle power, check the wiring if applicable, contact the Danfoss supplier or the service department if the fault persists. Note the event number for further troubleshooting directions.			X		RC	C
0x61FB	4632	Internal Communication Fault	An internal communication fault is detected. Cycle power, check the wiring if applicable, contact the service provider if the fault persists. Note the event number for further troubleshooting directions.		X				

Table 41: Summary Table - (continued)

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
0x61FB	4654	Control Node Disconnected	Internal communication route to one or more control nodes is disconnected.		X				
0x61FC	4605	Internal Communication Fault	An internal communication fault is detected. Cycle power, check the wiring if applicable, contact the service provider if the fault persists. Note the event number for further troubleshooting directions.			X		C	C
0x61FC	4606	Internal Communication Fault	An internal communication fault is detected. Cycle power, check the wiring if applicable, contact the Danfoss supplier or the service department if the fault persists. Note the event number for further troubleshooting directions.			X		C	C
0x61FC	4639	High Speed Bus Sync Error	Internal error detected with high-speed bus connection to parallel control unit.			X		C	C
0x61FC	4648	High Speed Bus Error	Internal error detected with high-speed bus connection to parallel control unit.			X		C	C
0x61FC	4858	Internal Fault	An internal fault is detected. The power system has not received the required reference for modulation. Cycle power, check the wiring if applicable, contact the Danfoss supplier or the service department if the fault persists. Note the event number for further troubleshooting directions.		X	X		C	
0x61FC	4859	Internal Fault	An internal fault (connection from power system) is detected. Cycle power, check the internal wiring, contact the service provider if the fault persists. Note the event number for further troubleshooting directions.		X	X		C	
0x61FC	4860	Unexpected Time Adjust	An internal fault (unexpected time adjustment) is detected. Cycle power, check the internal wiring, contact the service provider if the fault persists. Note the event number for further troubleshooting directions.			X		C	C
0x61FC	4861	Synchronization Fault	An internal fault (time synchronization error between controller and power system) is detected. Cycle power, check the internal wiring, contact the service provider if the fault persists. Note the event number for further troubleshooting directions.			X		C	C

Table 41: Summary Table - (continued)

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
0x61FC	4862	PDS	An internal communication fault is detected. Cycle power, check the wiring if applicable, and contact the Danfoss supplier or the service department if the fault persists. Note the event number for further troubleshooting directions.			X		C	C
0x61FC	4863	Internal Fault	An internal fault (connection with power system) is detected. Cycle power, check the internal wiring, contact the service provider if the fault persists. Note the event number for further troubleshooting directions.			X		C	C
0x61FF	4608	Internal Failure detected	An Internal Failure was detected.			X			
0x61FF	4609	IO Failure detected	An IO Failure was detected.			X			
0x6320	4350	Configuration Error	An invalid system configuration is detected.		X	X		C	C
0x6320	5301	Invalid Control Config.	An invalid control configuration is preventing operation.		X	X		C	
0x6320	5302	Start Blocked	Start of the motor is blocked. Check the Motor Ctrl. Ready Status Word for the cause.		X	X		C	
0x7080	5220	Brake Feedback Wrong State	Mechanical brake feedback is in a wrong state. Feedback state should reflect state of brake, except during opening or closing phases.		X				
0x7080	5221	Brake Priming Timeout	Brake priming has timed out. The drive could not produce the configured priming torque to open the brake safely.		X				
0x7080	5222	Brake Feedback Timeout	Brake feedback has timed out. The feedback signal is indicating that the mechanical brake has not opened or closeed within the configured time.		X				
0x70FF	4128	Control Fan Failure	The control board cooling fan is not running at the commanded speed.		X				
0x70FF	4129	Main Fan Failure	The main cooling fan is not following its reference speed. Check the wiring of the fan and whether its blocked or polluted. Replace the fan if necessary.		X				

Table 41: Summary Table - (continued)

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
0x70FF	4130	Internal Fan Failure	The internal fan is running below its reference speed. Check the wiring of the fan and whether its blocked or polluted. Replace the fan if necessary.		X				
0x70FF	4133	LCL Fan Speed Fault	LCL cooling fan not tracking commanded output.			X		C	C
0x7110	5204	Brake Resistor Test Active	The Brake Resistor Test is active. Normal run of the drive is not possible.		X				
0x7110	5205	Brake Resistor Test Failed	The Brake Resistor Test was unsuccessful. Check the brake resistor and its connections.			X		C	C
0x7110	5206	Brake Resistor Test Successful	The test of the brake resistor is performed successfully.	X					
0x7111	4403	Brake Ch. Switch Shorted	A short circuit of the brake chopper switch is detected, which can be dangerous. Disconnect power. Service is required.		X	X		C	
0x7113	4400	Brake Chopper Overload	A brake chopper overcurrent is detected. Reduce the brake voltage level and check the rating of the brake resistor.		X		X	C	C
0x7113	4401	Brake Resistor Temp. High	The brake resistor temperature is too high. Check the rating of the brake resistor and cooling conditions. Reduce the generated regenerative power.		X	X		C	C
0x7113	4402	Brake Resistor Missing	The brake resistor or its connection is missing.		X	X		C	
0x7113	4404	Brake Failure	A brake failure is detected, further testing will clarify the failure source. Coast first to run the test.		X			C	
0x7120	4177	Motor Thermal Overload	A thermal overload of the motor is detected. Check if the shaft torque is too high.		X	X		C	
0x7120	4178	Motor Speed High	The motor speed is above the normal operating range.		X	X		C	

Table 41: Summary Table - (continued)

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
0x7120	4179	AMA Current Low	The nominal current of the motor is too low for accurate results of automatic motor adaptation (AMA).		X				
0x7120	4180	Rotor Angle Detection Error	Rotor angle detection has failed. This might be as the motor is not suited to the drive or the motor is missing.		X	X		C	
0x7120	4181	Low Motor Saliency For High Frequency Injection Mode	Motor saliency is too low for HF injection mode.		X	X		C	
0x7120	4382	Blocked Rotor	The rotor is blocked.		X	X		C	
0x7120	5200	AMA Active	The AMA (Automatic Motor Adaptation) is active. Normal run of the motor is not possible. Apply a start signal to run the AMA.		X				
0x7120	5201	AMA Motor Data	The motor data measurement of the AMA (Automatic Motor Adaptation) was unsuccessful.			X		C	C
0x7120	5202	AMA Motor Type	The motor type detection of the AMA (Automatic Motor Adaptation) was unsuccessful.			X		C	C
0x7120	5203	AMA Successful	The AMA (Automatic Motor Adaptation) was performed successfully.	X					
0x7120	5300	Invalid Motor Data	Invalid motor data is preventing operation. Check the motor data settings.		X	X		C	
0x7122	4182	Motor Sync Loss	Select the drive response if the synchronization between motor and drive is lost. This is only relevant when using a permanent magnet or synchronous reluctance motor.		X	X		C	
0x72FF	4417	Feedback Option Fault	The Feedback Option is indicating a fault condition.			X		C	C

Table 41: Summary Table - (continued)

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
0x7300	4207	Sensor Configuration	A sensor configuration error is detected. A sensor is either missing, not expected, or incorrectly connected.			X		RC	
0x7310	4418	Bad Speed Feedback	Speed Feedback value is not reliable.			X		C	
0x7500	4638	Drive to Drive Connection Lost	Drive to drive connection is lost.		X	X		C	C
0x7580	5141	Control Panel Connection Lost	The connection to the control panel is lost. Control via control panel is released.						
0x7580	5142	PC Connection Lost	The connection to the PC tool is lost. PC control is released.						
0x8081	5155	No-Flow	A no-flow situation is detected. Check the outlet side of the pump.						
0x8081	5156	Dry-Run	A dry-run situation is detected, indicating that there is no water in the pump. Check the inlet side of the pump.						
0x8082	6111	End of Curve	The end of the pump curve is reached. This can indicate a broken pipe in the system on the outlet side of the pump.						
0x8100	4256	Address Conflict	The fieldbus has identified an Address Conflict on the network which made the device back off.		X				
0x8100	4257	Ethernet Cable Fault	When no link is present, a measurement is done to measure the distance to the far end of the cable. This warning occurs at measured distances > 4 m. This can occur when the device at the far end is turned off, disconnected, or the cable is broken. Check the cable at the distance provided in the detailed info.		X				
0x8100	4258	Invalid Fieldbus Configuration	An issue due to an invalid configuration of the fieldbus connection is detected. Features not supported by the device, mismatch between configured and actually available features or modules not available in the device. See additional detail info.	X	X				

Table 41: Summary Table - (continued)

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
0x8100	4260	Redundant Controller Missing	One or more of the expected fieldbus controllers are missing.		X				
0x8100	4261	Fieldbus Topology Mismatch	The current fieldbus topology does not match the topology provided at commissioning time.		X				
0x8100	4263	Ethernet Link Status Change d	A change of the Ethernet link status is detected. Additional info has details about which port and state.	X					
0x8100	4265	Ethernet Redundancy Error	Primary or backup physical path is missing.		X				
0x8100	4266	X1 Cable Redundancy	Indicates that physical path from X1 interface to the controller is missing or wrongly configured.		X				
0x8100	4267	X2 Cable Redundancy	Indicates that physical path from X2 interface to the controller is missing or wrongly configured.		X				
0x8100	4268	FieldbusStartUp	Internal occurrence to mask away TopologyMismatch occurrence during startup	X					
0x8100	4269	Network Time Protocol	Information of Network Time Protocol server. See detailed info.	X					
0x8100	4280	Controller Not in Run	Controller not in RUN state.		X				
0x8100	4281	Interface Configuration Change	Interface configuration for an ethernet port has changed. See detailed info.	X					

Table 41: Summary Table - (continued)

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
0x8100	5162	Alternative Control Place due to Fieldbus Timeout	Fieldbus process data timeout caused a change to the alternative control place.		X				
0x81FD	4270	No Modbus TCP Connection	No Modbus TCP communication is currently established. This happens before the first connection is established, or if all connections have stopped (gracefully or disruptively).	X					
0x81FD	4271	No PROFINET Connection	No PROFINET I/O communication is currently established. This happens before the first connection is established, or if all connections have stopped (gracefully or disruptively).	X					
0x81FD	4272	No EtherNet/IP Connection	No EtherNet/IP communication is currently established. This happens before the first connection is established, or if all connections have stopped (gracefully or disruptively).	X					
0x81FD	4273	No EtherCAT Connection	No EtherCAT communication is currently established. This happens during start-up before the first connection is established, or if all connections has stopped (gracefully or disruptively).	X					
0x81FD	4282	No Modbus RTU Connection	No Modbus RTU communication is currently established. This event occurs during start-up until the first connection is established, or if all connections have stopped (gracefully or disruptively).	X					
0x81FD	4284	NoBacnetMstpConnection	No BACnet MS/TP communication is currently established. Will happen during startup until first connection is established. Or if all connections has stopped.	X					
0x81FE	4274	Loss of Modbus TCP I/O	One or more of the Fieldbus I/O connections has failed. This can happen when an established Fieldbus I/O Connection is disrupted by for example a cable break, or a power cut of the PLC or other infrastructure components.		X				
0x81FE	4275	Loss of PROFINET I/O	One or more of the Fieldbus I/O connections have failed. This can happen when an established Fieldbus I/O connection is disrupted by for example a cable break, or a power cut of the PLC or other infrastructure components.		X				

Table 41: Summary Table - (continued)

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
0x81FE	4276	Loss of EtherNet /IP I/O	One or more of the Fieldbus I/O connections have failed. This can happen when an established Fieldbus I/O Connection is disrupted by for example a cable break, or a power cut of the PLC or other infrastructure components.		X				
0x81FE	4277	Loss of EtherCAT Connection	One or more of the fieldbus I/O connections has failed. This can happen when an established fieldbus I/O connection is disrupted by for example a cable break, or a power cut of the PLC or other infrastructure components.		X				
0x81FE	4283	Loss of Modbus RTU Connection	One or more of the fieldbus I/O connections has failed. This can happen when an established fieldbus I/O connection is disrupted by for example a cable break or a power cut of the PLC or other infrastructure components.		X				
0x81FE	4285	BACnet Connection Timeout	There has been no read/write requests within the specified BACnet connection timeout.	X					
0x81FF	4278	Primary Process Data Timeout	The fieldbus I/O data has not been updating any of the process data monitored by the primary process data monitor (Watchdog1). This can happen when the fieldbus has lost control or the current transferred I/O data is not valid.			X		C	C
0x81FF	4279	Secondary Process Data Timeout	The fieldbus I/O Data has not been updating any of the process data monitored by the secondary process data monitor (Watchdog2). This can happen when the fieldbus has lost control or the current transferred I/O data is not valid.			X		C	C
0x8331	5171	Torque Limit Timeout Motoring	The drive exceeded the allowed time in torque limit.			X		C	
0x8331	5172	Torque Limit Timeout Regenerative	The drive exceeded the allowed time in torque limit.			X		C	
0x8400	5210	Below Min. Speed	The Speed Monitor has detected that the speed is below the configured minimum speed.			X		C	C

Table 41: Summary Table - (continued)

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
0x8400	5211	Below Min. Speed	The Speed Monitor has detected that the speed is below the configured minimum speed.		X				
0x8400	5290	Speed Too High	The speed monitor has detected that the speed is above the configured maximum.			X		C	C
0x8400	5291	Speed Too High	The speed monitor has detected that the speed is above the configured maximum.		X				
0x8400	5292	Start Below Min. Speed	The start took too long. The speed has not reached the minimum speed within the time frame configured.			X		C	C
0x8611	4192	Position Following Error	The actual position is outside the allowed range of the position error window around a position demand value for longer than the position error delay.		X				
0x8612	4193	Positive Position Limit	Motor position is outside the allowed positive range (PositionMax).		X	X		C	C
0x8612	4194	Position Command Rejected	Position command was rejected because of position software end limit.		X				
0x8612	4195	Positive Hardware End Limit	The positioning controller detected that the drive is exceeding the positive hardware end limits.		X	X		C	C
0x8612	4196	Negative Position Limit	Motor position is outside the allowed negative range (PositionMin).		X	X		C	C
0x8612	4197	Negative Hardware End Limit	The positioning controller detected that the drive is exceeding the negative hardware end Limits.		X	X		C	C
0x8612	4198	ZeroPulseError	Homing on the zero pulse is not possible with the selected feedback type.			X		C	C
0x8615	4385	AuditLogStopped	This shows that drive is not able to send the Audit logs		X				
0x9080	5230	Lost Load Detected	Drive is not detecting any load on the motor shaft.						

Table 41: Summary Table - (continued)

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
0xF004	5270	Inertia Estimation Active	The drive is ready for performing the Inertia Estimation. A start command is required.		X				
0xF004	5271	Inertia Estimation Failed	The Inertia Estimation failed.			X		C	C
0xF004	5272	Inertia Estimation Successful	Inertia Estimation was performed successfully.	X					
0xFF01	5123	External Interlock 1	The external signal as configured with parameters 5.2.2.* caused interlock 1. Check the external equipment.			X		C	
0xFF01	5124	External Interlock 2	The external signal as configured with parameters 5.2.2.* caused interlock 2. Check the external equipment.			X		C	
0xFF02	5701	Preventive Maintenance 1	Preventive Maintenance Service Request 1.		X				
0xFF02	5702	Preventive Maintenance 2	Preventive Maintenance Service Request 2.		X				
0xFF02	5703	Preventive Maintenance 3	Preventive Maintenance Service Request 3.		X				
0xFF02	5704	Preventive Maintenance 4	Preventive Maintenance Service Request 4.		X				
0xFF02	5705	Preventive Maintenance 5	Preventive Maintenance Service Request 5.		X				
0xFF02	5706	Preventive Maintenance 6	Preventive Maintenance Service Request 6.		X				

Table 41: Summary Table - (continued)

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
0xFF02	5707	Preventive Maintenance 7	Preventive Maintenance Service Request 7.		X				
0xFF02	5708	Preventive Maintenance 8	Preventive Maintenance Service Request 8.		X				
0xFF02	5709	Preventive Maintenance 9	Preventive Maintenance Service Request 9.		X				
0xFF02	5710	Preventive Maintenance 10	Preventive Maintenance Service Request 10.		X				
0xFF06	5901	Logic Input Error	Configured input function reports an error.		X				
0xFF06	5902	Logic Output Error	Configured output function reports an error.		X				
0xFF06	5903	Logic Block Configuration Error	Logic block configuration is incorrect.		X				
0xFF06	5904	Logic State Error	Logic state handling reports an error.		X				

8 Appendix

8.1 iC Speed Profile

8.1.1 Overview

The iC Speed profile is used with the iC7 series motor applications. The iC Speed profile differs from the PROFIdrive profile, because it does not have a state machine. It is only controlled by the actual state 1/0 of the control bits, not the sequence in which they are manipulated.

8.1.2 Control Word

Table 42: iC Speed Profile Control Word Bits

Bit number	Name	Description
0+1	Preset reference selector	00: Preset reference 1 01: Preset reference 2 10: Preset reference 3 11: Preset reference 4
2	Reserved	Reserved for future use. Any control words sent to the device should keep this bit at 0 to ensure compatibility with future extensions of the control word.
3	No coast/Coast	1: No function. 0: Causes the drive to immediately coast the motor.
4	No quick stop/Quick stop	1: No function. 0: Quick stops the drive and ramps down the motor speed to stop as defined with the quick stop ramp parameter.
5	No hold/Hold output frequency	1: No function. 0: Hold the present output frequency (in Hz).
6	Start/No start	1: If the other starting conditions are fulfilled, this selection allows the drive to start the motor. 0: Stops the drive and ramps down the motor speed as defined with the ramp down parameter.
7	Reset	0 ⇒ 1: Acknowledge faults.(1) 0: No function.
8	Jog/No jog	1: Sets the output frequency to the jog speed defined with the jog speed parameter. 0: No function.
9	Ramp select	1: Ramp 2 is active. 0: Ramp 1 is active.

Table 42: iC Speed Profile Control Word Bits - (continued)

Bit number	Name	Description
10	Data valid	1: Use process data (controlled by PLC). 0: Ignore the current process data. This is linked to the submodule where the CTW is present. If signals are to be covered, the CTW/STW profile (for example, the iC Speed Profile) must be part of the signals list. Use the previously processed data when the data valid bit was true (no control by PLC).
11	Reserved	Reserved for future use.
12	Fieldbus Digital Input 1	These bits are reserved for application-specific advanced control. Select the value ***CTW bit x*** for any input parameter to use this signal for the activation of a selected function. For more information, refer to the *Parameter Descriptions* chapter in the application guide.
13	Fieldbus Digital Input 2	
14	Fieldbus Digital Input 3	
15	Fieldbus Digital Input 4	

1) Acknowledge is edge-triggered, when the logic is changed from 0 to 1. Faults can only be acknowledged if the triggering condition has been removed and any required acknowledgment has been done.

8.1.3 Status Word

Table 43: iC Speed Profile Status Word Bits

Bit number	Name	Description
0	Control ready	1 = The device controls are ready and react to process data. 0 = The device controls are not ready and do not react to process data.
1	Frequency converter ready	1 = The frequency converter is ready for operation. 0 = The frequency converter is not ready for operation. This status does not involve faults and warnings as they are indicated in their respective bits elsewhere.
2	Coast	1 = There are no active coast signals, and the motor can start when a start signal is given. 0 = The frequency converter has an active coast signal and has released the motor.
3	Fault	1 = A fault has occurred, and an acknowledge signal is required to re-establish operation. 0 = There are no faults.
4	Reserved	Reserved.
5	Reserved	Reserved.
6	Reserved	Reserved.
7	Warning	1 = A warning is active. 0 = There are no warnings.
8	Speed=reference	1 = The current motor speed matches the current speed reference within a given tolerance. The tolerance is product specific. 0 = The motor runs, but the current speed is different from the current speed reference, for example, while the speed ramps up or down during start or stop.

Table 43: iC Speed Profile Status Word Bits - (continued)

Bit number	Name	Description
9	Bus control/Local operation	1 = The device is controlled and reacting to I/O and process data. 0 = The device does not react on commands from the fieldbus, for 1 of the following reasons: • CTW bit 10 = 0. • HMI is in local mode. • MyDrive® Insight has taken control. • Control places do not include fieldbus.
10	Frequency limit	1 = The output frequency is within the defined motor limits. 0 = The output frequency has exceeded the defined motor limits. The speed limits are set with the parameters: • ***P 5.8.3.1 Positive Speed Limit*** • ***P 5.8.3.2 Negative Speed Limit*** • ***P 5.8.3.3 Minimum Speed Limit***
11	Operation	1 = The process is running, and the motor can be running or start at any time. 0 = There are no active start requests, and the process does not run. The motor is coasted and is not started.
12	Reserved	Reserved.
13	Reserved	Reserved.
14	User defined	These bits are reserved for application-specific advanced control. For more information, refer to the *Parameter Descriptions* chapter in the application guide.
15	User defined	

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