

ENGINEERING
TOMORROW



Application Guide

iC7 Series Active Front End

iC7-Marine | iC7-Automation



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1 Introduction to App Guide

1.1 Version History

| Version | Remarks | Software Version |
|------------------------------|---|---|
| AB485341347770, version 0101 | Updated for General Release 1. Document ID number changed. | Application software version 5.0.0 Firmware version 5.6.3 |
| AB318753809018, version 0201 | Migration from Tech Pub Studio to Ixiasoft editor program. | Application software version 2.1.1. Firmware version 3.4.3 |
| AB318753809018, version 0101 | Updated for Controlled Release. | Application software version 2.1.1. Firmware version 3.4.3 |

1.2 Purpose of this Application Guide

This application guide provides information on operating the Active Front End application of the iC7 Series. The application guide provides an overview of parameters and value ranges for operating the power converter. In addition to converter parameters, information on the various user interfaces to configure parameters, configuration examples with recommended parameter settings and troubleshooting steps are included in the application guide.

Intended Audience

The intended audience of the application guide is trained personnel, automation engineers, and configurators with experience in operating with parameters and with basic knowledge of Danfoss AC power converters.

1.3 Additional Resources

Additional resources are available with related information.

The design guide provides information about the capability and functionality to design power converter systems with the iC7 series.

The operating guide provides detailed specification, requirements, and installation instructions of the iC7 series power converters.

Protocol specific fieldbus Operating Guides provide details on how to configure and use a specific fieldbus protocol with iC7 series power converters.

The control panel user guide provides detailed specifications and operations to use the various control panel portfolios of iC7 series.

1.4 Safety Symbols

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).

2 Application Software Overview

2.1 Introduction to the Application Software

The Active Front End (AFE) power converter is used to transfer power between the AC input and the common DC bus. The main functionality of the AFE is to maintain a stable DC-link voltage. Whenever there is load in the DC-link, the AFE rectifies the alternating current and voltage and transfers power from the AC input to the common DC bus. When there is excess energy in the DC-link, the AFE module inverts the direct current and voltage and transfers power from the common DC bus to the AC input. A common application for an AFE is to use it as an AC grid interface for motor drives. With an AFE, the braking power generated by motors can be fed back to the grid.

The AFE can boost the DC-link voltage within the voltage window of the converter hardware. The advantage is that the DC voltage available for motor inverters is not limited even under unideal grid conditions. In addition, the same 480 V AC motors can be used whether the grid voltage is 400 V AC or 480 V AC. The power quality of the AFE is excellent since it does not draw reactive current from the grid. Furthermore, the harmonic distortion is low (<5%) which means that the incoming transformer does not need to be oversized and the unit can meet the most stringent harmonics requirements. The DC-link voltage is also much smoother than with standard diode or thyristor rectifier circuits (NFE). An AFE can also produce reactive current so other low power factor equipment can be compensated.

The AFE needs an external pre-charging circuit. Using parameter settings in the Active Front End application software, the start and stop sequence is automated by controlling the pre-charge circuit and main circuit breaker.

An overview of AFE application software is shown in the following figure.

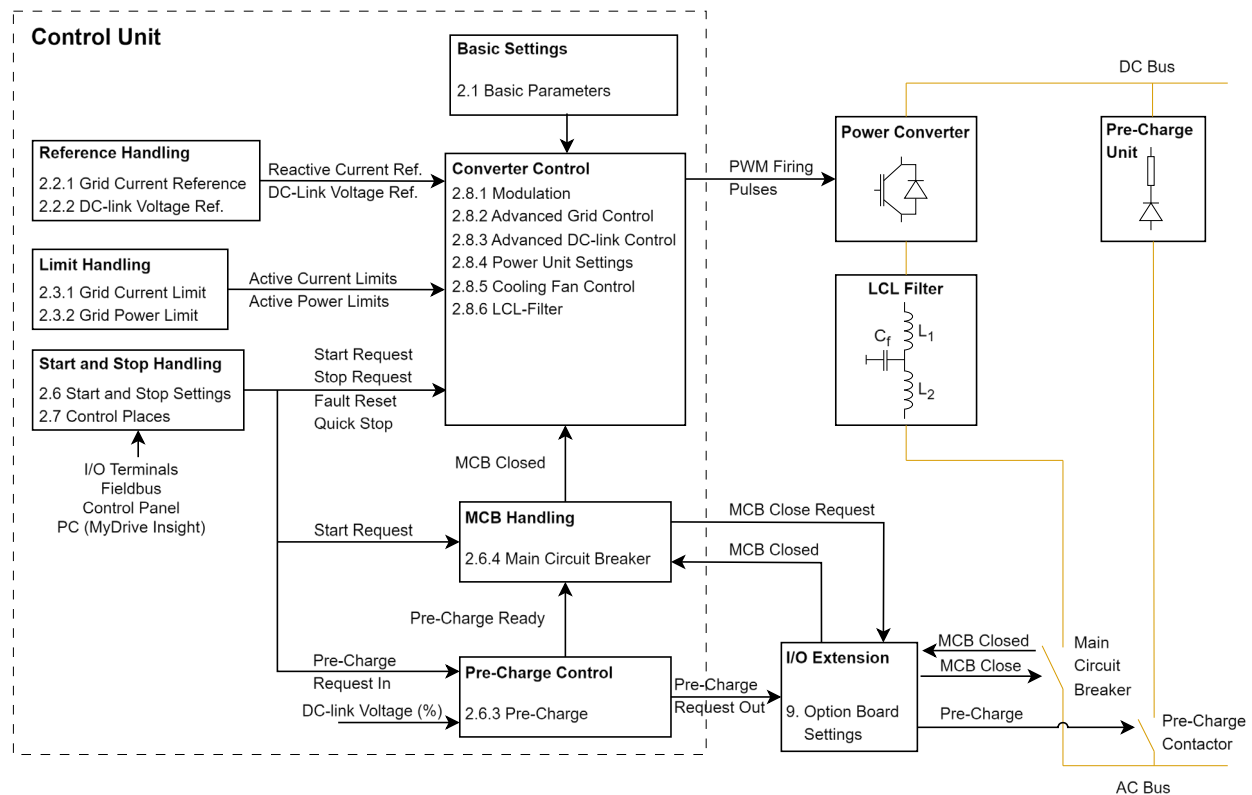


Figure 1: Overview of AFE application software.

The Active Front End has the following elements:

- **Control module:** The Active Front End application software controls the AFE unit functions.
- **Active Front End:** The unit consists of the LCL Filter and the AFE module.
- **Pre-charging circuit:** The Active Front End module requires an external pre-charging circuit. The purpose of the pre-charging unit is to charge the voltage in the DC link to a level sufficient for connecting the Active Front End module to the mains. For information on sizing, refer to the relevant Deign Guide.
- **LCL Filter:** The LCL Filter allows the power flow which also reduces the ripple current of the basic frequency, switching frequency, and their harmonics into the mains.
- **Main Circuit Breaker (MCB control):** The AFE application controls the MCB of the system with a relay. When charging of the DC bus is ready, the MCB is closed. MCB feedback is required for the effective functioning of AFE.

For more information on the wiring installations, see system module Operating Guides.

2.1.1 General Features

The application software provides a wide range of built-in features for converter control, security, services, and protections.

DC-Link Voltage Control

Provides users the ability to give a DC-link voltage reference which the converter maintains.

Output Current and Power Limiting Functionality

Provides users the capability to configure the maximum and minimum limits of the grid side active current and power.

Event Handling and Customization

Events indicate undesirable conditions for the converter to operate in. Faults, warnings, and infos are the three types of events.

Faults are critical events which require the operator to take immediate action so that converter is not damaged and converter operations are not stopped.

Warnings are events which indicate that the operator must perform recommended mitigating actions. When warnings occur in the system, the converter continues to operate.

Info events are mainly for notifying the operator of a situation, or to log events into the history. These events do not typically require the operator to take any actions, and they do not stop the operator from operating the converter.

The application software enables the operator to configure conditions and responses to fault and warning events. Configuring events and responses alerts operators so that they can perform necessary actions for the safe operation of the module, converter, and application. Some special activities to handle events include, for example, automatic output deration followed by a fault to stop modulation, and automatic opening of the main circuit breaker after a fault.

Logging and Storage of Data

Both converter and process related signals are logged and stored. The operator can select the process-related signals which are stored. Converter and process data are exported to a format which can be easily understood. The data can be exported from MyDrive® Insight.

The converter records important events which help users understand how the converter or module is used. Apart from standard events logged automatically by the converter, the operator can select events which have to be recorded.

Auto-detection of I/O

The converter has inbuilt terminals and installation space for options. The converter can automatically detect the installed options and connected terminals.

Grid Voltage Measurement Option

AFE can operate without the mains voltage measurement option. The voltage drop across the line filter can be compensated for by configuring the filter parameters in sensorless mode. Extended features are available when the two-channel AC mains Voltage Measurement Option OC7V0 is used. AFE can use the line voltage measurement option for the following operations:

- Line filter energization:
 - AFE can charge the filter capacitors and synchronize to the voltage measured from the other side of the main circuit breaker. This way the inrush currents and voltage transients typically occurring after the breaker closes are effectively avoided.
- Grid voltage dips:
 - The line voltage measurement option helps AFE to handle grid voltage dips without tripping.
- Monitoring of the grid voltage and frequency.

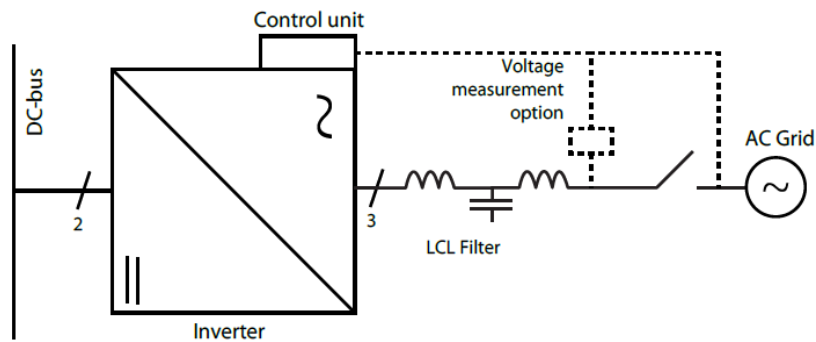


Figure 2: AFE with filter voltage feedback and grid voltage feedback measured by the Voltage Measurement Option OC7V0.

Paralleling AFEs

Paralleling refers to a system in which multiple AFEs (equipped with their own control units) are connected to the same DC bus and the same AC bus. Several power units can operate under one control unit using a star coupler board, and this configuration is considered a single AFE from the system level point of view. Paralleling does not require any communication between the AFEs, but software features like DC voltage drooping and paralleling synchronization mode must be used to guarantee smooth operation of the AFE. A typical paralleling configuration is illustrated in the following figure.

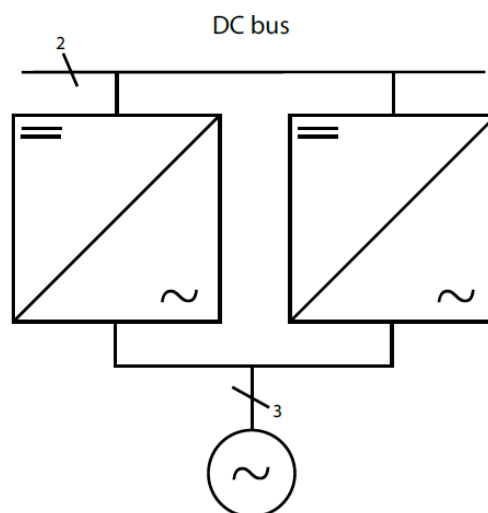


Figure 3: Paralleled AFEs with a common DC bus and a common AC bus.

Paralleling synchronization mode activates a controller for parallel-connected converters to reduce circulating common mode current when the converters are not galvanically isolated. Paralleling synchronization mode can be activated by parameter No. 9654

DC voltage drooping is used to balance the active current (power) drawn from the grid between multiple converters that are controlling the same DC-link voltage. DC-link voltage references are modified according to the following figure as function of active current (power). For example, if one drive is drawing more power from the grid to DC link than the others, its DC-link voltage reference is reduced most, which reduces its power in relation to other converters through the DC-link voltage controller. The DC voltage drooping can be configured with parameters No. 2912 and 5095.

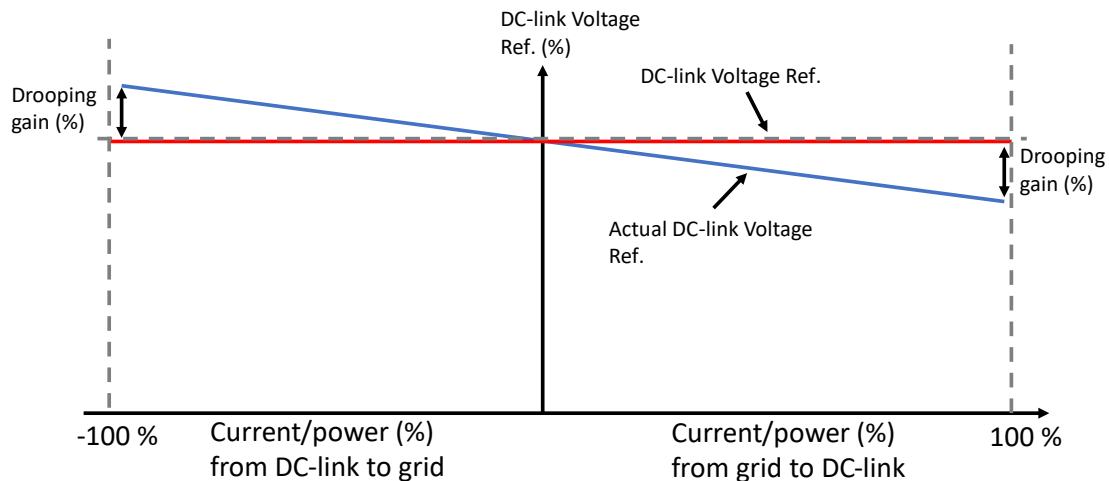


Figure 4: Operation principle of DC voltage drooping.

2.1.2 Protection Features

The Active Front End application software includes multiple protection features. The following is a short summary of the most relevant protections.

DC-link Overvoltage Protection

The converter stops modulation when the overvoltage trip level is reached. This protection also opens the main circuit breaker and brings the DC-link voltage down. The trip level depends on the power unit hardware, and the default response for this protection is a fault. The trip level or the response cannot be changed.

Overtemperature Protection

The converter stops modulation when the overtemperature trip level for the converter heat sink is reached. This protection also opens the main circuit breaker and brings the DC-link voltage down. The trip level depends on the power unit hardware, and the default response for this protection is a fault. The trip level or the response cannot be changed.

Overcurrent Protection

The converter stops modulation when the overcurrent trip level is reached. This protection also opens the main circuit breaker and brings the DC-link voltage down. The trip level depends on the power unit hardware, and the default response for this protection is a fault. The trip level or the response cannot be changed.

Cooling Supervision

Cooling supervision is only available for liquid-cooled AFE units.

Protects of the AFE converter and LCL Filter by monitoring the status of the cooling module through digital inputs.

Cooling supervision can be configured with the digital input No. 2400 Cooling Monitor Input. The response can be configured either as a warning or a fault, or both. Different responses can be configured based on the run/stop state of the converter using No. 2402 Cooling Monitor Response. A delay in seconds can be added for the triggering of the protection using No. 2401 Cooling Monitor Fault Delay.

Filter Temperature Protection

LCL Filter temperatures are monitored using AuxBus nodes and the converter can issue a warning or fault based on the filter temperature measurements. The operator cannot configure this protection.

Missing Phase

The converter stops modulation when it detects one or more of the grid phases is missing.

Quick Stop

Quick Stop stops the converter regardless of the operation condition. Quick Stop allows the converter to make a controlled stop, for example, when the emergency stop is pressed. Usually there are a few seconds to make a controlled stop before the emergency stop forces all breakers to open and makes the system electrically safe. In a Quick Stop, the modulation is stopped immediately and the main circuit breaker is opened.

The Quick Stop function can be initiated from the fieldbus or using digital inputs.

2.2 Start and Stop Sequence

The power-up sequence of the converter system can be configured. The start sequence, and parameters No. 6566 Pre-Charge Ready Level and No. 6559 MCB Closing Mode, affect the startup behavior. The Main Circuit Breaker closing mode can be configured to be one of the following:

- DC-Link Pre-Charge Ready (this is the default selection)
- Start Command
- DC-Link Pre-Charge Ready or Start Command
- LCL Filter Energized

The DC link pre-charging can be started based on a start command or a dedicated digital input. The start- and stop sequence, charging, and the main circuit breaker can be controlled via the fieldbus or the I/O interface.

2.2.1 Starting when DC-Link Pre-Charge Ready is the MCB Closing Mode

In a typical startup sequence, the unit is responsible for controlling the DC-link pre-charging and connecting to the AC grid using the Main Circuit Breaker (MCB) with default settings. The following start and stop sequence illustrations provide an overview on the process conditions and stages.

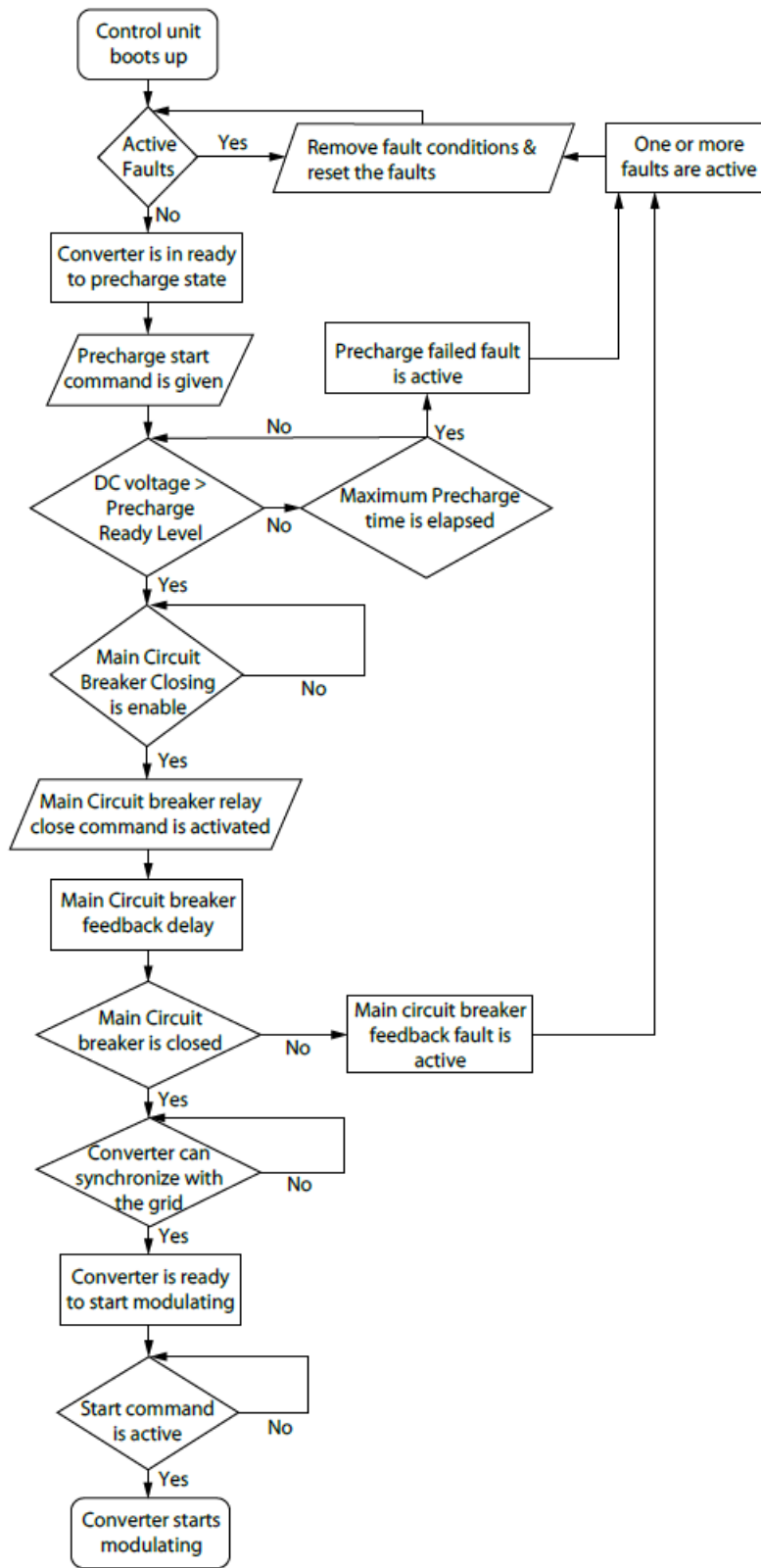


Figure 5: Start sequence flow chart.

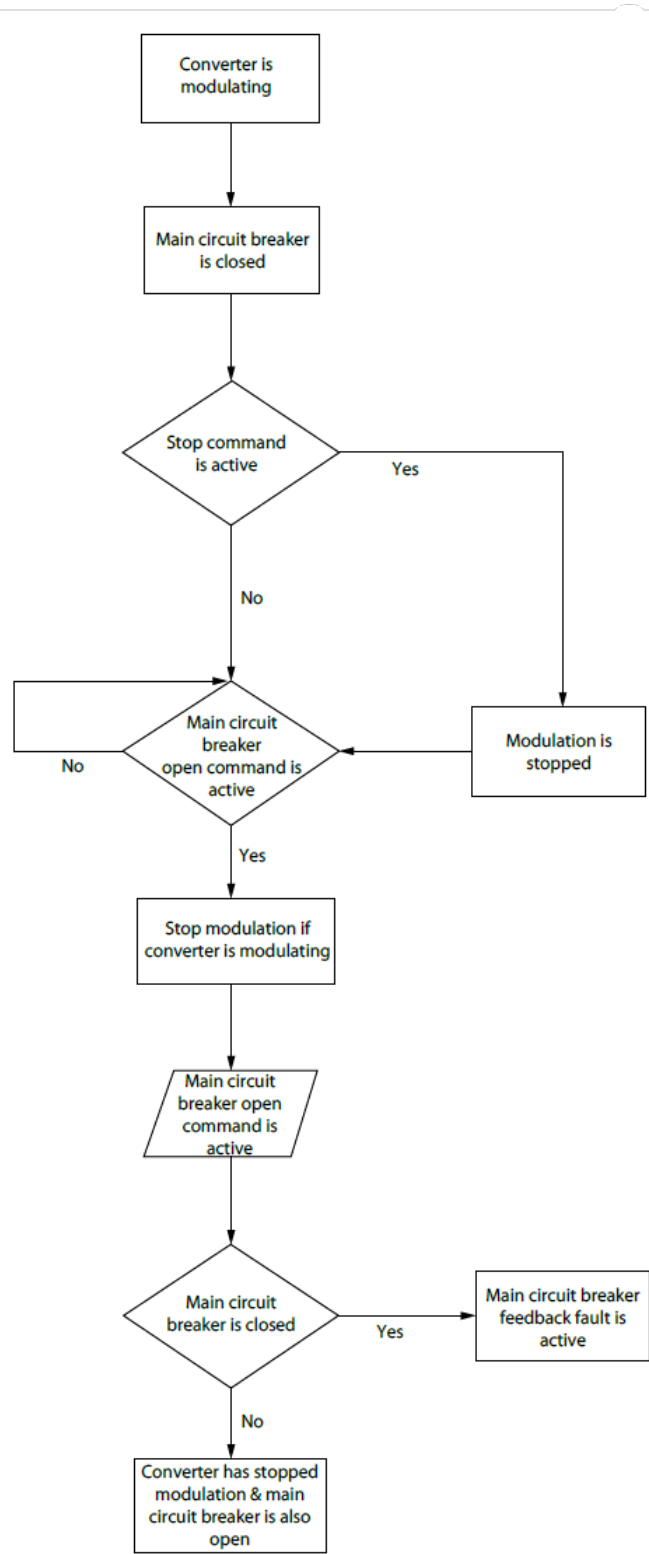


Figure 6: Stop sequence flow chart.

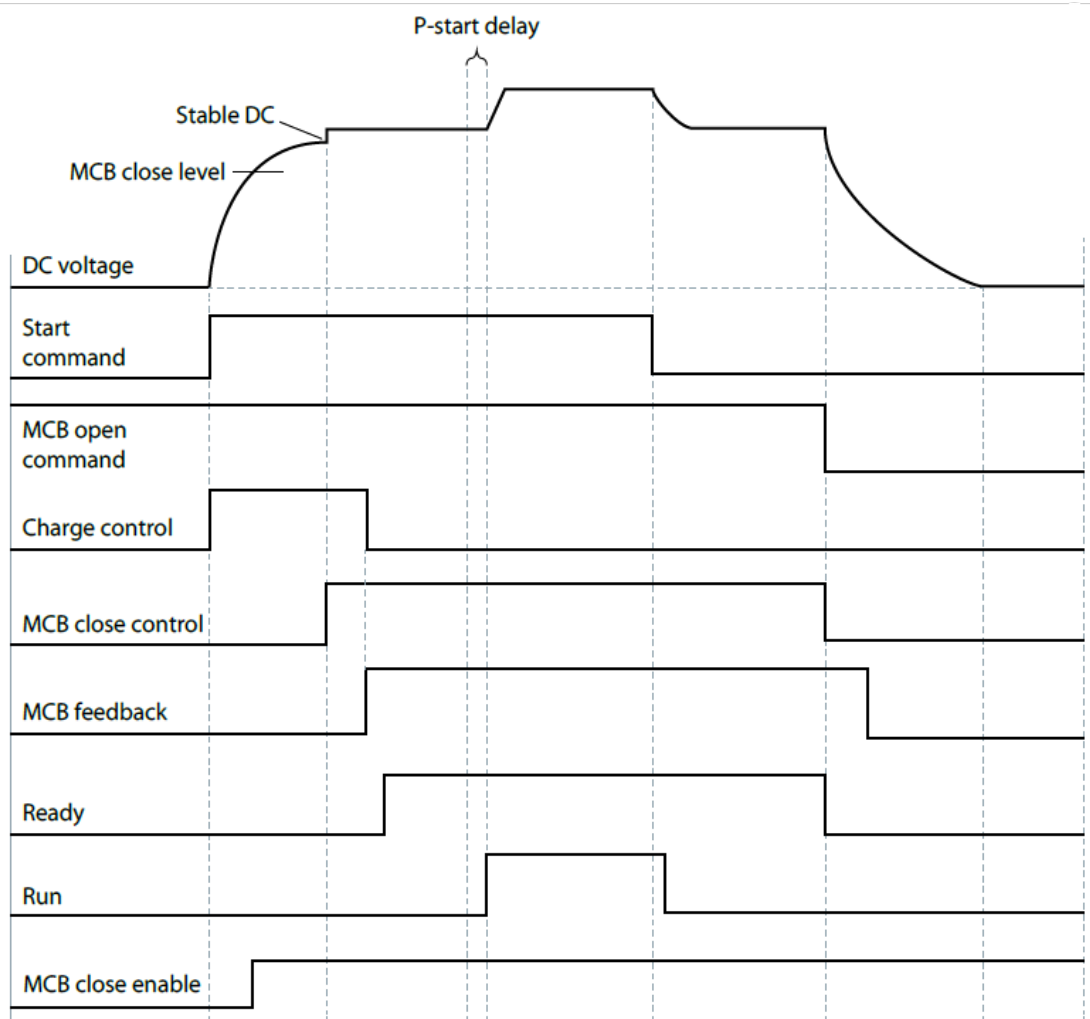


Figure 7: Pre-charge and main circuit breaker operation.

2.2.2 Starting when Filter Energization Ready is the MCB Closing Mode

In this mode, the DC link is charged first, and the converter is allowed to run to pre-energize and synchronize the voltage of the LCL filter before the command to close the main circuit breaker is issued. An external voltage measurement board is required for this mode. The voltage measurement board must be connected behind the main circuit breaker. A typical startup sequence, when the unit is responsible for controlling the DC-link pre-charging and connecting to the AC grid after the filter is energized, is illustrated in the following Figure.

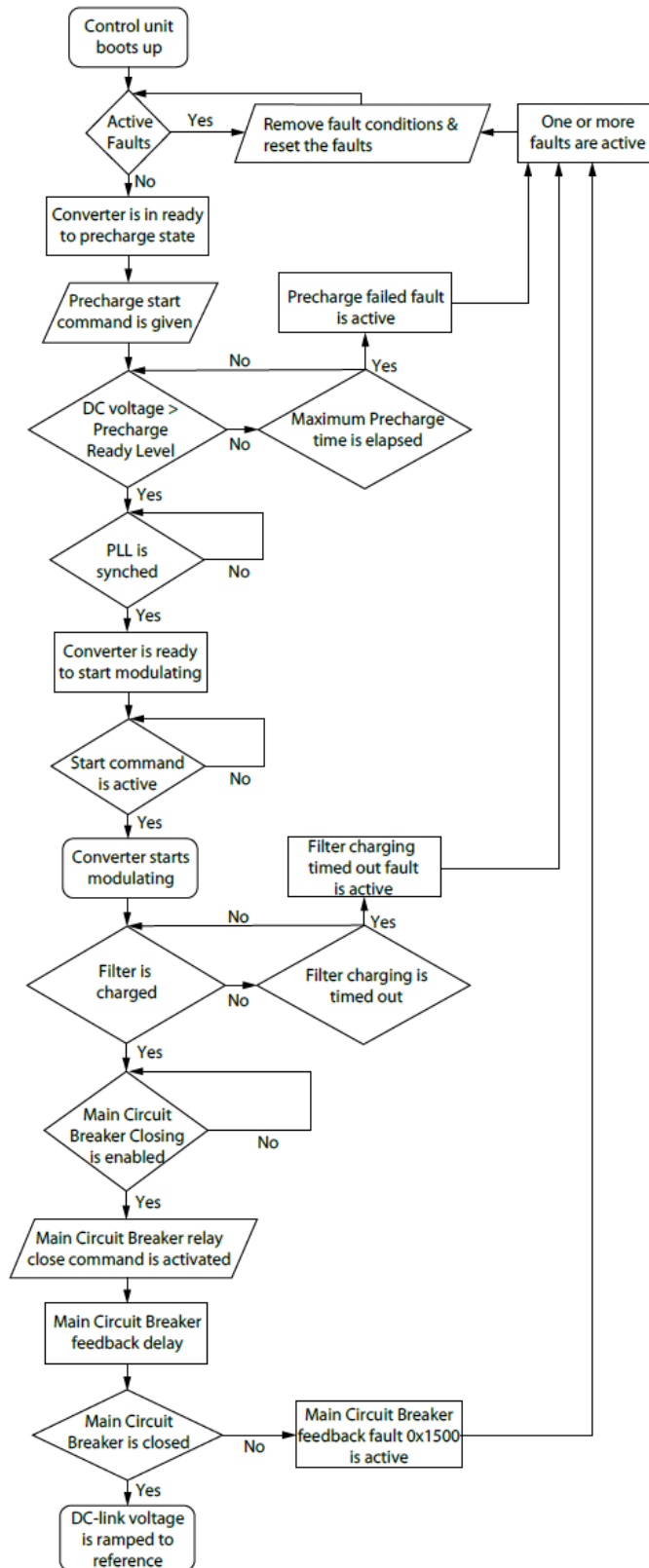


Figure 8: Start sequence when LCL Filter Energized is the MCB Closing Mode.

This mode reduces the inrush current from the grid when the main circuit breaker is closed. Before the main circuit breaker is closed, the filter voltage is ramped up to the measured grid voltage during the time defined by parameter No. 5161. If filter energization takes more than the time defined by parameter No. 5162, the filter energization fails and causes a fault. DC-link pre-charge has a minimum pre-charge time, which can be set using parameter No. 6565. The minimum pre-charge time must be configured according to the dimensioning of the pre-charge circuit.

2.3 Fieldbus Profile Description

The iC7 Series products provide a flexible fieldbus profile which can be mapped according to customer needs. The standard bit configuration is described in this chapter.

The following figures present standard procedures which are only applicable when control is through fieldbus, when bit 10 is true, and fieldbus control place is the active control place. The white boxes show the control word bits which are required to transition between different states. The gray boxes show different states of the fieldbus profile, indicating the value of status word bits, which must be in the state shown.

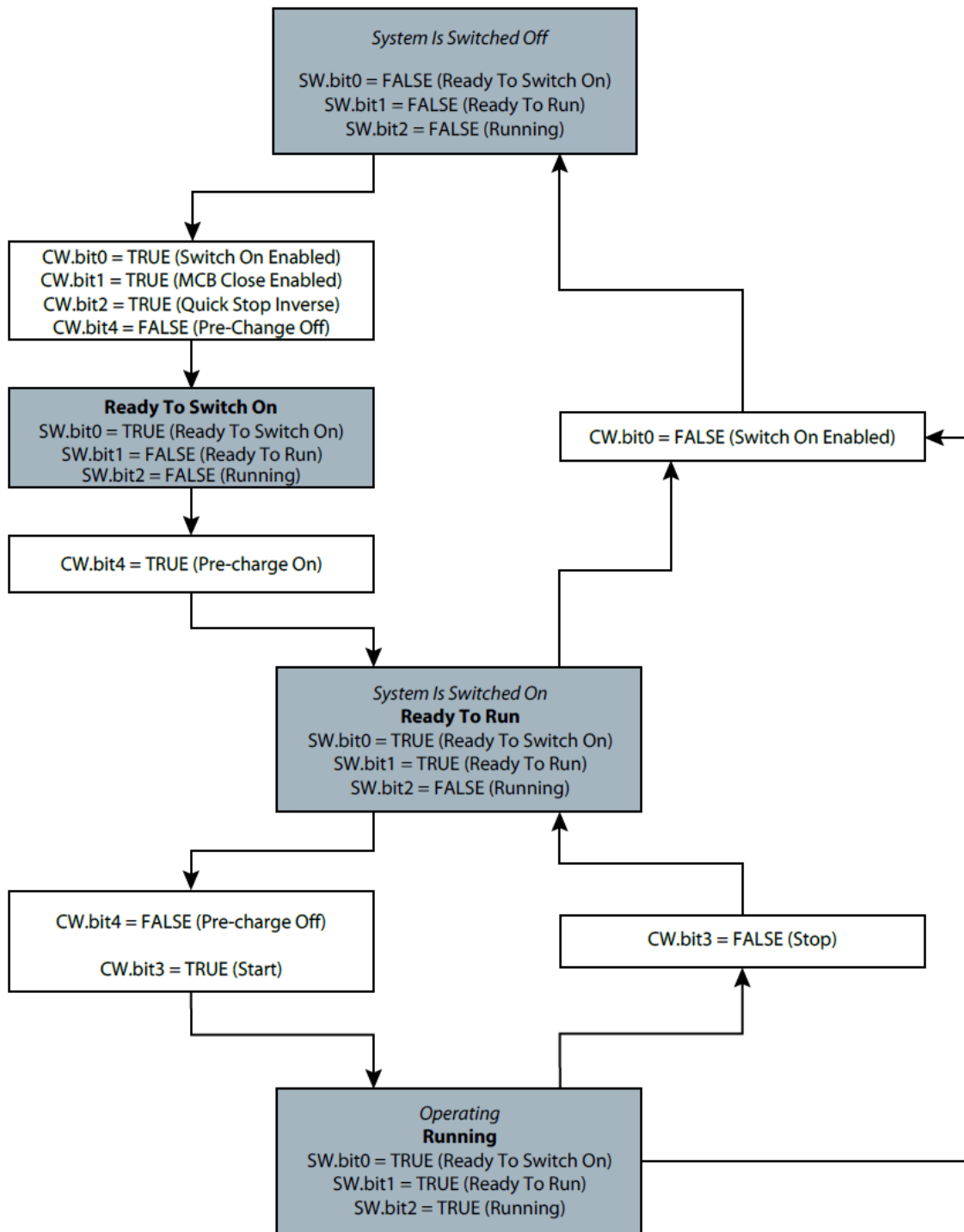


Figure 9: Start- and stop sequence flow chart when using separate commands for pre-charge (CW.bit4) and start (CW.bit3).

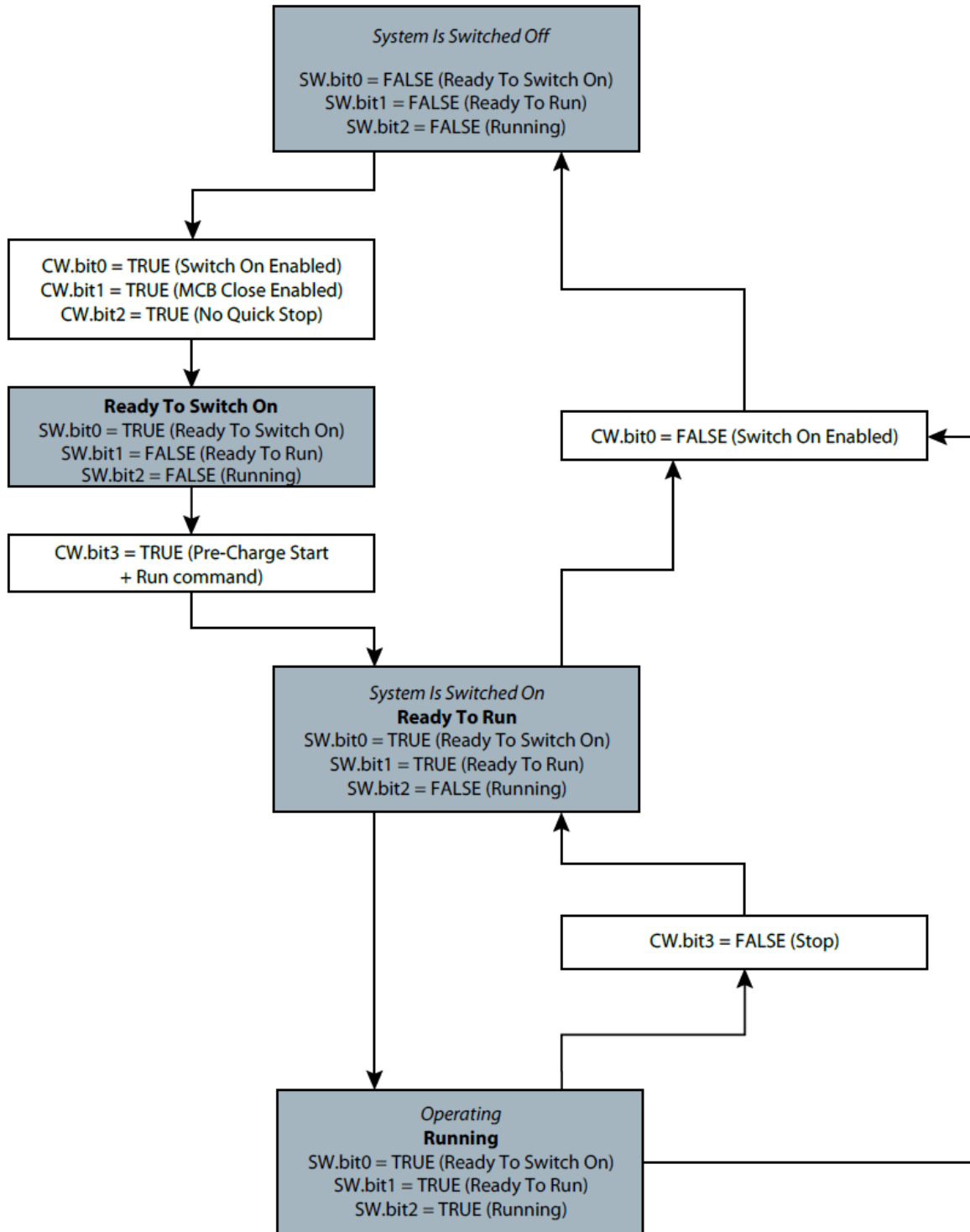


Figure 10: Start- and stop sequence flow chart when start bit (CW.bit3) is used both for pre-charge and start commands.

| State | Description |
|------------------------|---|
| System is switched off | Prohibits the converter from starting. |
| Ready to switch on | The converter is ready to start charging, with no active faults and no active conditions to inhibit switching on. |
| System is switched on | The converter is pre-charged and on. |
| Operating | The converter is running. |

2.3.1 Fieldbus Control Word and Bit Description

| Bit | Name | Description | Further Information |
|-----|-----------------------|--|--|
| 0 | Switch On Enabled | 0: DC-link pre-charge, MCB closure, and running are prevented/interrupted, MCB is opened if closed. 1: DC-link pre-charge, MCB closure, and running are not prevented/interrupted, MCB is not opened if closed. | The behavior of this bit is similar to digital input (No. 4728). |
| 1 | MCB Close Enabled | 0: If pre-charge is completed, the MCB is not allowed to close. Running is also prevented or interrupted. MCB is opened if closed. 1: If pre-charge is completed, the MCB is allowed to close. | |
| 2 | Quick Stop Inverse | 0: Initiate Quick Stop. 1: Do not initiate Quick Stop. | |
| 3 | Start | 0: Stop the unit if it is running, or stop the pre-charging sequence if it is not completed. 1: Start running if already pre-charged. Otherwise initiate pre-charging and then start running. | Use the fieldbus start mode (parameter No. 5114) to configure whether a new start command is required after the unit has been stopped or to start running immediately after all stopping conditions (quick stop, faults, and so on) are cleared. |
| 4 | Pre-charge | 0: Stop the DC-link pre-charge, if ongoing. 1: Start/continue the DC-link pre-charge. | This bit has an effect only if DC-link pre-charging is not externally controlled. |
| 5-6 | - | Reserved | |
| 7 | Event Reset | 0: Do not reset events 1: Reset active events | A rising edge (a transition from false to true) on this bit issues an event reset request. |
| 8-9 | - | Reserved | |
| 10 | Data Valid | 0: Ignore the current incoming process data values, instead use the last processed value when the 'Data Valid' bit was true. 1: Use the current incoming process data values. | For Modbus® TCP protocol, the validity check applies for all the registers that are sent in the same message as the control word. |
| 11 | Watchdog | Incoming watchdog bit from customer. Use for monitoring the fieldbus connection. | |
| 12 | Vendor Specific Bit 1 | Select the value "Control word 1 - bit 12" for any Input parameter to utilize this signal for the activation of a desired function. | |

| Bit | Name | Description | Further Information |
|-----|-----------------------|---|---------------------|
| 13 | Vendor Specific Bit 2 | Select the value "Control word 1 - bit 13" for any Input parameter to utilize this signal for the activation of a desired function. | |
| 14 | Vendor Specific Bit 3 | Select the value "Control word 1 - bit 14" for any Input parameter to utilize this signal for the activation of a desired function. | |
| 15 | Vendor Specific Bit 4 | Select the value "Control word 1 - bit 15" for any Input parameter to utilize this signal for the activation of a desired function. | |

2.3.2 Fieldbus Status Word and Bit Description

| Bit | Name | Description | Further Information |
|-------|--------------------|--|--|
| 0 | Ready to Switch On | 0: Unit is not ready to run 1: Unit is ready to run | This bit indicates that the unit is ready to start the startup sequence (pre-charging and/or MCB closure, if controlled by the application). There are no active faults and the Switch On Enabled bit is active. |
| 1 | Ready to Run | 0: Unit is not ready to run 1: Unit is ready to run | When this bit is true, it indicates that the unit can be successfully started with bit 3 of the control word. |
| 2 | Running | 0: Unit is not running (modulating) 1: Unit is running (modulating) | This bit indicates whether the unit is in running state (modulating). |
| 3 | Fault | 0: No active faults 1: One or more faults are active | This bit indicates the presence of one or more active fault level events. |
| 4 | - | Reserved | |
| 5 | Quick Stop Inverse | 0: Quick stop is active 1: Quick Stop is not active | This bit indicates whether the quick stop command is active or not |
| 6 | - | Reserved | |
| 7 | Warning | 0: No active warnings 1: One or more warnings are active | This bit indicates the presence of one or more active warning level events. |
| 8 | - | Reserved | |
| 9 | Controlled by PLC | 0: Fieldbus is not the active control place 1: Fieldbus is the active control place | This bit indicates whether the unit is controlled from fieldbus or not. |
| 10 | - | Reserved | |
| 11 | Run Enabled | 0: Run enable signal from dedicated input is missing 1: Run enable signal from dedicated input is present | This bit indicates the state of the Run Enable Input (parameter No. 103) |
| 12-14 | - | Reserved | |
| 15 | Watchdog | Bit used for the fieldbus watchdog. | Mirroring control word bit 11 |

3 User Interfaces and How to Configure

3.1 Overview of User Interfaces

To interact with a Danfoss iC7 Series converter, use either the control panel as a simple and direct interface, or the software tool MyDrive® Insight for more advanced interaction with the converter. The control panel can be mounted directly on the converter, or close to the converter by using a control panel mounting kit.

With MyDrive® Insight the converter can be accessed from a remote place if the infrastructure is in place and the network provides the required access rights.

3.2 Control Panel

The chapter provides an overview about the different control panel options, the related elements, important features and functionalities, and quick guidance on how to use the 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.

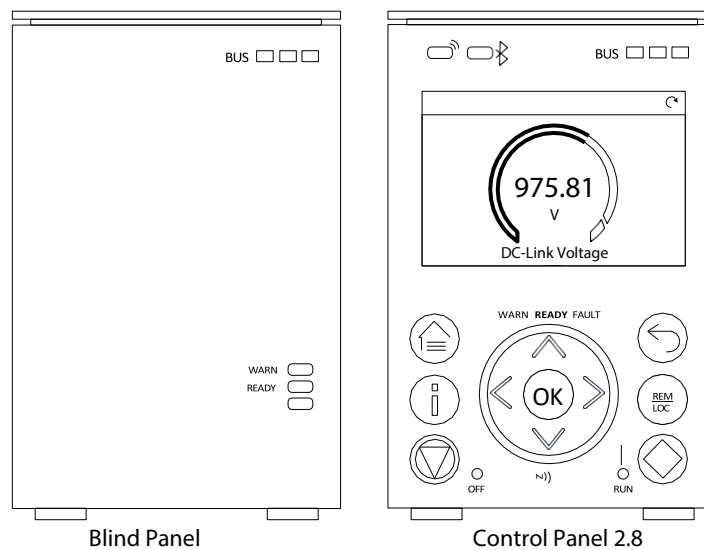


Figure 11: Control Panel options.

- **Blind Panel OPX00:** This panel shows the basic status of the converter and fieldbus indicators. The panel is typically used when only limited interaction with the converter is required after installation and commissioning, or when the converters are controlled by fieldbus.
- **Control Panel 2.8 OPX20:** This panel is the standard user interface, and used when frequent interaction with the converter is required. The panel enables easy setup of the converter via parameters, monitoring the converter status, and 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 converter status and fieldbus communication.
- Halo indicator with 3 colors to illustrate converter status at a glance.
- A display which can be customized to show required or essential information.
- Buttons to control the converter 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.

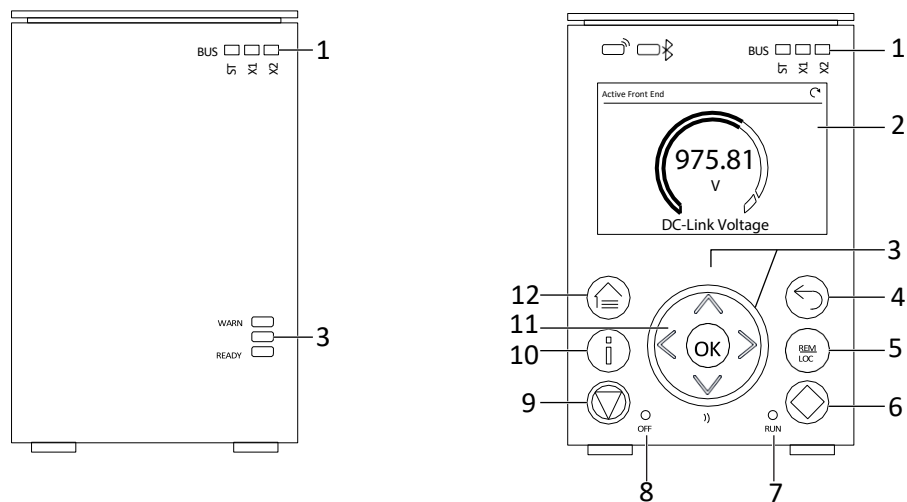


Figure 12: Control Panel elements.

| Legend | Name of Element | Description |
|--------|-----------------------------|---|
| 1 | Fieldbus Indicators | <p>The LEDs indicate the status of the communication interface X1 and X2.</p> <ul style="list-style-type: none"> • [ST] <ul style="list-style-type: none"> ○ 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] <ul style="list-style-type: none"> ○ Green blinking LED indicates data exchange on communication interface X1. ○ Red blinking LED indicates an error during data exchange on communication interface X1. • [X2] <ul style="list-style-type: none"> ○ 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. |
| 3 | Converter Status Indicators | <p>The LEDs indicate the status of the converter.</p> <ul style="list-style-type: none"> • [WARN] <ul style="list-style-type: none"> ○ When this text is lit in yellow, it indicates a warning-level event. • [READY] <ul style="list-style-type: none"> ○ 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] <ul style="list-style-type: none"> ○ When this text is lit in red, it indicates a fault. <p>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.</p> |
| 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 | <p>The indicator has the following states:</p> <ul style="list-style-type: none"> • On: Start command is applied and the converter is modulating. • Off: The converter has stopped, and the start command is not applied. |

| Legend | Name of Element | Description |
|--------|------------------|--|
| 8 | OFF LED | <p>The indicator has the following states:</p> <ul style="list-style-type: none"> • Steadily on: The indicator is in this state because of either of the following two reasons: <ul style="list-style-type: none"> ○ 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 seconds: Indicates that 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. <p>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.</p> |
| 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 | <ul style="list-style-type: none"> • 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 converter, including warnings and faults.
- Navigable menus, where the parameter settings of the converter can be viewed and changed.

3.2.3.1 Starting the Converter and Control Panel Display

While the converter is powering up until it is ready to operate, the control panel display shows the following:

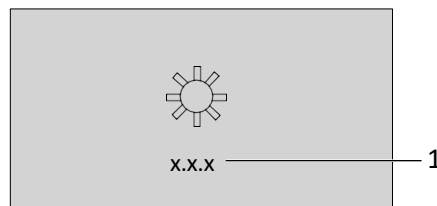


Figure 13: Control Panel display on startup.

| Legend | Description |
|--------|----------------------------|
| 1 | The panel software version |

NOTICE

When the converter is started, it takes 25–30 s for the converter to be in ready state and for the control panel display to change to the Home screen (default).

3.2.3.2 Understanding Readout Screens

When the converter is in ready state, the control panel display shows the Home screen. By default, the Home screen is shown as follows, however the Home screen can be customized.

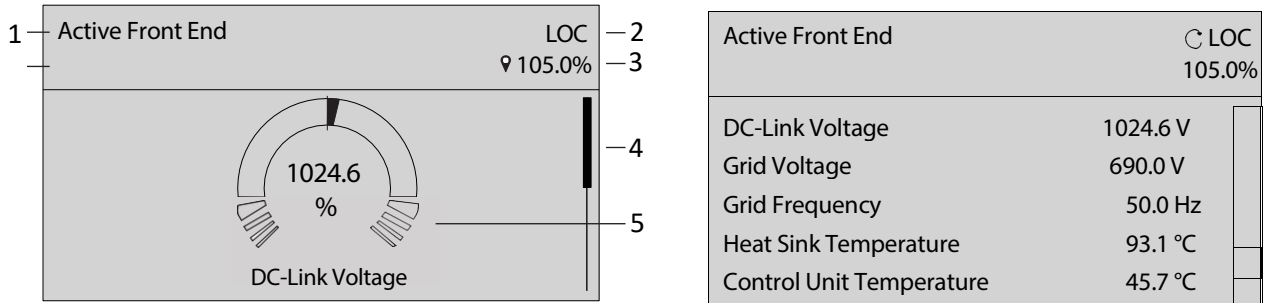


Figure 14: Home screen (Donut View vs. Line view)

| Legend | Description |
|--------|--|
| 1 | The name of the application software |
| 2 | The current control place of the converter. REM indicates remote control and LOC indicates local control. The visible arrow indicates that the converter is in running state. |
| 3 | The DC-voltage reference. The local reference can only be changed when the converter is in local control. |
| 4 | The scroll bar. The scroll bar indicates whether the screen is in the upper Readout Screen 1 or lower Readout Screen 2 position, when in the menu structure or parameters |
| 5 | The readout value as a donut infographic view. It is possible to show only a single readout in a donut view. When more than 1 readout is configured, the screen changes to a line view. A minimum of 2 and a maximum of 5 readouts are shown in the line view. |

Press the down arrow on the control panel when in Readout Screen 1, and the control panel screen navigates to Readout Screen 2. As a factory default setting, the control panel shows 5 readout values, as shown in the preceding image.

3.2.3.3 Changing the Content of the Readout Screens

This chapter outlines an example procedure for changing or customizing the content of Readout Screen 1. The same procedure is applicable for Readout Screen 2.

1. To start the screen content editing mode, press [OK] for a minimum of 5 seconds. The screen changes as shown in the following image.

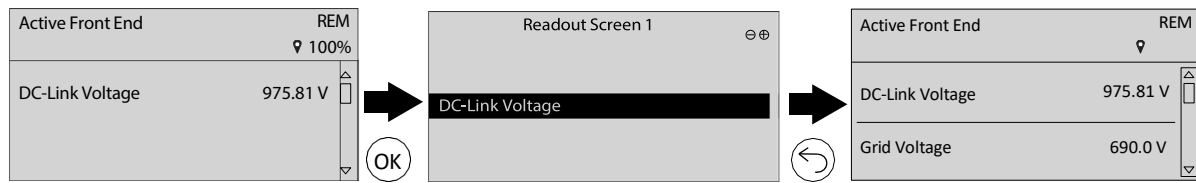


Figure 15: Typical Readout Screen

- Remove an existing readout by pressing the up-arrow button on the control panel and navigating to the Remove readout button (-) on the UI and pressing it.

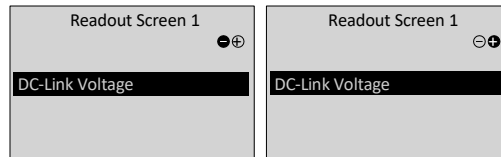


Figure 16: Add and remove readout buttons

NOTICE

When the remove readout button is pressed, the last readout on the list is removed.

- Add a readout to the screen by navigating to the Add readout button (+) on the UI and pressing it. To move between the Add readout and Remove readout buttons, press the left or right arrow buttons on the control panel.
- After pressing the Add readout button, select the readout to be added.

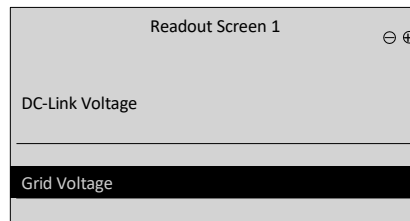


Figure 17: Updating the readout screen

- Add more readouts by pressing the Add readout button and selecting a readout.
- After selecting the readouts to be added or removed from the list, press [OK].
- To exit the screen content editing mode, press the [Home] or [Back] button.

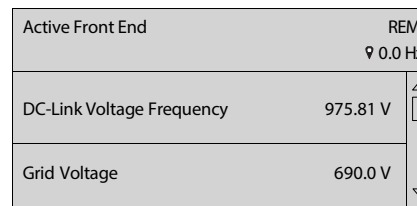


Figure 18: Updated readout screen

NOTICE

The readout screens can also be adjusted using parameter group 5.2 Control Panel. For more information, see Customization (Menu Index 5).

3.2.3.4 Adjusting Display Backlight and Contrast

When in Readout Screen 1 or Readout 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:

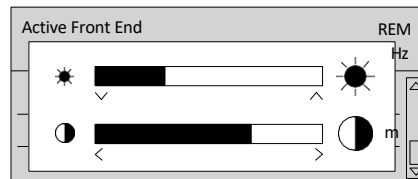


Figure 19: Intensity change of backlight and contrast

- 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.

3.2.3.5 Parameter Group Screen and Overall Navigation

Pressing the [Home/Menu] button toggles between the readout screens and the parameter group screen. The content of the parameter group screen can vary depending on the current level of the parameter group. A typical parameter group screen is shown in the following image.

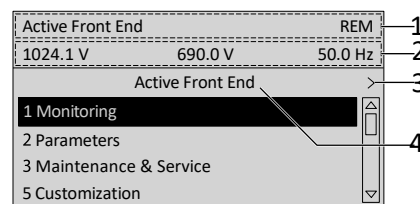


Figure 20: Parameter group screen

| Legend | Description |
|--------|---|
| 1 | Name and control state of the converter. |
| 2 | The menu readout header. It shows the DC-link Voltage, Grid Voltage and Grid Frequency (left-to-right) |
| 3 | Previous and Next arrow icons. Press the icons to navigate 1 level above or below in the parameter group structure. When the Previous or Next arrow is not shown, it indicates that the view is at the top or bottom of the menu structure, respectively. |
| 4 | Name of the application software that is active in the converter. |

Basic navigation techniques

To navigate through and within the different parameter groups, use the navigation buttons of the control panel.

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

- To navigate to parameter subgroups or parameters within a parameter group, press the left or right arrows of the control panel.
- To navigate to a higher level in the parameter/parameter group screens press the Back button, and to navigate to a lower level press the OK button.

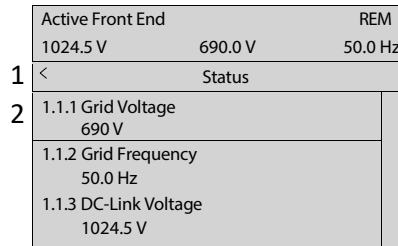


Figure 21: Parameter navigation

| Legend | Description |
|--------|--|
| 1 | Previous button when in a parameter group. |
| 2 | When parameters are defined as readout only, the current value is shown below the parameter name. A black outline around the parameter without any highlighting indicates that the value of the parameter cannot be changed. |

3.2.3.6 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 **P2.1.6 Unit Voltage Class**.

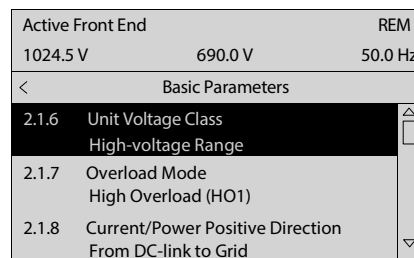


Figure 22: Changing selection in a Parameter

1. To view the selections of the parameter, press the right arrow button or [OK] on the control panel. The selections available for the parameter are shown on the screen.

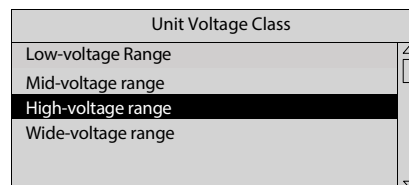


Figure 23: Choice selection for a Parameter

2. To browse through the selections, press the up or down arrow buttons.
3. To select a selection, press [OK].

3.2.3.7 Changing a Parameter Value

The example parameter in this procedure is **P2.1.1 Grid Nominal Frequency**.

1. Go to parameter **P2.1.1 Grid Nominal Frequency** and press [OK].
2. 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.
3. To increase or decrease the value, press the up and down arrow buttons.
4. Confirm the changes by pressing [OK].

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

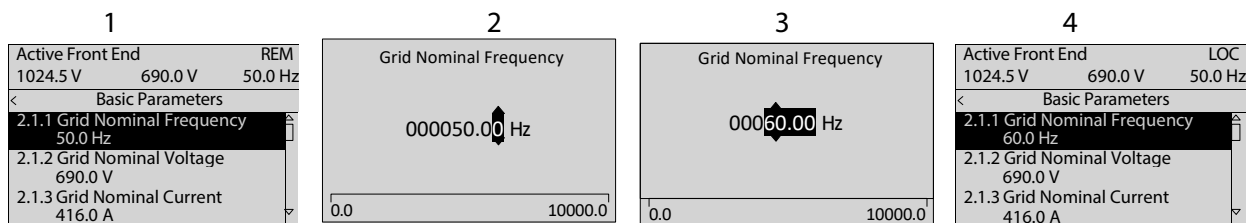


Figure 24: Changing value in a parameter

3.2.3.8 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.

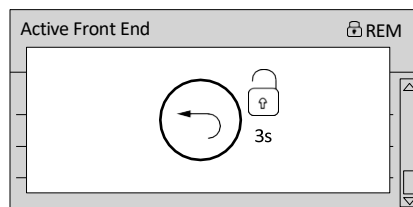


Figure 25: Control Panel lock screen

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.

3.2.4 Control Panel Shortcuts

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

| 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 |
| Accessing DC-Link Voltage Reference editor | Local Control Active Home screen active | [OK] | <1 s to activate |

| Action | Precondition | Buttons | Activation Time |
|--|-----------------------|---------------|-------------------------------|
| Editing Home screen readouts | Home screen active | [OK] | 5 s to activate |
| Editing the Menu Readout header | Any menu is active | [OK] | 5 s to activate |
| Show active events | Home screen is active | Info | Single press |
| Adjusting screen contrast and brightness | Home screen is active | Info + arrows | Continuous simultaneous press |

3.3 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.
- Monitor the converters as part of daily operations or any others.
- Collect data and information for troubleshooting, maintenance, and service.
- Discovery and access to multiple converters in a network.
- Intuitive user interface.
- Notifications and visualizations on real-time information and events about the converter.
- PC control to perform operations such as starting or stopping the converter, set references, set direction, reset, and coast of the converter.
- Perform updates on single or multiple converters.
- Backup and restore of parameter settings.
- Data logging and analyzing for troubleshooting.

NOTICE

The section is documented for MyDrive® Insight version 2.8.0 or above. Make sure to uninstall lower versions of MyDrive® Insight from the workstation to utilize the latest MyDrive® Insight functions.

NOTICE

The section MyDrive® Insight in the application guide covers basic information such as getting started with MyDrive® Insight, accessing and viewing or changing the parameters, and PC control to operate the converter using MyDrive® Insight. For further information on the different MyDrive® screens, integrated help within MyDrive® Insight will be available in future releases.

NOTICE

The following figures and examples are from the iC7 Automation product. Thus, there are mentions of “iC7 Industry” and parameter and index references that do not apply in this application. However, all the principles do apply.

3.3.1 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/>.

Procedure:

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

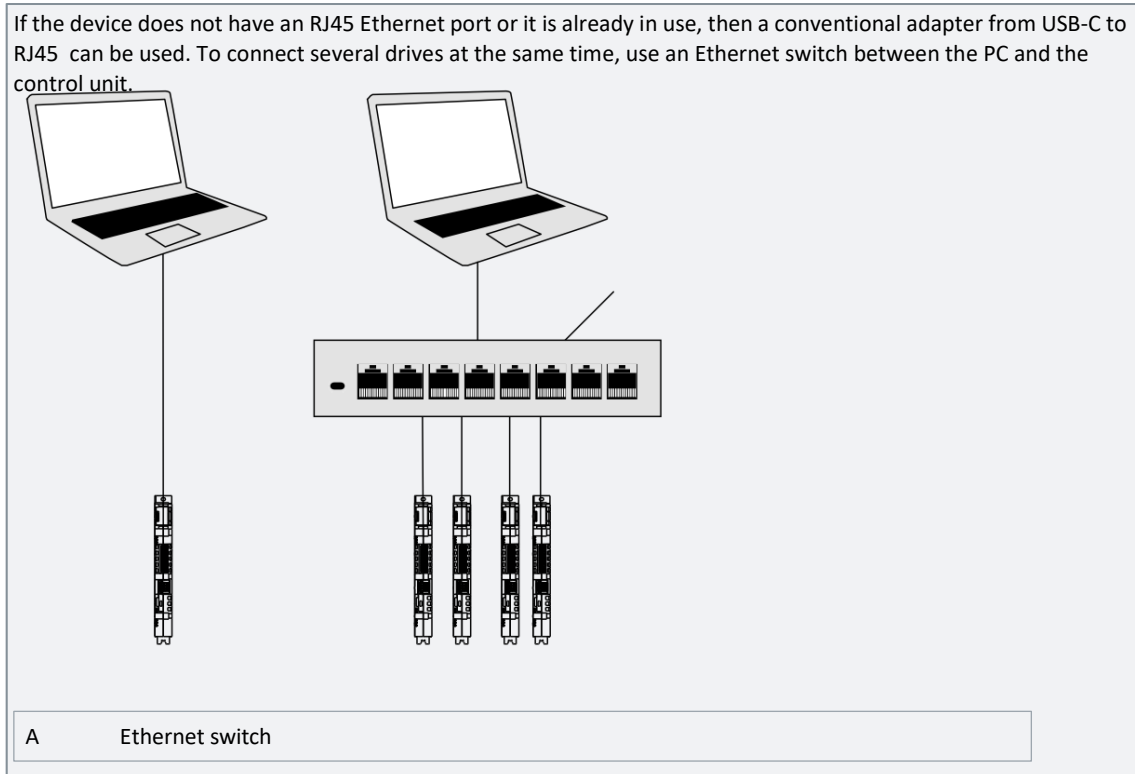


Figure 26: Connection between PC and power converter.

2. When the converter is powered up and in Ready state, open MyDrive® Insight on the device and the converter is recognized.

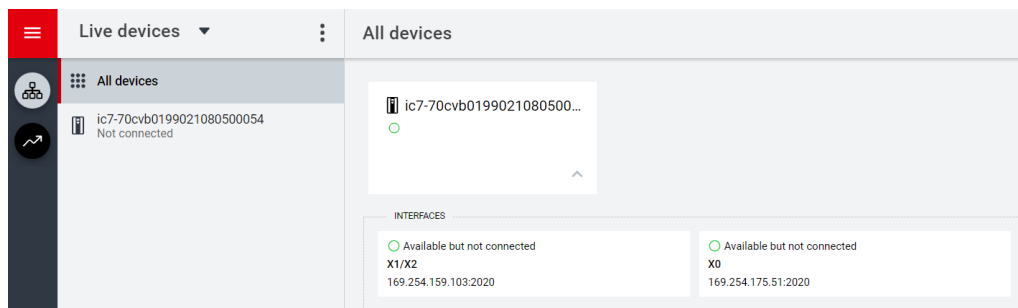


Figure 27: Confirm connection in MyDrive® Insight.

3. To establish or confirm the connection, click the recognized converter(s).

Once the connection is established, the drive is marked with a connection symbol (green color) in MyDrive® Insight, as shown.

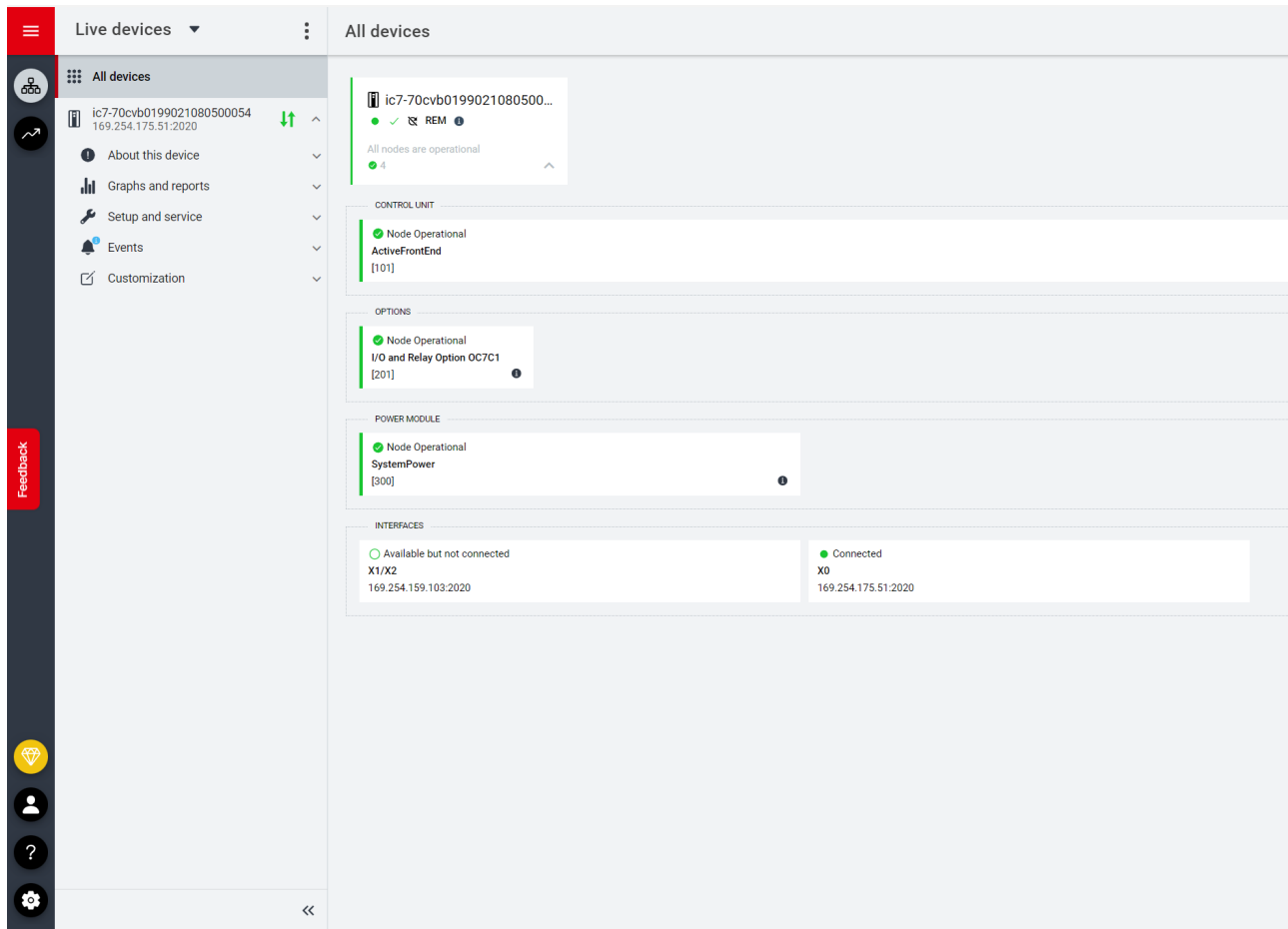


Figure 28: Establish the connection in MyDrive® Insight.

4. Select the required interaction for the converter. In this example, the Device Info (About this device) screen is shown.

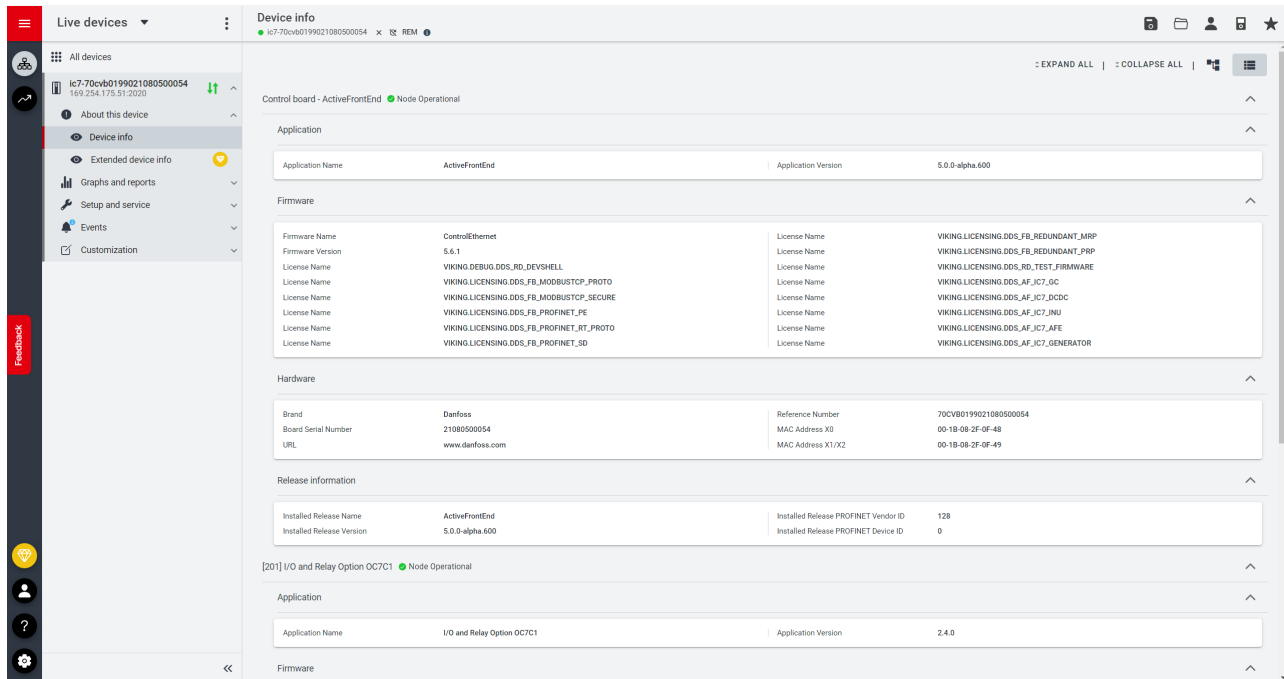


Figure 29: Device info screen in MyDrive® Insight.

NOTICE

The application guide covers basic information such as accessing parameters and using the PC control in MyDrive® In-sight.

3.3.2 Accessing Parameters and Understanding Parameter Screens in MyDrive® Insight

Viewing and Changing Parameters

1. To access the parameters of the connected converter, click Setup and Service.
2. Click Parameters → Live, as shown.

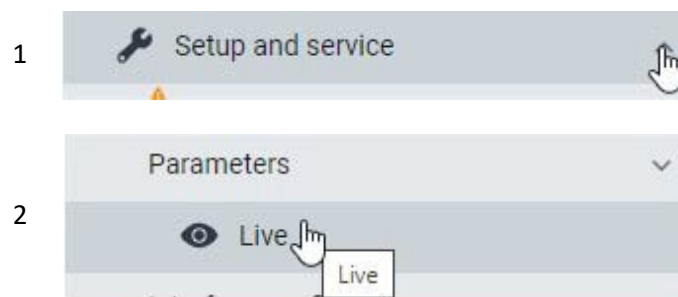


Figure 30: Setup and Service tab in MyDrive® Insight.

Parameter Screen Overview

The following is an overview of the Parameters (Live) screen in MyDrive® Insight. Note that the parameters and groups from the following examples are from the iC7 Industry application and they do not exist in the Active Front End application.

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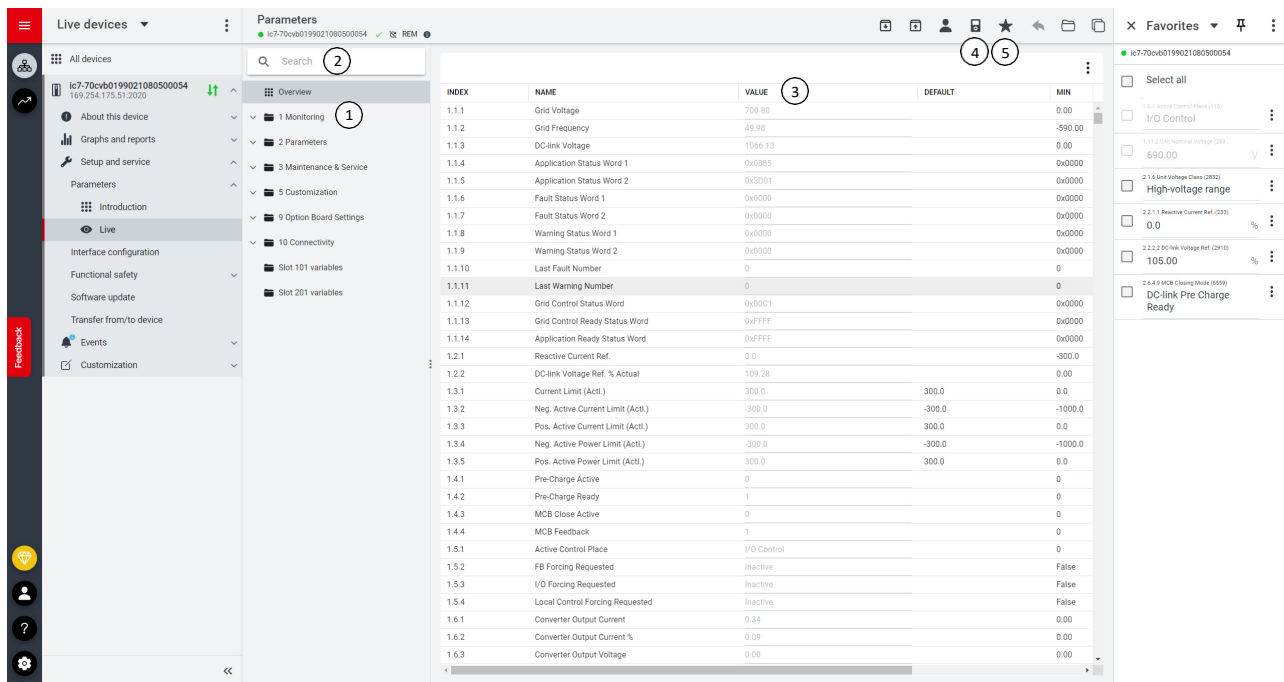


Figure 31: Parameters in the Live view in MyDrive® Insight.

| Legend | Name | Description |
|--------|-------------------|--|
| 1 | Parameter group | Navigate through the different parameter groups in the converter. |
| 2 | Search field | Use the search function to find a specific parameter. |
| 3 | Value field | View and change a parameter value or selection. All the parameters for the converter are shown on the Live screen. |
| 4 | PC Control button | Switch to PC control to start or stop the converter using MyDrive® Insight. |
| 5 | Favorites | Select a parameter as a favorite by clicking the star in its row. |

Navigate through different parameter groups

In the following figure, navigating to parameter subgroup 2.2.2 DC-Link Voltage Reference is shown as an example.

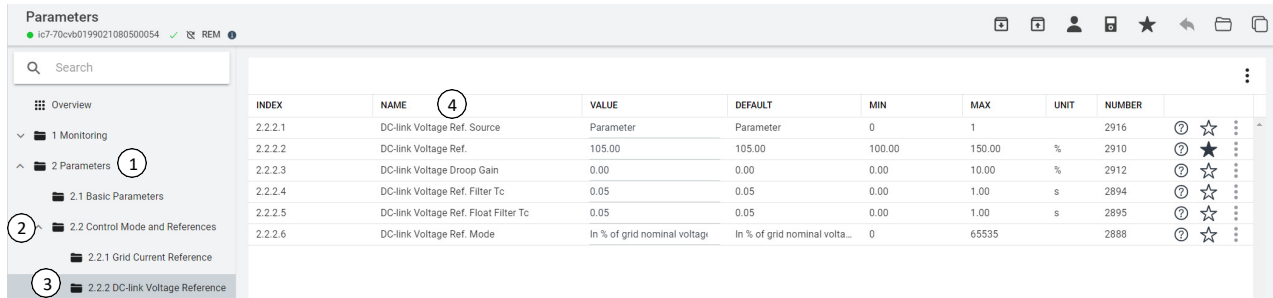


Figure 32: Parameter group navigation in MyDrive® Insight.

1. Click the parameter group (1) from the Live panel.
2. Click the parameter subgroup (2).

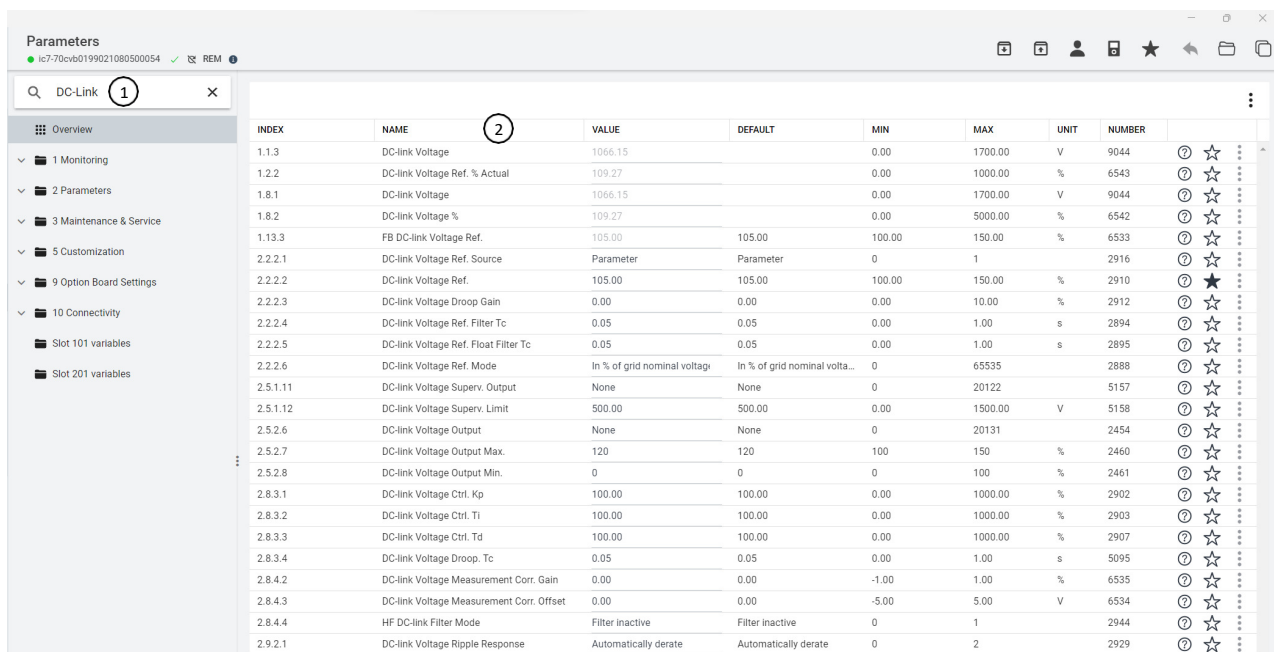
- Repeat step 2, until the right level of parameter subgroup (3) is reached to find the specific parameters (4).

NOTICE

When in a specific parameter subgroup, only parameters relevant to the parameter subgroup can be accessed.

Searching for a specific parameter

In the Search field, type the search term. The search returns all parameters that have the search term in the name, index, or number. In the following example, all parameters with DC-Link (1) in the name are listed in the search results (2). Note that in the example the Overview tab is activated, which leads for the search to be conducted within all parameter groups. The search can also be conducted inside a specific group or subgroup by activating the wanted group.



| INDEX | NAME | VALUE | DEFAULT | MIN | MAX | UNIT | NUMBER | | |
|----------|--|------------------------------|-------------------------------|--------|---------|------|--------|---|---|
| 1.1.3 | DC-link Voltage | 1066.15 | | 0.00 | 1700.00 | V | 9044 | ? | ☆ |
| 1.2.2 | DC-link Voltage Ref. % Actual | 109.27 | | 0.00 | 1000.00 | % | 6543 | ? | ☆ |
| 1.8.1 | DC-link Voltage | 1066.15 | | 0.00 | 1700.00 | V | 9044 | ? | ☆ |
| 1.8.2 | DC-link Voltage % | 109.27 | | 0.00 | 5000.00 | % | 6542 | ? | ☆ |
| 1.13.3 | FB DC-link Voltage Ref. | 105.00 | | 100.00 | 150.00 | % | 6533 | ? | ☆ |
| 2.2.2.1 | DC-link Voltage Ref. Source | Parameter | Parameter | | 1 | | 2916 | ? | ☆ |
| 2.2.2.2 | DC-link Voltage Ref. | 105.00 | 105.00 | 100.00 | 150.00 | % | 2910 | ? | ☆ |
| 2.2.2.3 | DC-link Voltage Droop Gain | 0.00 | 0.00 | 0.00 | 10.00 | % | 2912 | ? | ☆ |
| 2.2.2.4 | DC-link Voltage Ref. Filter Tc | 0.05 | 0.05 | 0.00 | 1.00 | s | 2894 | ? | ☆ |
| 2.2.2.5 | DC-link Voltage Ref. Float Filter Tc | 0.05 | 0.05 | 0.00 | 1.00 | s | 2895 | ? | ☆ |
| 2.2.2.6 | DC-link Voltage Ref. Mode | In % of grid nominal voltage | In % of grid nominal volta... | 0 | 65535 | | 2888 | ? | ☆ |
| 2.5.1.11 | DC-link Voltage Superv. Output | None | None | 0 | 20122 | | 5157 | ? | ☆ |
| 2.5.1.12 | DC-link Voltage Superv. Limit | 500.00 | 500.00 | 0.00 | 1500.00 | V | 5158 | ? | ☆ |
| 2.5.2.6 | DC-link Voltage Output | None | None | 0 | 20131 | | 2454 | ? | ☆ |
| 2.5.2.7 | DC-link Voltage Output Max. | 120 | 120 | 100 | 150 | % | 2460 | ? | ☆ |
| 2.5.2.8 | DC-link Voltage Output Min. | 0 | 0 | 0 | 100 | % | 2461 | ? | ☆ |
| 2.8.3.1 | DC-link Voltage Ctrl. Kp | 100.00 | 100.00 | 0.00 | 1000.00 | % | 2902 | ? | ☆ |
| 2.8.3.2 | DC-link Voltage Ctrl. Ti | 100.00 | 100.00 | 0.00 | 1000.00 | % | 2903 | ? | ☆ |
| 2.8.3.3 | DC-link Voltage Ctrl. Td | 100.00 | 100.00 | 0.00 | 1000.00 | % | 2907 | ? | ☆ |
| 2.8.3.4 | DC-link Voltage Droop. Tc | 0.05 | 0.05 | 0.00 | 1.00 | s | 5095 | ? | ☆ |
| 2.8.4.2 | DC-link Voltage Measurement Corr. Gain | 0.00 | 0.00 | -1.00 | 1.00 | % | 6535 | ? | ☆ |
| 2.8.4.3 | DC-link Voltage Measurement Corr. Offset | 0.00 | 0.00 | -5.00 | 5.00 | V | 6534 | ? | ☆ |
| 2.8.4.4 | HF DC-link Filter Mode | Filter inactive | Filter inactive | 0 | 1 | | 2944 | ? | ☆ |
| 2.9.2.1 | DC-link Voltage Ripple Response | Automatically derate | Automatically derate | 0 | 2 | | 2929 | ? | ☆ |

Figure 33: Parameter search in MyDrive® Insight.

Viewing and Changing Parameter Settings

When in a specific parameter group, all parameters related to the parameter group are shown.

Depending on the access type of the parameter, there is a possibility to view the parameter setting or change the current selection or value of the parameter.

In the following picture, parameter group 4 Motor is shown as an example.

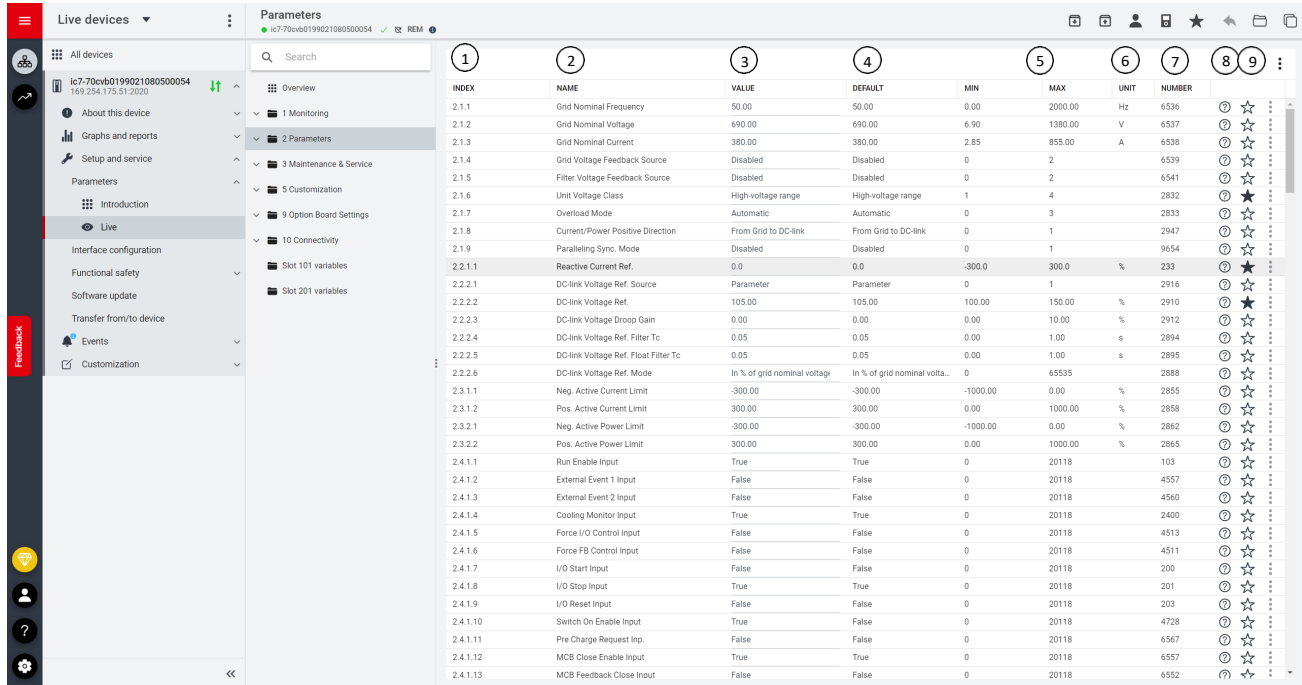


Figure 34: Parameter overview in MyDrive® Insight.

| Legend | Name | Description |
|--------|------------------|---|
| 1 | Index | Based on the parameter group structure, the index defines the location of the parameter. The index is not used as a unique identifier of a parameter. |
| 2 | Name | Name of the parameter. |
| 3 | Value | The current values of the parameters. The values can be edited by clicking the values in the value field. |
| 4 | Default | The factory setting (default value) of the parameter. |
| 5 | Min and Max | When applicable, the minimum and maximum values of the parameter are shown in the Min and Max fields. |
| 6 | Unit | When applicable, the unit of the parameter is shown in the Unit field. |
| 7 | Number | The unique identifier for each parameter. The identifier is independent and decoupled from the parameter index values. |
| 8 | Help | Click the "?" button to see a description about the parameter. For more detailed descriptions, see chapter 7 Parameter Descriptions of this guide. |
| 9 | Favorites (star) | Clicking the Favorites icon adds the parameter to the Favorites tab. |

3.3.3 PC Control to Operate the Converter Using MyDrive® Insight

To operate the converter using PC control, click the Control Panel button in MyDrive® Insight. The following illustration shows the different screens to operate the converter via MyDrive® Insight.

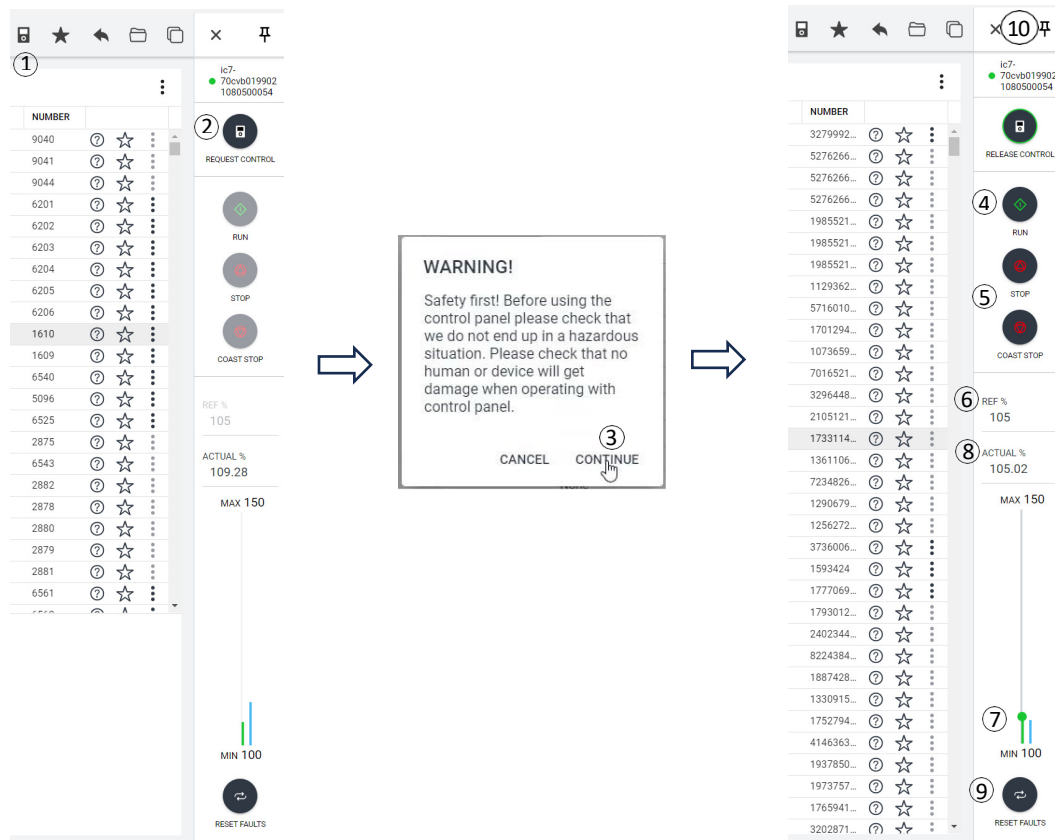


Figure 35: Operating the converter with MyDrive® Insight.

To access PC Control in MyDrive® Insight and operate the converter, perform the following:

1. Activate the PC Control window by pressing the icon in the task bar (1).
2. Click the REQUEST CONTROL button (2).
3. Click Continue (3) to confirm secure operational conditions while controlling the converter using MyDrive® Insight.
4. Use the RUN button (4) to request a converter start. Use the STOP or COAST STOP buttons (5) to request the converter to stop. Note! If COAST STOP is performed, PC Control must be released or the main circuit breaker must be opened in order to restart the converter in PC Control.
5. Use the REF field (6) or the reference slider (7) to adjust the DC-Link Voltage reference. The actual value of the DC-Link Voltage can be monitored from the ACTUAL field (8) or from the blue indicator bar next to the reference slider.
6. To perform a fault reset, click RESET FAULTS (9).
7. For ease of access, click the Pin button (10) to make the control panel be constantly visible on the screen.

3.3.4 Datalogger

The datalogger in MyDrive® Insight enables the monitoring of signals and related information for the selected signals. To access the Datalogger feature, select the converter (1), then go to Graphs and Reports (2) → Datalogger (3).

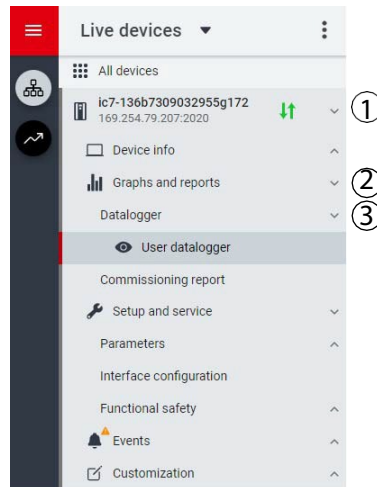


Figure 36: Navigation to the Datalogger in MyDrive® Insight.

The following figure shows the Datalogger main controls.

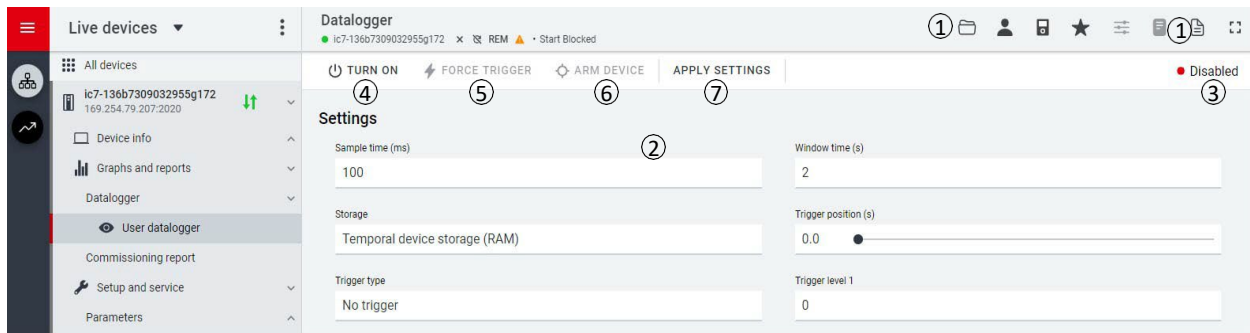


Figure 37: Datalogger screen in MyDrive® Insight.

| Legend | Description |
|--------|---|
| 1 | Opens the window to select available Datalogger files for viewing. |
| 2 | Shows the list of Datalogger settings. |
| 3 | Shows the Datalogger status. |
| 4 | Enables or disables Datalogger. When disabled, all Datalogger configuration settings are inactive. When enabled, Datalogger is active and operates based on the configuration settings. |
| 5 | Activates the force trigger. The 0 – 1 transition (rising edge) triggers Datalogger manually. This function is typically used with automatic triggers. |
| 6 | Arms Datalogger. The 0 – 1 transition (rising edge) readies Datalogger for triggering. |
| 7 | Applies any changed settings. |

3.3.4.1 Configuring Datalogger

To configure the datalogger, the following are the 2 main steps:

- Configure the signals to be recorded using the datalogger.
- Configure the datalogger settings.

Procedure:

1. Open Datalogger.

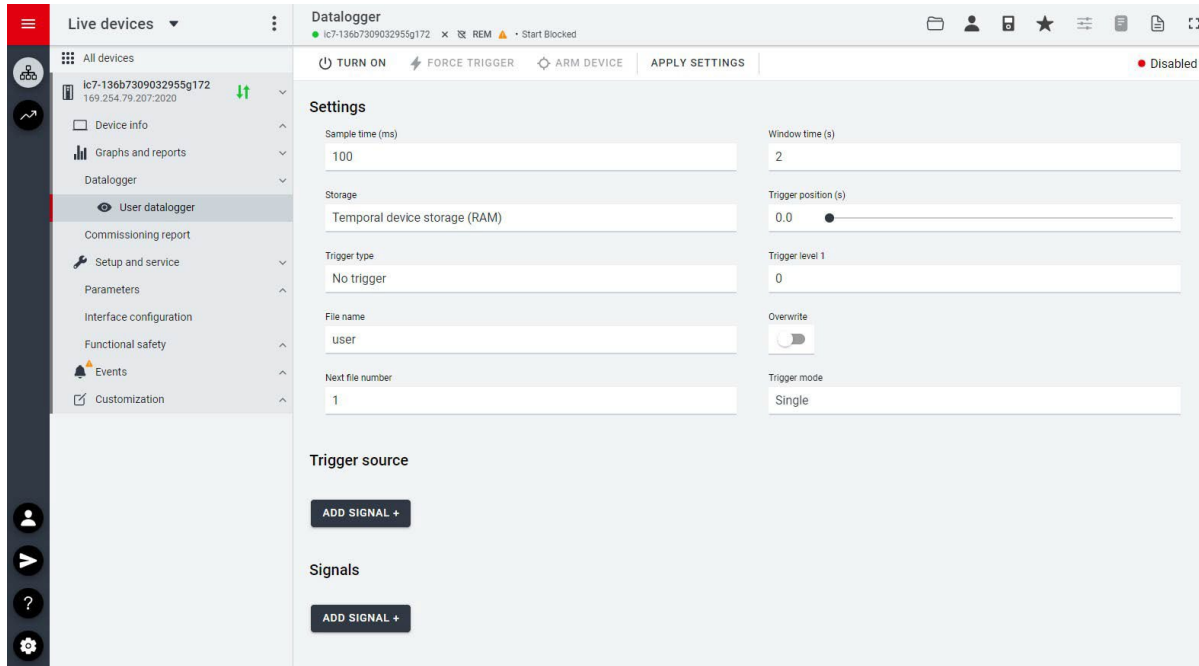
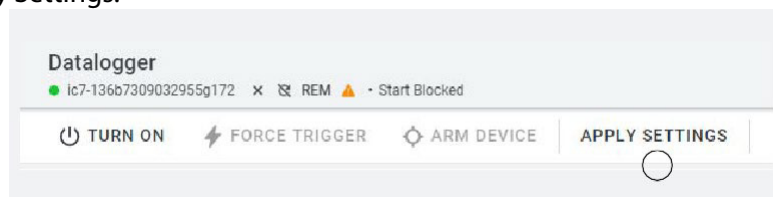


Figure 38: Datalogger settings.

| Field name | Field Description |
|----------------------|---|
| Sample time (ms) | Enter a sample time in ms. The actual sample time depends on the switching frequency. Fast sample rate settings result in data changing slowly in the resulting log. |
| Window time (s) | Defines the size of the capture window. Enter the window time in seconds. High sample rates and large capture times that result in large capture files may be rejected when the configuration is applied. |
| Storage | Select the location to which datalogger files are stored. Available selections are: <ul style="list-style-type: none"> • RAM: Settings are stored to the RAM of the converter. • Flash: Settings are stored to the flash of the converter. • SD card: Data is stored on the (optional) microSD card. The microSD cards supported are SD, SDHC, or SDXC which must be formatted for the FAT32 file system. SDHC is the recommended type, as they are delivered preformatted to FAT32. |
| Trigger position (s) | Adjust the slider to position the trigger. Setting the trigger position to 0 indicates the datalogger recording starts at the time of the trigger. Setting a negative value indicates that the datalogger recording starts after the trigger has occurred. Setting a positive value indicates that the datalogger recording starts before the trigger has occurred. |

| Field name | Field Description |
|------------------|---|
| Trigger type | <p>Following are the trigger types:</p> <ul style="list-style-type: none"> • No trigger (manual trigger only) • Equal triggers when the value of the trigger source variable is equal to trigger level 1. • Not equal triggers when the value of the trigger source variable is not equal to trigger level 1. • Greater than triggers when the value of the trigger source variable is greater than trigger level 1. • Greater than or equal to triggers when the value of the trigger source variable is greater than or equal to trigger level 1. • Less than triggers when the value of the trigger source variable is less than trigger level 1. • Less than or equal to triggers when the value of the trigger source variable is less than or equal to trigger level 1. • Rising edge triggers when the value of the trigger source variable rises above trigger level 1. If the trigger source is already above trigger level 1, the trigger must first drop below the trigger level. • Falling edge triggers when the value of the trigger source variable falls below trigger level 1. If the trigger source is already below trigger level 1, the trigger must first rise above the trigger level. |
| Trigger level 1 | Defines the trigger level associated with the defined trigger type. This level is used for all single-level trigger types. The entry in the field defines the lower trigger level for window trigger types, such as bounds and out of bounds. |
| File name | Name of the file for datalogger recording. |
| Overwrite | <p>Click the toggle button to turn the overwrite function on or off.</p> <ul style="list-style-type: none"> • On: Overwrite is enabled. A file number is not appended to the data log file. The datalogger overwrites a previous datalog file. • Off: Overwrite is disabled. A file number is appended to the log file. For each datalog, the datalog file is incremented and the previous datalog file is not overwritten. |
| Next file number | The number entered in this field is appended to the initial datalog file. Entry in the field is useful when data-logs are previously available in the converter. The number is auto incremented with each datalog recording when the entry in Next file number is enabled. |
| Trigger mode | <p>Select 1 of the following trigger modes.</p> <ul style="list-style-type: none"> • Single trigger mode: After a datalog recording, the datalogger must be rearmed before another trigger is allowed. • Auto trigger mode: After a datalog recording, the datalogger automatically rearms and starts to accept triggers. |
| Trigger source | Click the Add signal button under the Trigger source heading. A Trigger source field appears. Click on the Trigger source field to select the signal source which is used for triggering the datalogger recording. The trigger source list opens in a new window: |
| Signals | <p>Click the Add signal button under the Signals heading. A Signal field appears. Click on the Signal field to select the signals that are logged. The signal list opens in a new window.</p> <p>Add more signals as necessary by clicking the <i>Add signal</i> button again.</p> |

2. Click Apply Settings.



After the signal selection and the datalogger settings, the datalogger is ready to record the logs. To view a recorded datalog file, click either one of the icons shown in the figure. The file can be selected from the Captures tab or from the selected file system.

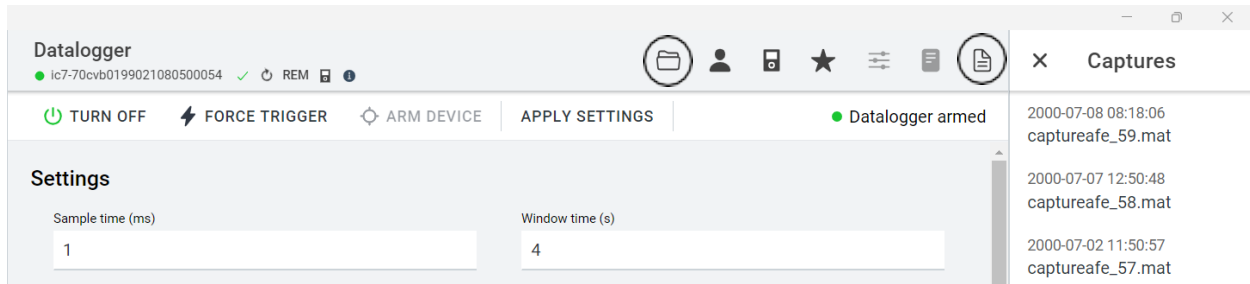


Figure 39: Datalogger log file viewing possibilities.

3.3.5 Backup and Restore

The Backup feature in MyDrive® Insight allows the operator to store the parameter settings of the converter into a new or existing project file, RAM, or Flash memory of the converter, or to an optional microSD card.

To use the microSD card as a storage device, the microSD card must be inserted in the slot on the interface module located behind the control panel, as shown in the following image.

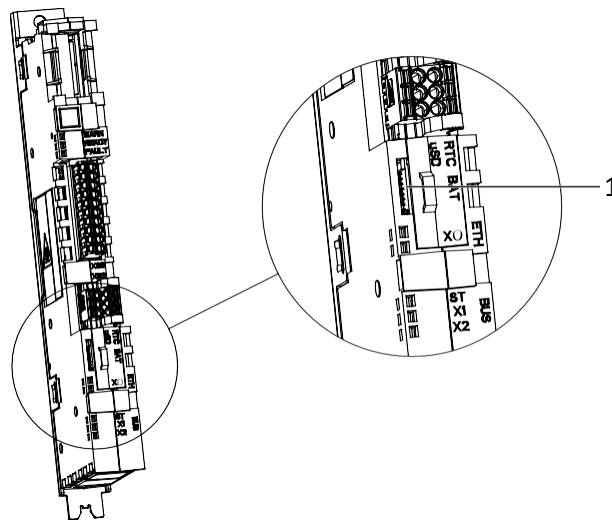


Figure 40: microSD card slot.

| Legend | Description |
|--------|-----------------------|
| 1 | The microSD card slot |

Following are the types of microSD card supported by the interface module, which must be formatted for the file system FAT32.

- Secure Digital (SD) card
- Secure Digital High Capacity (SDHC)
- Secure Digital Extended Capacity (SDXC)

NOTICE

It is recommended to use SDHC cards as they are delivered as preformatted to FAT32.

3.3.5.1 Backing up the Converter

Procedure

1. To back up the converter, select a converter, go to Setup & Services → Parameters → Live.
2. Click the icon as shown in the figure.

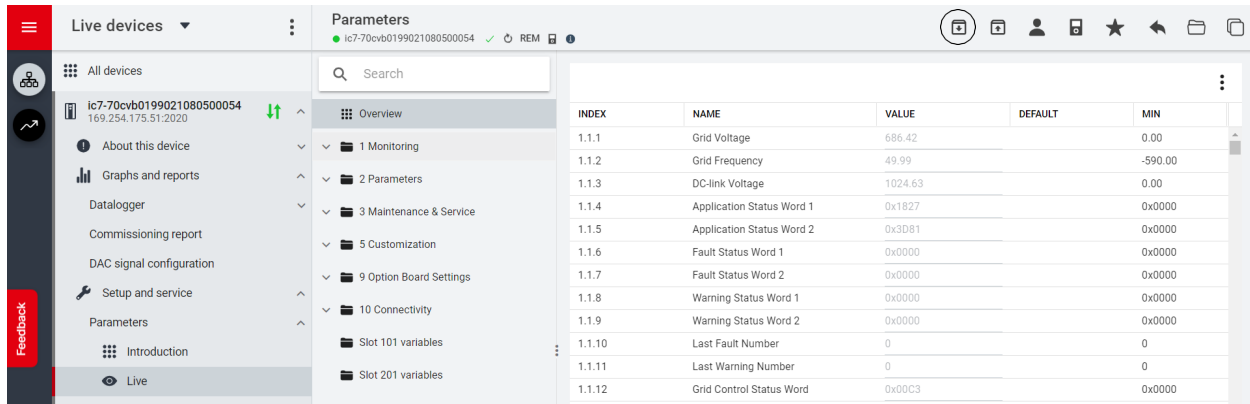


Figure 41: Backup icon.

- This opens a screen to select the backup destination. The destinations to back up are:
 - **Project:** The user can back up an existing project or a new project.
 - **Device file system:** The user can back up to 1 of the available memory devices of the drive.

3. Click Next.
4. If Project was selected, give the backup file a name and description.
If Device file system was selected, select where to save the backup. The selections are flash, RAM, or an (optional) microSD card. It is possible to specify a name for the backup file as well.
5. Click Backup to begin backup.

- Once backup is completed, a notification screen about it appears. If a project file was created, the backup is shown in the device menu under Parameters.

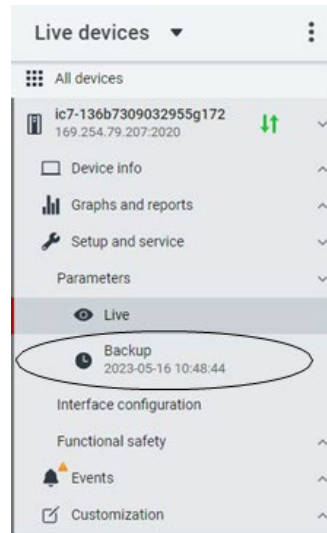


Figure 42: Backup file.

3.3.5.2 Restoring the data into the Converter

Procedure

1. To restore data to the converter, select a converter, go to Setup & Service → Parameters → Live.
2. Click the icon as shown in the following figure.

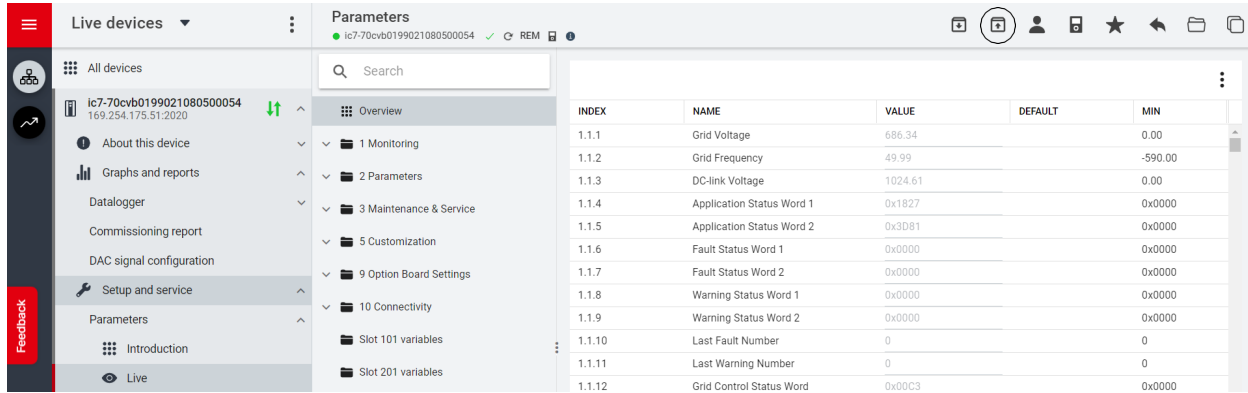


Figure 43: Restore data icon.

3. Select the source of the data which must be restored to the converter.

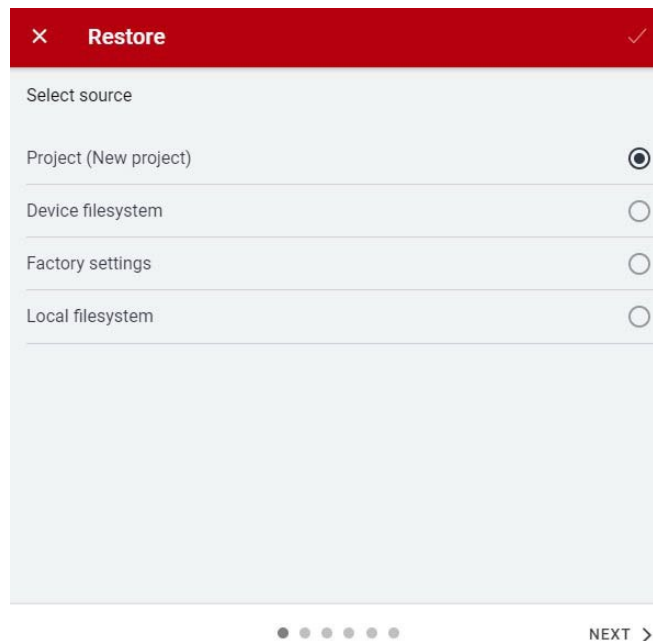


Figure 44: Source of data to be restored.

4. Click Next to select the backup source device and view the available backup files.
5. If Project is the restore source, select the correct backup to restore. Click Next.

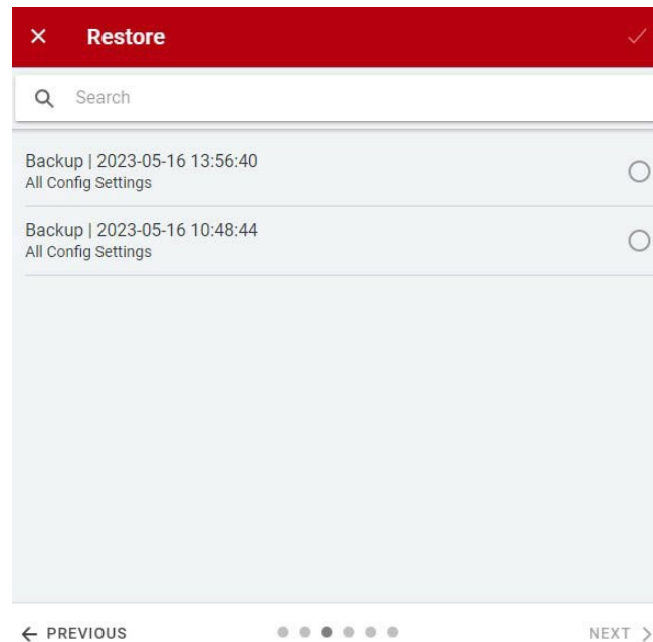


Figure 45: Backup file selection.

6. Select the files for restoring data into the converter, as shown in the following figure, and click Next.

NOTICE

It is possible to exclude Ethernet port settings when restoring data.

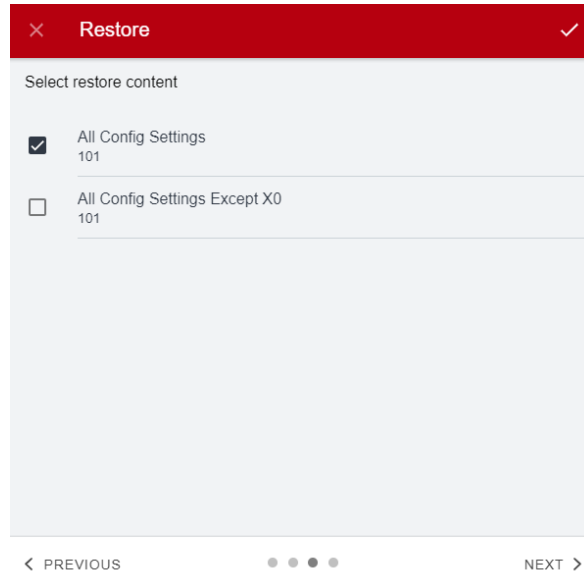


Figure 46: Restore content selection.

7. The system asks confirmation for the restore action. Click Restore.

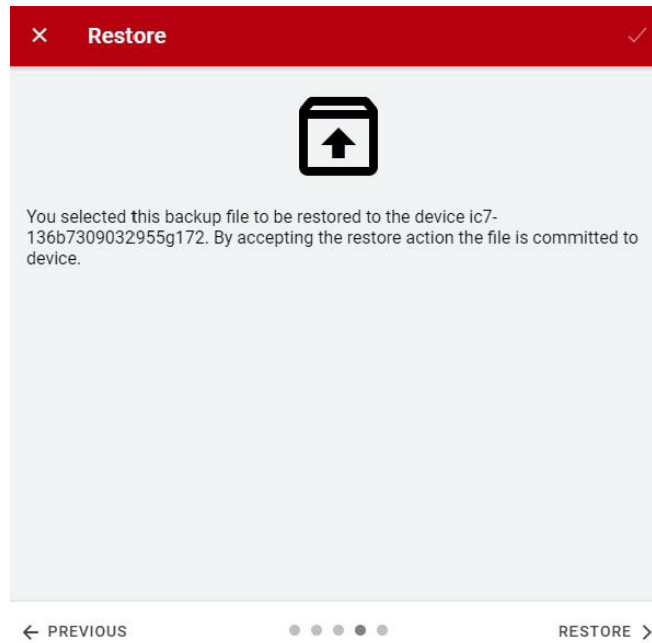


Figure 47: Restore confirmation.

On successful restore of data, a message is shown.

4 Application Software Structure and Overview

4.1 Parameter Groups, Related Content, and Settings

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 converter, within a logical structure.

- All readouts for monitoring the converter and the application behavior are in group 1 Monitoring.
- Most of the converter configuration, application-specific parameters, and the configuration of external control signals are accessed via parameter group 2 Parameters.
- Features and functions such as Maintenance & Service, Functional Safety, and Customization are in parameter groups 3, 4, and 5.
- The hardware setup for I/O interface, Options, and communication interfaces is done in parameter groups 9 and 10.
- The features and related parameters are grouped in individual parameter groups. Each feature has a parameter group of its own.
- The visibility of some parameters and parameter groups depend on the converter hardware used.
- The following table provides information about the parameter groups.

| Index | Parameter group name | Description |
|-------|-----------------------|--|
| 1 | Monitoring | Contains readout values for monitoring converter and application functions. |
| 2 | Parameters | Contains parameters for configuring most of the converter's functions. |
| 3 | Maintenance & Service | Contains parameters exclusively related to software information, events, counters, and backup and restore. |
| 4 | Functional Safety | Contains parameters for configuring Safe Torque Off, as well as other safety features. <i>Note that this menu appears only if applicable to the system.</i> |
| 5 | Customization | Contains parameters to customize and adapt the behavior of the converter and user interface design. |
| 9 | Option Board Settings | Contains hardware-related parameters to configure option board related settings. |
| 10 | Connectivity | Parameters to configure the inbuilt and optional communication of the converter system. |

Application Guide

| Parameter Group 1 st level | Parameter Group 2 nd level | Parameter Group 1 st level | Parameter Group 2 nd level | Parameter Group 1 st level | Parameter Group 2 nd level |
|--|---|--|--|---|--|
| 1. Monitoring | 1.1 Basic Monitoring | 2. Parameters | 2.1 Basic Parameters | 3. Maintenance & Service | 3.1 Software Information |
| | 1.2 Control Mode and Reference Monitoring | | 2.2 Control Mode and References | | 3.2 Events |
| | 1.3 Limit Monitoring | | 2.3 Limits | | 3.3 Operational Counters |
| | 1.4 Start and Stop Monitoring | | 2.4 Digital and Analog Inputs | | 3.4 Backup and Restore |
| | 1.5 Control Place Monitoring | | 2.5 Digital and Analog Outputs | 4 Functional Safety <i>(not applicable to AFE)</i> | |
| | 1.6 Converter Output Monitoring | | 2.6 Start and Stop Settings | 5 Customization | 5.1 Control Panel |
| | 1.7 Grid Monitoring | | 2.7 Control Places | 9. Option Board Settings | *System Specific Menu Content |
| | 1.8 DC-Link Monitoring | | 2.8 Converter Control | 10. Connectivity | Integrated Communication |
| | 1.9 Converter Control Monitoring | | 2.9 Protections and Responses | | |
| | 1.10 Protection Monitoring | | | | |
| | 1.11 Power Unit Monitoring | | | | |
| | 1.12 Cooling Fan Monitoring | | | | |
| | 1.13 Fieldbus Process Data Monitoring | | | | |
| | * System specific option board monitoring | | | | |

5 Configuration Examples

5.1 Introduction and Prerequisites

This section covers the basic configuration steps of an Active Front End converter. The specific application can require more steps such as protection settings. Use the following topics as reference during the converter configuration/commissioning process:

- For control panel related configurations, see 3.2.3 Control Panel Basic Configurations.
- For information on using MyDrive® Insight, see 3.3.1 Getting Started with MyDrive® Insight.
- For detailed information about the parameters, see 6 Parameter Lists and 7 Parameter Descriptions.

The following examples assume that the control unit and pre-charging circuits are powered externally, the converter is controlled through the I/O interface with an OC7C1 I/O and Relay option, in control of pre-charging, and the following wiring configuration is used.

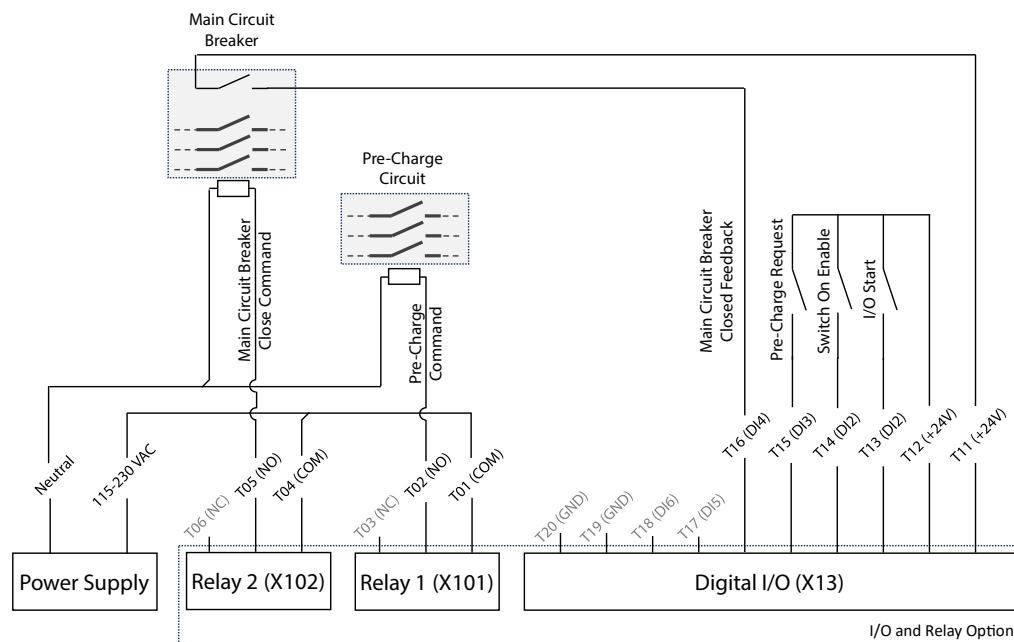


Figure 48: I/O Signal wiring diagram for the example configuration.

Prerequisite:

NOTICE

Ensure that the converter is mounted safely as described in the relevant Operating Guide.

NOTICE

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 Basic I/O is named Basic I/O T13 in the selection list.

5.2 Basic Setup of the Converter

The basic setup of the converter consists of the following configuration steps.

1. Configuring the power unit settings.

2. Configuring the grid nominal settings.
3. Configuring the I/O control place and its command inputs.
4. Configuring readouts in the control panel.

Procedure:

1. Configure the power unit settings using the following parameters.

| Index | Parameter Name | Example Setting | Parameter Number |
|---|------------------------|---------------------------------|------------------|
| 2.1.12 | Unit Voltage Class* | High Voltage Range | 2832 |
| 2.1.13 | Overload Mode | Automatic | 2833 |
| 2.6.1.3 | Switch On Enable Input | I/O and Relay T14 Digital Input | 4728 |
| <p>*Note: The recommended voltage values for the selections depend on the converter type, size, and other such considerations. For example, for T7 units (525–690 V AC):</p> <ul style="list-style-type: none"> • Low Voltage Range: 525–550 V • Medium Voltage Range: 550–600 V • High Voltage Range: 600–690 V • Wide Voltage Range: 525-690 V | | | |

2. Configure the grid nominal values.

| Index | Parameter Name | Example Setting | Parameter Number |
|-------|------------------------|-----------------|------------------|
| 2.1.1 | Grid Nominal Frequency | 50 Hz | 6536 |
| 2.1.2 | Grid Nominal Voltage | 690 V | 6537 |
| 2.1.3 | Grid Nominal Current | 416 A | 6538 |

3. Configure the control place and command inputs.

| Index | Parameter Name | Example Setting | Parameter Number |
|---------|-------------------------|---------------------------------|------------------|
| 2.7.1.1 | Control Place Selection | I/O Control | 114 |
| 2.7.3.1 | I/O Start Input | I/O and Relay T13 Digital Input | 200 |
| 2.7.3.4 | I/O Start Mode | State High Start | 213 |

4. Configure the readouts in the control panel. See 3.2.3.3 Changing the Content of the Readout Screens.

5.3 Setup of Pre-Charge and Main Circuit Breaker Control

Pre-charging of the DC-link capacitors is required before switching on main power to avoid a high inrush current. The pre-charging function of the converter requires auxiliary voltage for the control unit and the pre-charging circuit, and it must use the digital I/Os and relays of an I/O option. Once pre-charging is done, the converter can close the main circuit breaker and power up the power unit.

The following steps must be taken to configure the control of both the pre-charging circuitry and the main circuit breaker.

1. Configure the pre-charge settings.
2. Configure the main circuit breaker settings.

Procedure:

1. Configure the pre-charge settings. *TODO

| Index | Parameter Name | Example Setting | Parameter Number |
|---------|---------------------------|---------------------------------|------------------|
| 2.6.3.1 | Pre-Charge Request Output | I/O and Relay T02 Relay Output | 6563 |
| 2.6.3.2 | Pre-Charge Ready Level | 80.0% | 6566 |
| 2.6.3.3 | Pre-Charge Request Inp. | I/O and Relay T15 Digital Input | 6567 |

2. Configure the main circuit breaker settings.

| Index | Parameter Name | Example Setting | Parameter Number |
|---------|--------------------------|---------------------------------|------------------|
| 2.6.4.1 | MCB Close Output | I/O and Relay T05 Relay Output | 6551 |
| 2.6.4.2 | MCB Feedback Close Input | I/O and Relay T16 Digital Input | 6552 |
| 2.6.4.9 | MCB Closing Mode | DC-link Pre-Charge Ready | 6559 |

5.4 Setup of DC-link Voltage Control

DC-link voltage control is used for bi-directional power transfer and stable DC-link voltage regulation. Control can also limit regenerative power towards the grid, for example in ship grids when required local loads are not available. The following steps can be taken to configure these functionalities.

1. Set a DC-link voltage reference.
2. Set a reactive current reference (if needed).

Procedure:

1. Set a DC-link voltage reference

| Index | Parameter Name | Example Setting | Parameter Number |
|---------|-----------------------------|-----------------|------------------|
| 2.2.2.1 | DC-link Voltage Ref. Source | Parameter | 2916 |
| 2.2.2.2 | DC-link Voltage Ref. | 105.0% | 2910 |

2. Set a reactive current reference (if needed)

| Index | Parameter Name | Example Setting | Parameter Number |
|---------|-----------------------|-----------------|------------------|
| 2.2.1.1 | Reactive Current Ref. | 0.0% | 233 |



6 Parameter Lists

6.1 How to Read Parameter Lists

The following chapters contain tables presenting the basic attributes of each parameter available in the application software. Each chapter represents a single subgroup within the menu structure.

The tables have the following format:

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|-----------|----------------------|------|----------------------|---------------------|---------|------|------|---------------|-----------|
| 1.2.3.4.5 | Parameter Name | 1234 | -10.0 ^[1] | 10.0 ^[1] | 0.0 | Hz | 0.01 | Config | REAL |
| 6.7.8 | Array Parameter Name | 5678 | 0 | 5 | [1,2] | | 1 | Config | UINT |

[1]: Value depends on the power unit specification.

- Index: shows the location of the parameter within the menu structure.
- Name: shows the parameter name.
- Num: shows the parameter number.
- Min: shows the minimum value that the parameter can have. For arrays, the single given value applies to all array elements.
- Max: shows the maximum value that the parameter can have. For arrays, the single given value applies to all array elements.
- Default: shows the value that the parameter has with factory default settings. For arrays, each element value is shown comma-separated within square brackets.
- Unit: shows the unit symbol of the parameter. Nothing is shown if the parameter is unitless.
- Reso: shows the resolution or display/edit precision of the parameter.
- Handling Type: shows whether the converter handles the parameter as a constantly changing *process* value or an infrequently changed *config(uration)* value. Use this field as a guide for evaluating how often to write to parameters when creating custom fieldbus configurations.
- Data type: shows the IEC 61131 elementary data type of the parameter.
- Possible references within any field take note of special conditions that are explained after the table.

6.1.1 Understanding Data Types

The following is an overview of the data types used in the iC7 application software. They are IEC 61131 elementary 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 up to 2,147,483,647 |
| USINT | Unsigned short integer | 8 | 0 up to 255 |
| UINT | Unsigned integer | 16 | 0 up to 65,535 |

| Data type | Description | Size (Bits) | Range |
|---------------|---------------------------|-------------|--|
| UDINT | Unsigned double integer | 32 | 0 up to 4,294,967,295 |
| REAL | Real numbers | 32 | -3.402823466 E+38 (approximately 7 digits) up to -1.175494351E-38 (approximately 7 digits) and +1.175494351 E-38 (approximately 7 digits) up to +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 - 18446744073709551615 |
| DATE_AND_TIME | Date and time information | 64 | N/A |

6.2 Monitoring

6.2.1 Basic Monitoring

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|--------|--------------------------------|------|----------|---------|---------|------|------|---------------|-----------|
| 1.1.1 | Grid Voltage | 9040 | 0.0 | 3.4e+38 | 0.0 | V | 0.01 | Process | REAL |
| 1.1.2 | Grid Frequency | 9041 | -3.4e+38 | 3.4e+38 | 0.0 | Hz | 0.01 | Process | REAL |
| 1.1.3 | DC-link Voltage | 9044 | 0.0 | 3.4e+38 | 0.0 | V | 0.01 | Process | REAL |
| 1.1.4 | Application Status Word 1 | 6201 | 0x0 | 0xffff | 0x0 | | 1 | Process | WORD |
| 1.1.5 | Application Status Word 2 | 6202 | 0x0 | 0xffff | 0x0 | | 1 | Process | WORD |
| 1.1.6 | Fault Status Word 1 | 6203 | 0x0 | 0xffff | 0x0 | | 1 | Process | WORD |
| 1.1.7 | Fault Status Word 2 | 6204 | 0x0 | 0xffff | 0x0 | | 1 | Process | WORD |
| 1.1.8 | Warning Status Word 1 | 6205 | 0x0 | 0xffff | 0x0 | | 1 | Process | WORD |
| 1.1.9 | Warning Status Word 2 | 6206 | 0x0 | 0xffff | 0x0 | | 1 | Process | WORD |
| 1.1.10 | Last Fault Number | 1610 | 0 | 65535 | 0 | | 1 | Process | UINT |
| 1.1.11 | Last Warning Number | 1609 | 0 | 65535 | 0 | | 1 | Process | UINT |
| 1.1.12 | Grid Control Status Word | 6540 | 0x0 | 0xffff | 0x0 | | 1 | Process | WORD |
| 1.1.13 | Grid Control Ready Status Word | 5096 | 0x0 | 0xffff | 0x0 | | 1 | Process | WORD |
| 1.1.14 | Application Ready Status Word | 6525 | 0x0 | 0xffff | 0x0 | | 1 | Process | WORD |

6.2.2 Control Mode and Reference Monitoring

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|-------|-------------------------------|------|----------|---------|---------|------|------|---------------|-----------|
| 1.2.1 | Reactive Current Ref. | 2875 | -3.4e+38 | 3.4e+38 | 0.0 | % | 0.1 | Process | REAL |
| 1.2.2 | DC-link Voltage Ref. % Actual | 6543 | 0.0 | 1000.0 | 105.0 | % | 0.01 | Process | REAL |

6.2.3 Limit Monitoring

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|-------|-----------------------------------|------|---------|--------|---------|------|------|---------------|-----------|
| 1.3.1 | Current Limit (Actl.) | 2882 | 0.0 | 1000.0 | 300.0 | % | 0.1 | Process | REAL |
| 1.3.2 | Neg. Active Current Limit (Actl.) | 2878 | -1000.0 | 0.0 | -300.0 | % | 0.1 | Process | REAL |
| 1.3.3 | Pos. Active Current Limit (Actl.) | 2880 | 0.0 | 1000.0 | 300.0 | % | 0.1 | Process | REAL |
| 1.3.4 | Neg. Active Power Limit (Actl.) | 2879 | -1000.0 | 0.0 | -300.0 | % | 0.1 | Process | REAL |
| 1.3.5 | Pos. Active Power Limit (Actl.) | 2881 | 0.0 | 1000.0 | 300.0 | % | 0.1 | Process | REAL |

6.2.4 Start and Stop Monitoring

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|-------|-------------------|------|-----|-----|---------|------|------|---------------|-----------|
| 1.4.1 | Pre-Charge Active | 6561 | 0 | 1 | 0 | | 1 | Process | INT |
| 1.4.2 | Pre-Charge Ready | 6562 | 0 | 1 | 0 | | 1 | Process | INT |
| 1.4.3 | MCB Close Active | 171 | 0 | 1 | 0 | | 1 | Process | INT |
| 1.4.4 | MCB Feedback | 172 | 0 | 1 | 0 | | 1 | Process | INT |

6.2.5 Control Place Monitoring

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|-------|---------------------------------|-----|-----|-----|---------|------|------|---------------|-----------|
| 1.5.1 | Active Control Place | 113 | 0 | 3 | 0 | | 1 | Process | UINT |
| 1.5.2 | FB Forcing Requested | 116 | 0 | 1 | 0 | | 1 | Process | BOOL |
| 1.5.3 | I/O Forcing Requested | 117 | 0 | 1 | 0 | | 1 | Process | BOOL |
| 1.5.4 | Local Control Forcing Requested | 124 | 0 | 1 | 0 | | 1 | Process | BOOL |

6.2.6 Converter Output Monitoring

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|-------|----------------------------|------|-----|---------|---------|------|------|---------------|-----------|
| 1.6.1 | Converter Output Current | 9000 | 0.0 | 3.4e+38 | 0.0 | A | 0.01 | Process | REAL |
| 1.6.2 | Converter Output Current % | 9001 | 0.0 | 200.0 | 0.0 | % | 0.01 | Process | REAL |
| 1.6.3 | Converter Output Voltage | 9005 | 0.0 | 3.4e+38 | 0.0 | V | 0.01 | Process | REAL |

6.2.7 Grid Monitoring

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|-------|------------------------|------|----------|---------|---------|------|------|---------------|-----------|
| 1.7.1 | Grid Frequency | 9041 | -3.4e+38 | 3.4e+38 | 0.0 | Hz | 0.01 | Process | REAL |
| 1.7.2 | Grid Voltage | 9040 | 0.0 | 3.4e+38 | 0.0 | V | 0.01 | Process | REAL |
| 1.7.3 | Grid Voltage Imbalance | 9047 | 0.0 | 100.0 | 0.0 | % | 0.1 | Process | REAL |
| 1.7.4 | Grid Current | 9060 | 0.0 | 3.4e+38 | 0.0 | A | 0.1 | Process | REAL |

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|--------|-------------------------|------|----------|---------|---------|------|------|---------------|-----------|
| 1.7.5 | Grid Current % | 9061 | -1000.0 | 1000.0 | 0.0 | % | 0.1 | Process | REAL |
| 1.7.6 | Grid Active Current % | 9062 | -1000.0 | 1000.0 | 0.0 | % | 0.01 | Process | REAL |
| 1.7.7 | Grid Reactive Current % | 9063 | -300.0 | 300.0 | 0.0 | % | 0.1 | Process | REAL |
| 1.7.8 | Grid Active Power | 9064 | -3.4e+38 | 3.4e+38 | 0.0 | kW | 0.01 | Process | REAL |
| 1.7.9 | Grid Active Power % | 9065 | -1000.0 | 1000.0 | 0.0 | % | 0.1 | Process | REAL |
| 1.7.10 | Grid Reactive Power % | 9052 | -1000.0 | 1000.0 | 0.0 | % | 0.1 | Process | REAL |

6.2.8 DC-Link Monitoring

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|-------|-------------------|------|-----|---------|---------|------|------|---------------|-----------|
| 1.8.1 | DC-link Voltage | 9044 | 0.0 | 3.4e+38 | 0.0 | V | 0.01 | Process | REAL |
| 1.8.2 | DC-link Voltage % | 6542 | 0.0 | 5000.0 | 0.0 | % | 0.01 | Process | REAL |

6.2.9 Converter Control Monitoring

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|-------|----------------------------|------|-------|---------|---------|------|------|---------------|-----------|
| 1.9.1 | Actual Switching Frequency | 2923 | 0.0 | 16000.0 | 0.0 | Hz | 0.01 | Process | REAL |
| 1.9.2 | Modulation Index | 5101 | 0.0 | 2.0 | 0.0 | | 0.01 | Process | REAL |
| 1.9.3 | Control Unit Temperature | 2952 | -50.0 | 200.0 | 0.0 | °C | 0.01 | Process | REAL |

6.2.10 Protection Monitoring

6.2.10.1 Measured Temp. Protection Status

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|-----------|---------------------|------|--------|-------|---------|------|------|---------------|-----------|
| 1.10.1.1 | Protection 1 Temp. | 5200 | -300.0 | 300.0 | 0.0 | °C | 0.01 | Process | REAL |
| 1.10.1.2 | Protection 2 Temp. | 5201 | -300.0 | 300.0 | 0.0 | °C | 0.01 | Process | REAL |
| 1.10.1.3 | Protection 3 Temp. | 5202 | -300.0 | 300.0 | 0.0 | °C | 0.01 | Process | REAL |
| 1.10.1.4 | Protection 4 Temp. | 5203 | -300.0 | 300.0 | 0.0 | °C | 0.01 | Process | REAL |
| 1.10.1.5 | Protection 5 Temp. | 5204 | -300.0 | 300.0 | 0.0 | °C | 0.01 | Process | REAL |
| 1.10.1.6 | Protection 6 Temp. | 5205 | -300.0 | 300.0 | 0.0 | °C | 0.01 | Process | REAL |
| 1.10.1.7 | Protection 7 Temp. | 5273 | -300.0 | 300.0 | 0.0 | °C | 0.01 | Process | REAL |
| 1.10.1.8 | Protection 8 Temp. | 5274 | -300.0 | 300.0 | 0.0 | °C | 0.01 | Process | REAL |
| 1.10.1.9 | Protection 9 Temp. | 5275 | -300.0 | 300.0 | 0.0 | °C | 0.01 | Process | REAL |
| 1.10.1.10 | Protection 10 Temp. | 5276 | -300.0 | 300.0 | 0.0 | °C | 0.01 | Process | REAL |

6.2.11 Power Unit Monitoring

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|--------|----------------|------|-----|-------|---------|------|------|---------------|-----------|
| 1.11.1 | Power Capacity | 2836 | 0.0 | 100.0 | 100.0 | % | 1 | Process | REAL |

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|--------|-----------------------|------|-------|---------|---------|------|------|---------------|-----------|
| 1.11.2 | Unit Nominal Voltage | 2830 | 0.0 | 3.4e+38 | 400.0 | V | 0.01 | Config | REAL |
| 1.11.3 | Unit Nominal Current | 2831 | 0.0 | 3.4e+38 | 23.0 | A | 0.01 | Config | REAL |
| 1.11.4 | Heat Sink Temperature | 2950 | -50.0 | 200.0 | 0.0 | °C | 0.01 | Process | REAL |

6.2.12 Cooling Fan Monitoring

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|--------|--------------------|------|-----|-------|---------|------|------|---------------|-----------|
| 1.12.1 | Main Fan Speed | 2931 | 0 | 32767 | 0 | rpm | 1 | Process | INT |
| 1.12.2 | Internal Fan Speed | 2926 | 0 | 32767 | 0 | rpm | 1 | Process | INT |

6.2.13 Fieldbus Process Data Monitoring

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|--------|-------------------------|------|-------|--------|---------|------|------|---------------|-----------|
| 1.13.1 | Fieldbus Control Word | 1335 | 0x0 | 0xffff | 0x4 | | 1 | Process | WORD |
| 1.13.2 | FB Status Word | 1307 | 0x0 | 0xffff | 0x0 | | 1 | Process | WORD |
| 1.13.3 | FB DC-link Voltage Ref. | 6533 | 100.0 | 150.0 | 105.0 | % | 0.01 | Process | REAL |

6.2.14 I/O and Relay Status

This group appears only if an I/O And Relay OC7C1 option is included in the converter. This menu appears as many times as there are these options in the system. Each menu and its parameters have the suffix of their option slot.

Refer to 6.6.1.1 I/O and Relay Status for the content of this menu.

6.2.15 Temperature Measurement Status

This group appears only if a Temperature Measurement OC7T0 option is included in the converter. This menu appears as many times as there are these options in the system. Each menu and its parameters have the suffix of their option slot.

Refer to 6.6.2.1 Temperature Measurement Status for the content of this menu.

6.2.16 Voltage Measurement Status

This group appears only if a Voltage Measurement OC7V0 option is included in the converter. This menu appears as many times as there are these options in the system. Each menu and its parameters have the suffix of their option slot.

Refer to 6.6.3.1 Voltage Measurement Status for the content of this menu.

6.3 Parameters

6.3.1 Basic Parameters

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|-------|----------------------------------|------|----------|---------|---------|------|------|---------------|-----------|
| 2.1.1 | Grid Nominal Frequency | 6536 | 0.0 | 2000.0 | 50.0 | Hz | 0.01 | Config | REAL |
| 2.1.2 | Grid Nominal Voltage | 6537 | -3.4e+38 | 3.4e+38 | 690.0 | V | 0.01 | Config | REAL |
| 2.1.3 | Grid Nominal Current | 6538 | -3.4e+38 | 3.4e+38 | 416.0 | A | 0.01 | Config | REAL |
| 2.1.4 | Grid Voltage Feedback Source | 6539 | 0 | 2 | 0 | | 1 | Config | UINT |
| 2.1.5 | Filter Voltage Feedback Source | 6541 | 0 | 2 | 0 | | 1 | Config | UINT |
| 2.1.6 | Unit Voltage Class | 2832 | 1 | 4 | 1 | | 1 | Config | UINT |
| 2.1.7 | Overload Mode | 2833 | 0 | 3 | 2 | | 1 | Config | UINT |
| 2.1.8 | Current/Power Positive Direction | 2947 | 0 | 1 | 0 | | 1 | Config | UINT |
| 2.1.9 | Paralleling Sync. Mode | 9654 | 0 | 2 | 0 | | 1 | Config | UINT |

6.3.2 Control Mode and References

6.3.2.1 Grid Current Reference

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|-----------------------|-----|--------|-------|---------|------|------|---------------|-----------|
| 2.2.1.1 | Reactive Current Ref. | 233 | -300.0 | 300.0 | 0.0 | % | 0.1 | Config | REAL |

6.3.2.2 DC-link Voltage Reference

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|--------------------------------------|------|-------|-------|---------|------|------|---------------|-----------|
| 2.2.2.1 | DC-link Voltage Ref. Source | 2916 | 0 | 1 | 0 | | 1 | Config | UINT |
| 2.2.2.2 | DC-link Voltage Ref. | 2910 | 100.0 | 150.0 | 105.0 | % | 0.01 | Config | REAL |
| 2.2.2.3 | DC-link Voltage Droop Gain | 2912 | 0.0 | 100.0 | 0.0 | % | 0.01 | Config | REAL |
| 2.2.2.4 | DC-link Voltage Ref. Filter Tc | 2894 | 0.0 | 1.0 | 0.05 | s | 0.01 | Config | REAL |
| 2.2.2.5 | DC-link Voltage Ref. Float Filter Tc | 2895 | 0.0 | 1.0 | 0.05 | s | 0.01 | Config | REAL |
| 2.2.2.6 | DC-link Voltage Ref. Mode | 2888 | 0 | 65535 | 0 | | 1 | Config | UINT |

6.3.3 Limits

6.3.3.1 Grid Current Limit

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|---------------------------|------|---------|--------|---------|------|------|---------------|-----------|
| 2.3.1.1 | Neg. Active Current Limit | 2855 | -1000.0 | 0.0 | -300.0 | % | 0.01 | Config | REAL |
| 2.3.1.2 | Pos. Active Current Limit | 2858 | 0.0 | 1000.0 | 300.0 | % | 0.01 | Config | REAL |

6.3.3.2 Grid Power Limit

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|-------------------------|------|---------|--------|---------|------|------|---------------|-----------|
| 2.3.2.1 | Neg. Active Power Limit | 2862 | -1000.0 | 0.0 | -300.0 | % | 0.01 | Config | REAL |
| 2.3.2.2 | Pos. Active Power Limit | 2865 | 0.0 | 1000.0 | 300.0 | % | 0.01 | Config | REAL |

6.3.4 Digital and Analog Inputs

6.3.4.1 Digital Inputs

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|----------|-------------------------------|------|-----|-------|---------|------|------|---------------|-----------|
| 2.4.1.1 | Run Enable Input | 103 | 0 | 29999 | 1 | | 1 | Config | UINT |
| 2.4.1.2 | External Event 1 Input | 4557 | 0 | 29999 | 0 | | 1 | Config | UINT |
| 2.4.1.3 | External Event 2 Input | 4560 | 0 | 29999 | 0 | | 1 | Config | UINT |
| 2.4.1.4 | Cooling Monitor Input | 2400 | 0 | 29999 | 1 | | 1 | Config | UINT |
| 2.4.1.5 | Force I/O Control Input | 4513 | 0 | 29999 | 0 | | 1 | Config | UINT |
| 2.4.1.6 | Force FB Control Input | 4511 | 0 | 29999 | 0 | | 1 | Config | UINT |
| 2.4.1.7 | I/O Start Input | 200 | 0 | 29999 | 0 | | 1 | Config | UINT |
| 2.4.1.8 | I/O Stop Input | 201 | 0 | 29999 | 1 | | 1 | Config | UINT |
| 2.4.1.9 | I/O Reset Input | 203 | 0 | 29999 | 0 | | 1 | Config | UINT |
| 2.4.1.10 | Switch On Enable Input | 4728 | 0 | 29999 | 10114 | | 1 | Config | UINT |
| 2.4.1.11 | Pre Charge Request Inp. | 6567 | 0 | 29999 | 10115 | | 1 | Config | UINT |
| 2.4.1.12 | MCB Close Enable Input | 6557 | 0 | 29999 | 1 | | 1 | Config | UINT |
| 2.4.1.13 | MCB Feedback Close Input | 6552 | 0 | 29999 | 10116 | | 1 | Config | UINT |
| 2.4.1.14 | MCB Feedback Open Input | 6553 | 0 | 29999 | 0 | | 1 | Config | UINT |
| 2.4.1.15 | MCB Tripped Input | 6554 | 0 | 29999 | 0 | | 1 | Config | UINT |
| 2.4.1.16 | Quick Stop Input | 212 | 0 | 29999 | 1 | | 1 | Config | UINT |
| 2.4.1.17 | Quick Stop Input 2 | 5104 | 0 | 29999 | 1 | | 1 | Config | UINT |
| 2.4.1.18 | Input Section Overtemp. Input | 5310 | 0 | 29999 | 1 | | 1 | Config | UINT |

6.3.5 Digital and Analog Outputs

6.3.5.1 Digital Outputs

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|-------------------------|------|-----|-------|---------|------|------|---------------|-----------|
| 2.5.1.1 | Ready Output | 205 | 0 | 65535 | 0 | | 1 | Config | UINT |
| 2.5.1.2 | Run Output | 206 | 0 | 65535 | 0 | | 1 | Config | UINT |
| 2.5.1.3 | Static Fault Output | 208 | 0 | 65535 | 0 | | 1 | Config | UINT |
| 2.5.1.4 | Static Warning Output | 209 | 0 | 65535 | 0 | | 1 | Config | UINT |
| 2.5.1.5 | Toggling Fault Output | 5180 | 0 | 65535 | 0 | | 1 | Config | UINT |
| 2.5.1.6 | Toggling Warning Output | 5181 | 0 | 65535 | 0 | | 1 | Config | UINT |
| 2.5.1.7 | FB CTW Bit 12 Output | 5193 | 0 | 29999 | 0 | | 1 | Config | UINT |

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|----------|--|------|-----|--------|---------|------|------|---------------|-----------|
| 2.5.1.8 | FB CTW Bit 13 Output | 5194 | 0 | 29999 | 0 | | 1 | Config | UINT |
| 2.5.1.9 | FB CTW Bit 14 Output | 5198 | 0 | 29999 | 0 | | 1 | Config | UINT |
| 2.5.1.10 | FB CTW Bit 15 Output | 5191 | 0 | 29999 | 0 | | 1 | Config | UINT |
| 2.5.1.11 | DC-link Voltage Superv. Output | 5157 | 0 | 65535 | 0 | | 1 | Config | UINT |
| 2.5.1.12 | DC-link Voltage Superv. Limit | 5158 | 0.0 | 1500.0 | 500.0 | V | 0.01 | Config | REAL |
| 2.5.1.13 | Local Control Active Output | 5178 | 0 | 65535 | 0 | | 1 | Config | UINT |
| 2.5.1.14 | I/O Control Active Output | 5177 | 0 | 65535 | 0 | | 1 | Config | UINT |
| 2.5.1.15 | Fieldbus Control Active Output | 5197 | 0 | 65535 | 0 | | 1 | Config | UINT |
| 2.5.1.16 | Active Event 1 Output | 5189 | 0 | 65535 | 0 | | 1 | Config | UINT |
| 2.5.1.17 | Event 1 Number | 5188 | 0 | 65535 | 0 | | 1 | Config | UINT |
| 2.5.1.18 | Active Event 2 Output | 5190 | 0 | 65535 | 0 | | 1 | Config | UINT |
| 2.5.1.19 | Event 2 Number | 5290 | 0 | 65535 | 0 | | 1 | Config | UINT |
| 2.5.1.20 | No Warning Output | 217 | 0 | 65535 | 0 | | 1 | Config | UINT |
| 2.5.1.21 | No Fault Output | 218 | 0 | 65535 | 0 | | 1 | Config | UINT |
| 2.5.1.22 | Local Control Forcing Requested Output | 125 | 0 | 29999 | 0 | | 1 | Config | UINT |
| 2.5.1.23 | I/O Forcing Requested Output | 121 | 0 | 65535 | 0 | | 1 | Config | UINT |
| 2.5.1.24 | FB Forcing Requested Output | 120 | 0 | 65535 | 0 | | 1 | Config | UINT |

6.3.5.2 Analog outputs

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|----------|------------------------------|------|----------|---------|---------|------|------|---------------|-----------|
| 2.5.2.1 | Output Current Output | 2453 | 0 | 65535 | 0 | | 1 | Config | UINT |
| 2.5.2.2 | Absolute Active Power Output | 2456 | 0 | 65535 | 0 | | 1 | Config | UINT |
| 2.5.2.3 | Active Power Output | 2455 | 0 | 65535 | 0 | | 1 | Config | UINT |
| 2.5.2.4 | Active Power Output Max. | 2458 | -10000.0 | 10000.0 | 3000.0 | kW | 0.01 | Config | REAL |
| 2.5.2.5 | Active Power Output Min. | 2459 | -10000.0 | 10000.0 | -3000.0 | kW | 0.01 | Config | REAL |
| 2.5.2.6 | DC-link Voltage Output | 2454 | 0 | 65535 | 0 | | 1 | Config | UINT |
| 2.5.2.7 | DC-link Voltage Output Max. | 2460 | 100.0 | 150.0 | 120.0 | % | 1 | Config | REAL |
| 2.5.2.8 | DC-link Voltage Output Min. | 2461 | 0.0 | 100.0 | 0.0 | % | 1 | Config | REAL |
| 2.5.2.9 | Main Fan Speed Output | 2462 | 0 | 65535 | 0 | | 1 | Config | UINT |
| 2.5.2.10 | Main Fan Speed Output Max. | 2463 | 0.0 | 10000.0 | 10000.0 | rpm | 1 | Config | REAL |
| 2.5.2.11 | Main Fan Speed Output Min. | 2464 | 0.0 | 10000.0 | 0.0 | rpm | 1 | Config | REAL |

6.3.6 Start and Stop Settings

6.3.6.1 Start Settings

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|------------------------|------|-----|-------|---------|------|------|---------------|-----------|
| 2.6.1.1 | Start Delay | 4718 | 0.0 | 10.0 | 0.0 | s | 0.01 | Config | REAL |
| 2.6.1.2 | Run Enable Input | 103 | 0 | 29999 | 1 | | 1 | Config | UINT |
| 2.6.1.3 | Switch On Enable Input | 4728 | 0 | 29999 | 10114 | | 1 | Config | UINT |

6.3.6.2 Quick Stop

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|---------------------|------|-----|-------|---------|------|------|---------------|-----------|
| 2.6.2.1 | Quick Stop Input | 212 | 0 | 29999 | 1 | | 1 | Config | UINT |
| 2.6.2.2 | Quick Stop Input 2 | 5104 | 0 | 29999 | 1 | | 1 | Config | UINT |
| 2.6.2.3 | Quick Stop Response | 4587 | 0 | 11 | 10 | | 1 | Config | UINT |

6.3.6.3 Pre Charge

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|---------------------------|------|------|---------|---------|------|------|---------------|-----------|
| 2.6.3.1 | Pre-Charge Request Output | 6563 | 0 | 29999 | 10102 | | 1 | Config | UINT |
| 2.6.3.2 | Pre-Charge Ready Level | 6566 | 80.0 | 120.0 | 80.0 | % | 0.01 | Config | REAL |
| 2.6.3.3 | Pre Charge Request Inp. | 6567 | 0 | 29999 | 10115 | | 1 | Config | UINT |
| 2.6.3.4 | Pre-Charge Allowed Output | 6569 | 0 | 29999 | 0 | | 1 | Config | UINT |
| 2.6.3.5 | Pre-Charge Allowed Level | 5510 | 30.0 | 3.4e+38 | 50.0 | % | 1 | Config | REAL |

6.3.6.4 Main Circuit Breaker

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|----------|--------------------------|------|-----|-------|---------|------|------|---------------|-----------|
| 2.6.4.1 | MCB Close Output | 6551 | 0 | 29999 | 10105 | | 1 | Config | UINT |
| 2.6.4.2 | MCB Feedback Close Input | 6552 | 0 | 29999 | 10116 | | 1 | Config | UINT |
| 2.6.4.3 | MCB Feedback Open Input | 6553 | 0 | 29999 | 0 | | 1 | Config | UINT |
| 2.6.4.4 | MCB Tripped Input | 6554 | 0 | 29999 | 0 | | 1 | Config | UINT |
| 2.6.4.5 | MCB Close Pulse Output | 6555 | 0 | 29999 | 0 | | 1 | Config | UINT |
| 2.6.4.6 | MCB Open Pulse Output | 6556 | 0 | 29999 | 0 | | 1 | Config | UINT |
| 2.6.4.7 | MCB Close Enable Input | 6557 | 0 | 29999 | 1 | | 1 | Config | UINT |
| 2.6.4.8 | MCB Feedback Fault Delay | 6558 | 0.0 | 5.0 | 2.0 | s | 0.01 | Config | REAL |
| 2.6.4.9 | MCB Closing Mode | 6559 | 0 | 3 | 0 | | 1 | Config | UINT |
| 2.6.4.10 | MCB Opening Mode | 6560 | 0 | 3 | 0 | | 1 | Config | UINT |

6.3.6.5 LCL-Filter Energization

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|--------------------------|------|-----|---------|---------|------|------|---------------|-----------|
| 2.6.5.1 | Filter Voltage Ramp Time | 5161 | 0.0 | 10000.0 | 0.1 | s | 0.01 | Config | REAL |

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|-------------------------------|------|-----|------|---------|------|------|---------------|-----------|
| 2.6.5.2 | Max. Filter Energization Time | 5162 | 0.1 | 50.0 | 10.0 | s | 0.1 | Config | REAL |

6.3.7 Control Places

6.3.7.1 Control Place Settings

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|---------------------------------|------|-----|-------|---------|------|------|---------------|-----------|
| 2.7.1.1 | Control Place Selection | 114 | 1 | 3 | 3 | | 1 | Config | UINT |
| 2.7.1.2 | Force FB Control Input | 4511 | 0 | 29999 | 0 | | 1 | Config | UINT |
| 2.7.1.3 | Force I/O Control Input | 4513 | 0 | 29999 | 0 | | 1 | Config | UINT |
| 2.7.1.4 | Control Place Forcing Mode | 1972 | 0 | 3 | 0 | | 1 | Config | UINT |
| 2.7.1.5 | Control Place Independent Reset | 109 | 0 | 1 | 0 | | 1 | Config | BOOL |
| 2.7.1.6 | Control Place Release Mode | 4800 | 0 | 1 | 1 | | 1 | Config | BOOL |
| 2.7.1.7 | Control Place Forcing Priority | 4732 | 1 | 3 | [1,3,2] | | 1 | Config | UINT |

6.3.7.2 Local Control

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|-------------------------------------|-----|-----|-----|---------|------|------|---------------|-----------|
| 2.7.2.1 | Local Control Mode | 107 | 0 | 2 | 0 | | 1 | Config | UINT |
| 2.7.2.2 | Continue Operation in Local Control | 108 | 0 | 1 | 0 | | 1 | Config | BOOL |

6.3.7.3 I/O Control

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|-----------------------------------|------|-----|-------|---------|------|------|---------------|-----------|
| 2.7.3.1 | I/O Start Input | 200 | 0 | 29999 | 0 | | 1 | Config | UINT |
| 2.7.3.2 | I/O Stop Input | 201 | 0 | 29999 | 1 | | 1 | Config | UINT |
| 2.7.3.3 | I/O Reset Input | 203 | 0 | 29999 | 0 | | 1 | Config | UINT |
| 2.7.3.4 | I/O Start Mode | 213 | 0 | 2 | 0 | | 1 | Config | UINT |
| 2.7.3.5 | Continue Operation in I/O Control | 5111 | 0 | 1 | 0 | | 1 | Config | BOOL |

6.3.7.4 Fieldbus Control

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|--|------|-----|-----|---------|------|------|---------------|-----------|
| 2.7.4.1 | Continue Operation in Fieldbus Control | 5112 | 0 | 1 | 0 | | 1 | Config | BOOL |
| 2.7.4.2 | Fieldbus Start Mode | 5114 | 0 | 1 | 1 | | 1 | Config | UINT |

6.3.8 Converter Control

6.3.8.1 Modulation

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|---------------------|------|----------|------------|---------|------|------|---------------|-----------|
| 2.8.1.1 | Switching Frequency | 2920 | -1.67e+8 | 16777216.0 | 1000.0 | kHz | 0.01 | Config | REAL |
| 2.8.1.2 | Modulator Options | 5093 | 0x0 | 0xffff | 0x0 | | 1 | Config | WORD |
| 2.8.1.3 | Modulator Type | 5100 | 1 | 6 | 1 | | 1 | Config | UDINT |

6.3.8.2 Advanced Grid Control

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|----------|-------------------------------|------|-------|---------|---------|------|------|---------------|-----------|
| 2.8.2.1 | Active Current Kp | 2868 | 0.0 | 1000.0 | 100.0 | % | 0.01 | Config | REAL |
| 2.8.2.2 | Active Current Ti | 2869 | 0.0 | 1000.0 | 100.0 | % | 0.01 | Config | REAL |
| 2.8.2.3 | Grid PLL Tc | 9659 | 0.01 | 1.0 | 0.1 | s | 0.01 | Config | REAL |
| 2.8.2.4 | Active Damping Kp | 2871 | 0.0 | 10000.0 | 100.0 | % | 0.01 | Config | REAL |
| 2.8.2.5 | Reactive Current Kp | 2849 | 0.001 | 1000.0 | 100.0 | % | 1 | Config | REAL |
| 2.8.2.6 | Reactive Current Ti | 2850 | 0.0 | 1000.0 | 100.0 | % | 1 | Config | REAL |
| 2.8.2.7 | Grid Control Options | 9658 | 0x0 | 0xffff | 0x0 | | 1 | Config | WORD |
| 2.8.2.8 | Paralleling Sync. Run Kp | 9655 | 0.0 | 1000.0 | 0.1 | | 0.01 | Config | REAL |
| 2.8.2.9 | Paralleling Sync. Stop Kp | 9656 | 0.0 | 1000.0 | 0.4 | | 0.01 | Config | REAL |
| 2.8.2.10 | Paralleling Sync. Shift Kp | 9657 | 0.0 | 1000.0 | 100.0 | % | 0.01 | Config | REAL |
| 2.8.2.11 | Harmonic Current Control Gain | 6519 | 0.0 | 1000.0 | 0.0 | % | 0.01 | Config | REAL |

6.3.8.3 Advanced DC-link Control

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|---------------------------|------|-----|--------|---------|------|------|---------------|-----------|
| 2.8.3.1 | DC-link Voltage Ctrl. Kp | 2902 | 0.0 | 1000.0 | 100.0 | % | 0.01 | Config | REAL |
| 2.8.3.2 | DC-link Voltage Ctrl. Ti | 2903 | 0.0 | 1000.0 | 100.0 | % | 0.01 | Config | REAL |
| 2.8.3.3 | DC-link Voltage Ctrl. Td | 2907 | 0.0 | 1000.0 | 100.0 | % | 0.01 | Config | REAL |
| 2.8.3.4 | DC-link Voltage Droop. Tc | 5095 | 0.0 | 1.0 | 0.05 | s | 0.01 | Config | REAL |

6.3.8.4 Power Unit Settings

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|--|------|------|--------|---------|------|------|---------------|-----------|
| 2.8.4.1 | Power Unit Enable Mask | 2835 | 0x0 | 0xffff | 0xffff | | 1 | Config | WORD |
| 2.8.4.2 | DC-link Voltage Measurement Corr. Gain | 6535 | -1.0 | 1.0 | 0.0 | % | 0.01 | Config | REAL |
| 2.8.4.3 | DC-link Voltage Measurement Corr. Offset | 6534 | -5.0 | 5.0 | 0.0 | V | 0.01 | Config | REAL |
| 2.8.4.4 | HF DC-link Filter Mode | 2944 | 0 | 2 | 2 | | 1 | Config | UINT |

6.3.8.5 Cooling Fan Control

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|------------------------|------|-----|-------|---------|------|------|---------------|-----------|
| 2.8.5.1 | Main Fan Minimum Speed | 2932 | 0.0 | 100.0 | 0.0 | % | 0.1 | Config | REAL |

6.3.8.6 LCL-Filter

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|---------------|------|-----|-----|-----------|------|------|---------------|-----------|
| 2.8.6.1 | LCL Filter L1 | 2904 | 0.0 | 1.0 | 0.000104 | μH | 0.01 | Config | REAL |
| 2.8.6.2 | LCL Filter Cf | 2905 | 0.0 | 1.0 | 0.0000825 | μF | 0.01 | Config | REAL |
| 2.8.6.3 | LCL Filter L2 | 2906 | 0.0 | 1.0 | 0.00004 | μH | 0.01 | Config | REAL |

6.3.9 Protections and Responses

6.3.9.1 General Settings

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|-------------------|------|-----|-----|---------|------|------|---------------|-----------|
| 2.9.1.1 | Retry after Fault | 2927 | 0 | 1 | 1 | | 1 | Config | BOOL |

6.3.9.2 Misc. Responses

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|---------------------------------|------|-----|-----|---------|------|------|---------------|-----------|
| 2.9.2.1 | DC-link Voltage Ripple Response | 2929 | 0 | 2 | 1 | | 1 | Config | UDINT |
| 2.9.2.2 | LCL Fan Fail Response | 2941 | 0 | 11 | 10 | | 1 | Config | UINT |

6.3.9.3 External Event

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|---------------------------|------|-----|-------|---------|------|------|---------------|-----------|
| 2.9.3.1 | External Event 1 Input | 4557 | 0 | 29999 | 0 | | 1 | Config | UINT |
| 2.9.3.2 | External Event 1 Response | 4559 | 0 | 11 | 10 | | 1 | Config | UINT |
| 2.9.3.3 | External Event 2 Input | 4560 | 0 | 29999 | 0 | | 1 | Config | UINT |
| 2.9.3.4 | External Event 2 Response | 4562 | 0 | 11 | 10 | | 1 | Config | UINT |

6.3.9.4 Cooling Monitor

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|-----------------------------|------|-----|-------|---------|------|------|---------------|-----------|
| 2.9.4.1 | Cooling Monitor Input | 2400 | 0 | 29999 | 1 | | 1 | Config | UINT |
| 2.9.4.2 | Cooling Monitor Fault Delay | 2401 | 0.0 | 300.0 | 10.0 | s | 0.01 | Config | REAL |
| 2.9.4.3 | Cooling Monitor Response | 2402 | 0 | 3 | 0 | | 1 | Config | UINT |

6.3.9.5 Measured Temp. Protection

6.3.9.5.1 Temp. 1 Protection

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|-----------|--------------------------|------|--------|-------|---------|------|------|---------------|-----------|
| 2.9.5.1.1 | Temp. 1 Input | 5206 | 0 | 29999 | 0 | | 1 | Config | UINT |
| 2.9.5.1.2 | Temp. 1 Limit 1 | 5207 | -300.0 | 300.0 | 120.0 | °C | 0.01 | Config | REAL |
| 2.9.5.1.3 | Temp. 1 Limit 2 | 5208 | -300.0 | 300.0 | 150.0 | °C | 0.01 | Config | REAL |
| 2.9.5.1.4 | Temp. 1 Limit 2 Response | 5209 | 3 | 11 | 11 | | 1 | Config | UINT |

6.3.9.5.2 Temp. 2 Protection

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|-----------|--------------------------|------|--------|-------|---------|------|------|---------------|-----------|
| 2.9.5.2.1 | Temp. 2 Input | 5210 | 0 | 29999 | 0 | | 1 | Config | UINT |
| 2.9.5.2.2 | Temp. 2 Limit 1 | 5211 | -300.0 | 300.0 | 120.0 | °C | 0.01 | Config | REAL |
| 2.9.5.2.3 | Temp. 2 Limit 2 | 5212 | -300.0 | 300.0 | 150.0 | °C | 0.01 | Config | REAL |
| 2.9.5.2.4 | Temp. 2 Limit 2 Response | 5213 | 3 | 11 | 11 | | 1 | Config | UINT |

6.3.9.5.3 Temp. 3 Protection

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|-----------|--------------------------|------|--------|-------|---------|------|------|---------------|-----------|
| 2.9.5.3.1 | Temp. 3 Input | 5214 | 0 | 29999 | 0 | | 1 | Config | UINT |
| 2.9.5.3.2 | Temp. 3 Limit 1 | 5215 | -300.0 | 300.0 | 120.0 | °C | 0.01 | Config | REAL |
| 2.9.5.3.3 | Temp. 3 Limit 2 | 5216 | -300.0 | 300.0 | 150.0 | °C | 0.01 | Config | REAL |
| 2.9.5.3.4 | Temp. 3 Limit 2 Response | 5217 | 3 | 11 | 11 | | 1 | Config | UINT |

6.3.9.5.4 Temp. 4 Protection

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|-----------|--------------------------|------|--------|-------|---------|------|------|---------------|-----------|
| 2.9.5.4.1 | Temp. 4 Input | 5218 | 0 | 29999 | 0 | | 1 | Config | UINT |
| 2.9.5.4.2 | Temp. 4 Limit 1 | 5219 | -300.0 | 300.0 | 120.0 | °C | 0.01 | Config | REAL |
| 2.9.5.4.3 | Temp. 4 Limit 2 | 5220 | -300.0 | 300.0 | 150.0 | °C | 0.01 | Config | REAL |
| 2.9.5.4.4 | Temp. 4 Limit 2 Response | 5221 | 3 | 11 | 11 | | 1 | Config | UINT |

6.3.9.5.5 Temp. 5 Protection

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|-----------|--------------------------|------|--------|-------|---------|------|------|---------------|-----------|
| 2.9.5.5.1 | Temp. 5 Input | 5222 | 0 | 29999 | 0 | | 1 | Config | UINT |
| 2.9.5.5.2 | Temp. 5 Limit 1 | 5223 | -300.0 | 300.0 | 120.0 | °C | 0.01 | Config | REAL |
| 2.9.5.5.3 | Temp. 5 Limit 2 | 5224 | -300.0 | 300.0 | 150.0 | °C | 0.01 | Config | REAL |
| 2.9.5.5.4 | Temp. 5 Limit 2 Response | 5225 | 3 | 11 | 11 | | 1 | Config | UINT |

6.3.9.5.6 Temp. 6 Protection

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|-----------|--------------------------|------|--------|-------|---------|------|------|---------------|-----------|
| 2.9.5.6.1 | Temp. 6 Input | 5226 | 0 | 29999 | 0 | | 1 | Config | UINT |
| 2.9.5.6.2 | Temp. 6 Limit 1 | 5227 | -300.0 | 300.0 | 120.0 | °C | 0.01 | Config | REAL |
| 2.9.5.6.3 | Temp. 6 Limit 2 | 5228 | -300.0 | 300.0 | 150.0 | °C | 0.01 | Config | REAL |
| 2.9.5.6.4 | Temp. 6 Limit 2 Response | 5229 | 3 | 11 | 11 | | 1 | Config | UINT |

6.3.9.5.7 Temp. 7 Protection

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|-----------|--------------------------|------|--------|-------|---------|------|------|---------------|-----------|
| 2.9.5.7.1 | Temp. 7 Input | 5239 | 0 | 29999 | 0 | | 1 | Config | UINT |
| 2.9.5.7.2 | Temp. 7 Limit 1 | 5243 | -300.0 | 300.0 | 120.0 | °C | 1 | Config | REAL |
| 2.9.5.7.3 | Temp. 7 Limit 2 | 5269 | -300.0 | 300.0 | 150.0 | °C | 1 | Config | REAL |
| 2.9.5.7.4 | Temp. 7 Limit 2 Response | 5235 | 3 | 11 | 11 | | 1 | Config | UINT |

6.3.9.5.8 Temp. 8 Protection

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|-----------|--------------------------|------|--------|-------|---------|------|------|---------------|-----------|
| 2.9.5.8.1 | Temp. 8 Input | 5240 | 0 | 29999 | 0 | | 1 | Config | UINT |
| 2.9.5.8.2 | Temp. 8 Limit 1 | 5247 | -300.0 | 300.0 | 120.0 | °C | 1 | Config | REAL |
| 2.9.5.8.3 | Temp. 8 Limit 2 | 5270 | -300.0 | 300.0 | 150.0 | °C | 1 | Config | REAL |
| 2.9.5.8.4 | Temp. 8 Limit 2 Response | 5236 | 3 | 11 | 11 | | 1 | Config | UINT |

6.3.9.5.9 Temp. 9 Protection

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|-----------|--------------------------|------|--------|-------|---------|------|------|---------------|-----------|
| 2.9.5.9.1 | Temp. 9 Input | 5241 | 0 | 29999 | 0 | | 1 | Config | UINT |
| 2.9.5.9.2 | Temp. 9 Limit 1 | 5249 | -300.0 | 300.0 | 120.0 | °C | 1 | Config | REAL |
| 2.9.5.9.3 | Temp. 9 Limit 2 | 5271 | -300.0 | 300.0 | 150.0 | °C | 1 | Config | REAL |
| 2.9.5.9.4 | Temp. 9 Limit 2 Response | 5237 | 3 | 11 | 11 | | 1 | Config | UINT |

6.3.9.5.10 Temp. 10 Protection

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|------------|---------------------------|------|--------|-------|---------|------|------|---------------|-----------|
| 2.9.5.10.1 | Temp. 10 Input | 5242 | 0 | 29999 | 0 | | 1 | Config | UINT |
| 2.9.5.10.2 | Temp. 10 Limit 1 | 5268 | -300.0 | 300.0 | 120.0 | °C | 1 | Config | REAL |
| 2.9.5.10.3 | Temp. 10 Limit 2 | 5272 | -300.0 | 300.0 | 150.0 | °C | 1 | Config | REAL |
| 2.9.5.10.4 | Temp. 10 Limit 2 Response | 5238 | 3 | 11 | 11 | | 1 | Config | UINT |

6.3.9.5.11 Common

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|------------|-----------------------------|------|--------|-------|-----------|------|------|---------------|-----------|
| 2.9.5.11.1 | Meas. Valid Range | 5230 | -300.0 | 300.0 | [200,-50] | °C | 0.01 | Config | REAL |
| 2.9.5.11.2 | Meas. Out of Range Response | 5231 | 0 | 11 | 3 | | 1 | Config | UINT |

6.3.9.6 Thermistor Monitoring

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|--------------------------------|------|-----|-------|---------|------|------|---------------|-----------|
| 2.9.6.1 | Thermistor Monitoring Response | 5232 | 0 | 11 | 10 | | 1 | Config | UINT |
| 2.9.6.2 | Thermistor Monitor 1 Input | 1520 | 0 | 29999 | 0 | | 1 | Config | UINT |
| 2.9.6.3 | Thermistor Monitor 2 Input | 1522 | 0 | 29999 | 0 | | 1 | Config | UINT |
| 2.9.6.4 | Thermistor Monitor 3 Input | 1524 | 0 | 29999 | 0 | | 1 | Config | UINT |

6.3.9.7 Fieldbus Protections

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|---------------------------------|------|------|---------|---------|------|------|---------------|-----------|
| 2.9.7.1 | Fieldbus Fault Response | 1304 | 0 | 11 | 10 | | 1 | Config | UINT |
| 2.9.7.2 | No Fieldbus Connection Response | 1305 | 0 | 11 | 0 | | 1 | Config | UINT |
| 2.9.7.3 | Process Data Timeout Response | 1306 | 1 | 11 | 1 | | 1 | Config | UINT |
| 2.9.7.4 | Process Data Timeout Delay | 1340 | 50.0 | 3.4e+38 | 1000.0 | s | 0.01 | Config | REAL |
| 2.9.7.5 | Fieldbus Watchdog Response | 5244 | 0 | 11 | 3 | | 1 | Config | UINT |
| 2.9.7.6 | Fieldbus Watchdog Delay | 5245 | 0.0 | 3000.0 | 5.0 | s | 0.01 | Config | REAL |
| 2.9.7.7 | Fieldbus Watchdog Start Delay | 5246 | 0.0 | 3000.0 | 30.0 | s | 0.01 | Config | REAL |

6.3.9.8 HMI Connection Loss

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|---------------------|------|-----|-----|---------|------|------|---------------|-----------|
| 2.9.8.1 | HMI Connection Loss | 5420 | 0 | 11 | 10 | | 1 | Config | UINT |

6.3.9.9 Cooling Fan Supervision

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|----------------------------|------|-----|-----|---------|------|------|---------------|-----------|
| 2.9.9.1 | Main Fan Fail Response | 2939 | 0 | 11 | 3 | | 1 | Config | UINT |
| 2.9.9.2 | Internal Fan Fail Response | 2940 | 0 | 11 | 3 | | 1 | Config | UINT |

6.3.9.10 Grid Frequency Supervision

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|----------|--------------------------------|------|-----|-------|---------|------|------|---------------|-----------|
| 2.9.10.1 | High Freq. Instant Fault Limit | 2840 | 0.0 | 590.0 | 66.0 | Hz | 0.01 | Config | REAL |
| 2.9.10.2 | Low Freq. Instant Fault Limit | 2841 | 0.0 | 590.0 | 45.0 | Hz | 0.01 | Config | REAL |

6.3.9.11 Grid Voltage Supervision

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|----------|---------------------------------------|------|---------|--------|---------|------|------|---------------|-----------|
| 2.9.11.1 | Grid Overvoltage Instant Fault Limit | 2842 | -1000.0 | 1000.0 | 115.0 | % | 0.01 | Config | REAL |
| 2.9.11.2 | Grid Undervoltage Instant Fault Limit | 2843 | -1000.0 | 1000.0 | 80.0 | % | 0.01 | Config | REAL |

6.3.9.12 Missing Grid Phase

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|----------|------------------------|-----|-----|-------|---------|------|------|---------------|-----------|
| 2.9.12.1 | Phase Fault Limit Run | 266 | 0.0 | 100.0 | 10.0 | % | 0.01 | Config | REAL |
| 2.9.12.2 | Phase Fault Limit Stop | 264 | 0.0 | 100.0 | 60.0 | % | 0.01 | Config | REAL |
| 2.9.12.3 | Phase Fault Delay | 265 | 0.0 | 100.0 | 0.1 | s | 0.01 | Config | REAL |

6.3.9.13 Pre Charge Monitoring

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|----------|----------------------------------|------|-----|------|---------|------|------|---------------|-----------|
| 2.9.13.1 | Max. Pre-Charge Time | 6564 | 5.0 | 50.0 | 20.0 | s | 0.01 | Config | REAL |
| 2.9.13.2 | Min. Pre-Charge Time | 6565 | 0.0 | 5.0 | 0.5 | s | 0.01 | Config | REAL |
| 2.9.13.3 | Ext. Pre-Charge Monitor Response | 6568 | 0 | 11 | 0 | | 1 | Config | UINT |

6.3.9.14 Input Section Over Temperature

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|----------|----------------------------------|------|-----|-------|---------|------|------|---------------|-----------|
| 2.9.14.1 | Input Section Overtemp. Input | 5310 | 0 | 29999 | 1 | | 1 | Config | UINT |
| 2.9.14.2 | Input Section Overtemp. Response | 5311 | 0 | 10 | 3 | | 1 | Config | UINT |

6.4 Maintenance & Service

6.4.1 Software Information

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|-------|---------------------|-----|-----|-----|---------|------|------|---------------|-----------|
| 3.1.1 | Application Version | 151 | | | | | 1 | Config | STRING |

6.4.2 Events

6.4.2.1 Event Simulation

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|---------------------------|------|-----|-------|---------|------|------|---------------|-----------|
| 3.2.1.1 | Simulate Persisting Event | 1401 | 0 | 10 | 0 | | 1 | Config | UINT |
| 3.2.1.2 | Simulate Event Number | 1402 | 0 | 65535 | 5260 | | 1 | Config | UINT |

6.4.3 Operational Counters

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|-------|----------------------|------|-----|---------|---------|------|------|---------------|-----------|
| 3.3.1 | Control Unit On Time | 2000 | 0 | 4.29e+9 | 0 | h | 1 | Process | UDINT |
| 3.3.2 | Power Unit On Time | 2001 | 0 | 4.29e+9 | 0 | h | 1 | Process | UDINT |
| 3.3.3 | Energy Consumption | 2002 | - | - | - | kWh | 1 | Process | ULINT |
| 3.3.4 | Ground Faults | 2004 | 0 | 50000 | 0 | | 1 | Process | UINT |
| 3.3.5 | Overvoltage Faults | 2005 | 0 | 50000 | 0 | | 1 | Process | UINT |
| 3.3.6 | Overcurrent Faults | 2006 | 0 | 50000 | 0 | | 1 | Process | UINT |
| 3.3.7 | Short Circuit Faults | 2007 | 0 | 50000 | 0 | | 1 | Process | UINT |

6.4.4 Backup & Restore

6.4.4.1 Backup

This is a menu screen for creating parameter backups from the control panel. With MyDrive® Insight, similar options are available via the “Backup” button within the “Parameters” screen. Check the available settings via the control panel or MyDrive® Insight.

6.4.4.2 Restore

This is a menu for restoring parameter backups from the control panel. With MyDrive® Insight, similar options are available via the “Restore” button within the “Parameters” screen. Check the available settings via the control panel or MyDrive® Insight.

6.5 Customization

6.5.1 Basic Settings

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|-------|---------------|------|-----|-----|---------|------|------|---------------|---------------|
| 5.1.1 | Date and Time | 2800 | - | - | - | | 1 | Config | DATE_AND_TIME |

6.5.2 Control Panel

6.5.2.1 Readout Screen 1

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|-------------------|-----|-----|---------|---------|------|------|---------------|-----------|
| 5.2.1.1 | Readout Field 1.1 | 305 | 0 | 4.29e+9 | 9044 | | 1 | Config | UDINT |
| 5.2.1.2 | Readout Field 1.2 | 301 | 0 | 4.29e+9 | 0 | | 1 | Config | UDINT |

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|-------------------|-----|-----|---------|---------|------|------|---------------|-----------|
| 5.2.1.3 | Readout Field 1.3 | 302 | 0 | 4.29e+9 | 0 | | 1 | Config | UDINT |
| 5.2.1.4 | Readout Field 1.4 | 303 | 0 | 4.29e+9 | 0 | | 1 | Config | UDINT |
| 5.2.1.5 | Readout Field 1.5 | 304 | 0 | 4.29e+9 | 0 | | 1 | Config | UDINT |

6.5.2.2 Readout Screen 2

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|-------------------|-----|-----|---------|---------|------|------|---------------|-----------|
| 5.2.2.1 | Readout Field 2.1 | 310 | 0 | 4.29e+9 | 9044 | | 1 | Config | UDINT |
| 5.2.2.2 | Readout Field 2.2 | 311 | 0 | 4.29e+9 | 9040 | | 1 | Config | UDINT |
| 5.2.2.3 | Readout Field 2.3 | 312 | 0 | 4.29e+9 | 9041 | | 1 | Config | UDINT |
| 5.2.2.4 | Readout Field 2.4 | 313 | 0 | 4.29e+9 | 2950 | | 1 | Config | UDINT |
| 5.2.2.5 | Readout Field 2.5 | 314 | 0 | 4.29e+9 | 2952 | | 1 | Config | UDINT |

6.6 Option Board Settings

6.6.1 I/O and Relay

This group and its subgroups appear only if an I/O And Relay OC7C1 option is included in the converter. This menu appears as many times as there are these options in the system. Each menu and its parameters have the suffix of their option slot.

6.6.1.1 I/O and Relay Status

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|-------|-------------------------|------|-------|--------|---------|------|------|---------------|-----------|
| 9.3.1 | Digital Input Bit Word | 1614 | 0x0 | 0xffff | 0x0 | | 1 | Process | WORD |
| 9.3.2 | Digital Output Bit Word | 1615 | 0x0 | 0xffff | 0x0 | | 1 | Process | WORD |
| 9.3.3 | T31 Analog Output Value | 1613 | -20.0 | 20.0 | 0.0 | | 0.01 | Process | REAL |
| 9.3.4 | T33 Analog Input Value | 1611 | -20.0 | 20.0 | 0.0 | | 0.01 | Process | REAL |
| 9.3.5 | T34 Analog Input Value | 1612 | -20.0 | 20.0 | 0.0 | | 0.01 | Process | REAL |

6.6.1.2 Digital Inputs/Outputs

6.6.1.2.1 Input T13

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|--------------------------------------|------|-----|-----|---------|------|------|---------------|-----------|
| 9.4.1.1 | T13 Terminal Mode | 2015 | 0 | 3 | 0 | | 1 | Config | UINT |
| 9.4.1.2 | T13 Signal Inversion | 2291 | 0 | 1 | 0 | | 1 | Config | UINT |
| 9.4.1.3 | T13 Standard Debounce Filtering Time | 2024 | 0.0 | 0.1 | 0.0 | ms | 1 | Config | REAL |

6.6.1.2.2 Input T14

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|-------------------|------|-----|-----|---------|------|------|---------------|-----------|
| 9.4.2.1 | T14 Terminal Mode | 2016 | 0 | 3 | 0 | | 1 | Config | UINT |

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|--------------------------------------|------|-----|-----|---------|------|------|---------------|-----------|
| 9.4.2.2 | T14 Signal Inversion | 2292 | 0 | 1 | 0 | | 1 | Config | UINT |
| 9.4.2.3 | T14 Standard Debounce Filtering Time | 2029 | 0.0 | 0.1 | 0.0 | ms | 1 | Config | REAL |

6.6.1.2.3 Input T15

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|--------------------------------------|------|-----|-----|---------|------|------|---------------|-----------|
| 9.4.3.1 | T15 Terminal Mode | 2022 | 0 | 3 | 0 | | 1 | Config | UINT |
| 9.4.3.2 | T15 Signal Inversion | 2295 | 0 | 1 | 0 | | 1 | Config | UINT |
| 9.4.3.3 | T15 Standard Debounce Filtering Time | 2297 | 0.0 | 0.1 | 0.0 | ms | 1 | Config | REAL |

6.6.1.2.4 Input T16

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|--------------------------------------|------|-----|-----|---------|------|------|---------------|-----------|
| 9.4.4.1 | T16 Terminal Mode | 2298 | 0 | 3 | 0 | | 1 | Config | UINT |
| 9.4.4.2 | T16 Signal Inversion | 2296 | 0 | 1 | 0 | | 1 | Config | UINT |
| 9.4.4.3 | T16 Standard Debounce Filtering Time | 2260 | 0.0 | 0.1 | 0.0 | ms | 1 | Config | REAL |

6.6.1.2.5 Input T17

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|--------------------------------------|------|-----|-----|---------|------|------|---------------|-----------|
| 9.4.5.1 | T17 Terminal Mode | 2017 | 0 | 3 | 0 | | 1 | Config | UINT |
| 9.4.5.2 | T17 Signal Inversion | 2293 | 0 | 1 | 0 | | 1 | Config | UINT |
| 9.4.5.3 | T17 Standard Debounce Filtering Time | 2034 | 0.0 | 0.1 | 0.0 | ms | 1 | Config | REAL |

6.6.1.2.6 Input T18

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|--------------------------------------|------|-----|-----|---------|------|------|---------------|-----------|
| 9.4.6.1 | T18 Terminal Mode | 2018 | 0 | 3 | 0 | | 1 | Config | UINT |
| 9.4.6.2 | T18 Signal Inversion | 2294 | 0 | 1 | 0 | | 1 | Config | UINT |
| 9.4.6.3 | T18 Standard Debounce Filtering Time | 2039 | 0.0 | 0.1 | 0.0 | ms | 1 | Config | REAL |

6.6.1.2.7 Output T21

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|-------------------------|------|-----|-----|---------|------|------|---------------|-----------|
| 9.4.7.1 | T21 Terminal Mode | 4015 | 0 | 1 | 0 | | 1 | Config | UINT |
| 9.4.7.2 | T21 Digital Output Type | 4013 | 0 | 3 | 3 | | 1 | Config | UINT |

6.6.1.2.8 Output T22

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|-------------------------|------|-----|-----|---------|------|------|---------------|-----------|
| 9.4.8.1 | T22 Terminal Mode | 4016 | 0 | 1 | 0 | | 1 | Config | UINT |
| 9.4.8.2 | T22 Digital Output Type | 4014 | 0 | 3 | 3 | | 1 | Config | UINT |

6.6.1.3 Analog Inputs/Outputs

6.6.1.3.1 Output T31

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|-------------------|------|-------|------|---------|------|------|---------------|-----------|
| 9.5.1.1 | T31 Terminal Mode | 2019 | 0 | 5 | 0 | | 1 | Config | UINT |
| 9.5.1.2 | T31 Terminal Type | 2284 | 0 | 2 | 1 | | 1 | Config | UINT |
| 9.5.1.3 | T31 Minimum Value | 2283 | -20.0 | 20.0 | 0.0 | | 0.01 | Config | REAL |
| 9.5.1.4 | T31 Maximum Value | 2282 | -20.0 | 20.0 | 10.0 | | 0.01 | Config | REAL |

6.6.1.3.2 Input T33

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|-------------------------------|------|-------|------|---------|------|------|---------------|-----------|
| 9.5.2.1 | T33 Terminal Mode | 2020 | 0 | 6 | 0 | | 1 | Config | UINT |
| 9.5.2.2 | T33 Terminal Type | 2273 | 1 | 2 | 1 | | 0.01 | Config | UINT |
| 9.5.2.3 | T33 Minimum Value | 2272 | -20.0 | 20.0 | 0.0 | | 0.01 | Config | REAL |
| 9.5.2.4 | T33 Maximum Value | 2271 | -20.0 | 20.0 | 10.0 | | 0.01 | Config | REAL |
| 9.5.2.5 | T33 Filter Time | 2270 | 0.0 | 60.0 | 0.0 | ms | 1 | Config | REAL |
| 9.5.2.6 | T33 Live Zero Threshold Value | 2274 | -20.0 | 20.0 | -10.0 | | 0.01 | Config | REAL |
| 9.5.2.7 | T33 Live Zero Timeout Value | 2275 | 0.0 | 60.0 | 0.0 | s | 0.01 | Config | REAL |

6.6.1.3.3 Input T34

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|-------------------------------|------|-------|------|---------|------|------|---------------|-----------|
| 9.5.3.1 | T34 Terminal Mode | 2021 | 0 | 6 | 0 | | 1 | Config | UINT |
| 9.5.3.2 | T34 Terminal Type | 2279 | 1 | 2 | 1 | | 0.01 | Config | UINT |
| 9.5.3.3 | T34 Minimum Value | 2278 | -20.0 | 20.0 | 0.0 | | 0.01 | Config | REAL |
| 9.5.3.4 | T34 Maximum Value | 2277 | -20.0 | 20.0 | 10.0 | | 0.01 | Config | REAL |
| 9.5.3.5 | T34 Filter Time | 2276 | 0.0 | 60.0 | 0.0 | ms | 1 | Config | REAL |
| 9.5.3.6 | T34 Live Zero Threshold Value | 2280 | -20.0 | 20.0 | -10.0 | | 0.01 | Config | REAL |
| 9.5.3.7 | T34 Live Zero Timeout Value | 2281 | 0.0 | 60.0 | 0.0 | s | 0.01 | Config | REAL |

6.6.2 Temperature Measurement

This group and its subgroups appear only if a Temperature Measurement OC7T0 option is included in the converter. This menu appears as many times as there are these options in the system. Each menu and its parameters have the suffix of their option slot.

6.6.2.1 Temperature Measurement Status

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|-------|-----------------------|------|---------|--------|---------|------|------|---------------|-----------|
| 9.3.2 | T4 Temperature Value | 4040 | -1000.0 | 1000.0 | 0.0 | °C | 1 | Process | REAL |
| 9.3.3 | T8 Temperature Value | 4041 | -1000.0 | 1000.0 | 0.0 | °C | 1 | Process | REAL |
| 9.3.4 | T12 Temperature Value | 4042 | -1000.0 | 1000.0 | 0.0 | °C | 1 | Process | REAL |
| 9.3.5 | T16 Temperature Value | 4043 | -1000.0 | 1000.0 | 0.0 | °C | 1 | Process | REAL |
| 9.3.6 | T20 Temperature Value | 4044 | -1000.0 | 1000.0 | 0.0 | °C | 1 | Process | REAL |

6.6.2.2 Temperature Inputs

6.6.2.2.1 Input T4

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|----------------------------|------|-------|------|---------|------|------|---------------|-----------|
| 9.4.1.1 | T4 Terminal Mode | 4045 | 0 | 7 | 0 | | 1 | Config | UINT |
| 9.4.1.2 | T4 Connection Type | 4046 | 0 | 4 | 0 | | 1 | Config | UINT |
| 9.4.1.3 | T4 Temperature Sensor Type | 4047 | 0 | 19 | 0 | | 1 | Config | UINT |
| 9.4.1.4 | T4 Offset | 4048 | -50.0 | 50.0 | 0.0 | °C | 1 | Config | REAL |

6.6.2.2.2 Input T8

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|----------------------------|------|-------|------|---------|------|------|---------------|-----------|
| 9.4.2.1 | T8 Terminal Mode | 4049 | 0 | 7 | 0 | | 1 | Config | UINT |
| 9.4.2.2 | T8 Connection Type | 4050 | 0 | 4 | 0 | | 1 | Config | UINT |
| 9.4.2.3 | T8 Temperature Sensor Type | 4051 | 0 | 19 | 0 | | 1 | Config | UINT |
| 9.4.2.4 | T8 Offset | 4052 | -50.0 | 50.0 | 0.0 | °C | 1 | Config | REAL |

6.6.2.2.3 Input T12

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|-----------------------------|------|-------|------|---------|------|------|---------------|-----------|
| 9.4.3.1 | T12 Terminal Mode | 4053 | 0 | 7 | 0 | | 1 | Config | UINT |
| 9.4.3.2 | T12 Connection Type | 4054 | 0 | 4 | 0 | | 1 | Config | UINT |
| 9.4.3.3 | T12 Temperature Sensor Type | 4055 | 0 | 19 | 0 | | 1 | Config | UINT |
| 9.4.3.4 | T12 Offset | 4056 | -50.0 | 50.0 | 0.0 | °C | 1 | Config | REAL |

6.6.2.2.4 Input T16

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|-----------------------------|------|-------|------|---------|------|------|---------------|-----------|
| 9.4.4.1 | T16 Terminal Mode | 2298 | 0 | 7 | 0 | | 1 | Config | UINT |
| 9.4.4.2 | T16 Connection Type | 4058 | 0 | 4 | 0 | | 1 | Config | UINT |
| 9.4.4.3 | T16 Temperature Sensor Type | 4059 | 0 | 19 | 0 | | 1 | Config | UINT |
| 9.4.4.4 | T16 Offset | 4060 | -50.0 | 50.0 | 0.0 | °C | 1 | Config | REAL |

6.6.2.2.5 Input T20

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|---------|-----------------------------|------|-------|------|---------|------|------|---------------|-----------|
| 9.4.5.1 | T20 Terminal Mode | 4017 | 0 | 7 | 0 | | 1 | Config | UINT |
| 9.4.5.2 | T20 Connection Type | 4062 | 0 | 4 | 0 | | 1 | Config | UINT |
| 9.4.5.3 | T20 Temperature Sensor Type | 4063 | 0 | 19 | 0 | | 1 | Config | UINT |
| 9.4.5.4 | T20 Offset | 4064 | -50.0 | 50.0 | 0.0 | °C | 1 | Config | REAL |

6.6.3 Voltage Measurement

This group and its subgroups appear only if a Voltage Measurement OC7V0 option is included in the converter. This menu appears as many times as there are these options in the system. Each menu and its parameters have the suffix of their option slot.

6.6.3.1 Voltage Measurement Status

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|--------|-----------------|------|----------|---------|---------|------|------|---------------|-----------|
| 9.3.1 | X52 Voltage | 4086 | 0.0 | 10000.0 | 0.0 | V | 0.1 | Process | REAL |
| 9.3.2 | X52 Frequency | 4087 | -400.0 | 400.0 | 0.0 | Hz | 0.01 | Process | REAL |
| 9.3.3 | X52 Phase Diff. | 4088 | -180.0 | 180.0 | 0.0 | ° | 1 | Process | REAL |
| 9.3.4 | X52 Voltage L1 | 4082 | -10000.0 | 10000.0 | 0.0 | V | 0.1 | Process | REAL |
| 9.3.5 | X52 Voltage L3 | 4083 | -10000.0 | 10000.0 | 0.0 | V | 0.1 | Process | REAL |
| 9.3.6 | X53 Voltage | 4089 | 0.0 | 10000.0 | 0.0 | V | 0.1 | Process | REAL |
| 9.3.7 | X53 Frequency | 4090 | -400.0 | 400.0 | 0.0 | Hz | 0.01 | Process | REAL |
| 9.3.8 | X53 Phase Diff. | 4091 | -180.0 | 180.0 | 0.0 | ° | 1 | Process | REAL |
| 9.3.9 | X53 Voltage L1 | 4084 | -10000.0 | 10000.0 | 0.0 | V | 0.1 | Process | REAL |
| 9.3.10 | X53 Voltage L3 | 4085 | -10000.0 | 10000.0 | 0.0 | V | 0.1 | Process | REAL |

6.6.3.2 Voltage Input X52

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|-------|----------------------------|------|-----|---------|---------|------|------|---------------|-----------|
| 9.4.1 | X52 Terminal Mode | 4099 | 0 | 2 | 0 | | 1 | Config | UINT |
| 9.4.2 | X52 Terminal Voltage Range | 4100 | 1.0 | 3.4e+38 | 1.0 | V | 0.1 | Config | REAL |

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|-------|--|------|--------|--------|---------|------|------|---------------|-----------|
| 9.4.3 | X52 Meas. Transformer Grid-Side Voltage | 4101 | 1.0 | 1e+05 | 1.0 | V | 0.1 | Config | REAL |
| 9.4.4 | X52 Meas. Transformer Converter-Side Voltage | 4102 | 1.0 | 1000.0 | 1.0 | V | 0.1 | Config | REAL |
| 9.4.5 | X52 Meas. Transformer Phase Shift | 4103 | -180.0 | 180.0 | 0.0 | ° | 1 | Config | REAL |

6.6.3.3 Voltage Input X53

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|-------|--|------|--------|---------|---------|------|------|---------------|-----------|
| 9.5.1 | X53 Terminal Mode | 4104 | 0 | 2 | 0 | | 1 | Config | UINT |
| 9.5.2 | X53 Terminal Voltage Range | 4105 | 1.0 | 3.4e+38 | 1.0 | V | 0.1 | Config | REAL |
| 9.5.3 | X53 Meas. Transformer Grid-Side Voltage | 4106 | 1.0 | 1e+05 | 1.0 | V | 0.1 | Config | REAL |
| 9.5.4 | X53 Meas. Transformer Converter-Side Voltage | 4107 | 1.0 | 1000.0 | 1.0 | V | 0.1 | Config | REAL |
| 9.5.5 | X53 Meas. Transformer Phase Shift | 4108 | -180.0 | 180.0 | 0.0 | ° | 1 | Config | REAL |

6.7 Connectivity

6.7.1 Integrated Communication

6.7.1.1 Communication interfaces

6.7.1.1.1 Host Settings

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|----------|-----------------------------|------|-----|-----|---------|------|------|---------------|-----------|
| 10.2.1.1 | Fully Qualified Domain Name | 7036 | - | - | - | | 1 | Config | STRING |

6.7.1.1.2 Ethernet Interface X0

6.7.1.1.2.1 IPv4 Settings

This is a menu screen for enabling IP configuration of the X0 interface. Check the available settings via the control panel or MyDrive® Insight.

6.7.1.1.2.2 IPv4 Status

This is a menu screen containing information about the IP configuration of the X0 interface. Check the available information via the control panel or MyDrive® Insight.

6.7.1.1.3 Ethernet Interface X1/X2 Settings

6.7.1.1.3.1 IPv4 Settings

This is a menu screen for enabling IP configuration of the X1/X2 interface. Check the available settings via the control panel or MyDrive® Insight.

6.7.1.1.3.2 IPv4 Status

This is a menu screen containing information about the IP configuration of the X1/X2 interface. Check the available information via the control panel or MyDrive® Insight.

6.7.1.1.4 Ethernet port X0

6.7.1.1.4.1 X0 Settings

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|------------|-----------------------|------|-----|-----|---------|------|------|---------------|-----------|
| 10.2.4.2.5 | Link configuration X0 | 7047 | 0 | 4 | 0 | | 1 | Config | USINT |

6.7.1.1.5 Ethernet port X1

6.7.1.1.5.1 X1 Settings

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|------------|-----------------------|------|-----|-----|---------|------|------|---------------|-----------|
| 10.2.5.2.5 | Link Configuration X1 | 7048 | 0 | 4 | 0 | | 1 | Config | USINT |

6.7.1.1.6 Ethernet port X2

6.7.1.1.6.1 X2 Settings

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|------------|-----------------------|------|-----|-----|---------|------|------|---------------|-----------|
| 10.2.6.2.5 | Link Configuration X1 | 7049 | 0 | 4 | 0 | | 1 | Config | USINT |

6.7.1.1.7 Port Mirroring

This is a menu screen for enabling and disabling the port-mirroring function for network troubleshooting with a network analyzer tool. Check the available configurations via the control panel or MyDrive® Insight.

6.7.1.2 Protocols

6.7.1.2.1 PROFINET®

6.7.1.2.1.1 Status

6.7.1.2.1.1.1 PROFINET® Report

This is the PROFINET® report screen showing active PROFINET® connection and configuration information. Check the available information via the control panel or MyDrive® Insight.

6.7.1.2.1.2 Configuration

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|------------|-----------------|------|-----|-----|---------|------|------|---------------|-----------|
| 10.3.2.2.1 | Name of Station | 7080 | - | - | - | | 1 | Config | STRING |

6.7.1.2.1.3 Diagnosis

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|------------|--------------------|------|-----|-----|---------|------|------|---------------|-----------|
| 10.3.2.3.1 | Diagnostic Fault | 7081 | 0 | 1 | 1 | | 1 | Config | BOOL |
| 10.3.2.3.2 | Diagnostic Warning | 7083 | 0 | 1 | 1 | | 1 | Config | BOOL |

6.7.1.2.2 Modbus® TCP

6.7.1.2.2.1 Configuration

| Index | Name | Num | Min | Max | Default | Unit | Reso | Handling Type | Data Type |
|------------|--------------------|------|-----|-----|---------|------|------|---------------|-----------|
| 10.3.3.2.1 | Persistent Storage | 7061 | 0 | 1 | 0 | | 1 | Config | BOOL |
| 10.3.3.2.3 | Byte Order | 7062 | 0 | 1 | 0 | | 1 | Config | USINT |
| 10.3.3.2.4 | Word Order | 7063 | 0 | 1 | 1 | | 1 | Config | USINT |

7 Parameter Descriptions

7.1 How to Read Parameter Descriptions

The following chapters contain descriptions for all the parameters in the Active Front End application software. Each chapter represents a single subgroup within the menu structure.

First the group is described. After that all parameters are listed and described. If applicable, the parameter selections are listed in a table, containing further descriptions for each selection.

The following is an example of a parameter description:

P1.2.3^[1] Parameter Name^[2] No. 1234^[3]
 This is a parameter description.^[4]

| Number | Name | Description |
|------------------|------------------------------------|--|
| 0 ^[5] | Name of selection 1 ^[6] | Description of selection 1. ^[7] |
| 1 | Name of selection 2 | Description of selection 2. |

[1]: The index number of the parameter, that is, the menu location.

[2]: Name of the parameter.

[3]: Unique identification number of the parameter.

[4]: Description of the parameter.

[5]: Selection number.

[6]: Selection name.

[7]: Description of the selection.

7.2 G1 Monitoring

This group contains readouts for monitoring the operation of the converter.

7.2.1 Basic Monitoring

This group contains readouts for monitoring the basic operation of the converter.

P1.1.1 Grid Voltage No. 9040

Shows grid line-to-line voltage (RMS) at the point of common coupling. If the converter is equipped with a voltage measurement option OC7V0, the voltage is measured via the option board. Otherwise, the voltage is measured from drive output terminals.

P1.1.2 Grid Frequency No. 9041

Shows the actual grid frequency. If the converter is equipped with a voltage measurement option OC7V0, the frequency is measured via the option board. Otherwise, the frequency is measured from drive output terminals.

P1.1.3 DC-Link Voltage No. 9044

Shows the actual DC-link voltage.

P1.1.4 Application Status Word 1 No. 6201

Shows the current status of the Application Status Word 1. The meaning of the bits is described in the following table.

| Bit No. | Name | Description |
|---------|------------------|--|
| 0 | Ready to Run | 0: The unit is not ready to start modulation. 1: The unit is ready to start modulation. |
| 1 | Run | 0: The unit is not running (modulating) 1: The unit is running (modulating) |
| 2 | Info | 0: No info level event is active. 1: One or more info level events are active. |
| 3 | Warning | 0: No warning level events are active. 1: One or more warning level events are active. |
| 4 | Fault | 0: No fault level events are active. 1: One or more fault level events are active. |
| 5 | PC Control | 0: The active control place is not PC. 1: The active control place is PC. |
| 6 | CP Control | 0: The active control place is not the control panel. 1: The active control place is the control panel. |
| 7 | IO Control | 0: The active control place is not I/O. 1: The active control place is I/O. |
| 8 | Fieldbus Control | 0: The active control place is not fieldbus. 1: The active control place is fieldbus. |
| 9 | Reserved | -- |
| 10 | Reserved | -- |
| 11 | Run Enable | 0: Run enable input is false. 1: Run enable input is true. |
| 12 | Start Active | 0: Start command is not active. 1: Start command is active. |
| 13 | Quick Stop | 0: Quick stop is not active. 1: Quick stop is active. |
| 14...15 | Reserved | -- |

P1.1.5 Application Status Word 2 No. 6202

Shows the current status of the Application Status Word 2. The meaning of the bits is described in the following table.

| Bit No. | Name | Description |
|---------|--------------|---|
| 0 | Toggled Info | 0 (steady): No info level event is active. 1: One or more info level events are active. If a new info level event becomes active when this bit is high, it is lowered for one second before being raised again. |

| Bit No. | Name | Description |
|---------|---------------------------|--|
| 1 | Toggled warning | 0 (steady): No warning level event is active. 1: One or more warning level events are active. If a new warning level event becomes active when this bit is high, it is lowered for one second before being raised again. |
| 2 | Toggled Fault | 0 (steady): No fault level event is active. 1: One or more fault level events are active. If a new fault level event becomes active when this bit is high, it is lowered for one second before being raised again. |
| 3 | Ready to Start Pre-Charge | 0 (steady): Pre-charging is not allowed. 1: Pre-charging is allowed. |
| 4 | Ready to Close MCB | 0 (steady): Closing the main circuit breaker is not allowed when DC Link pre-charging is complete. 1: Closing the main circuit breaker is allowed when DC Link pre-charging is complete. |
| 5 | Pre-Charge Detected | 0 (steady): Pre-charging is not detected. 1: Pre-charging is detected. |
| 6 | Pre-Charge Command | 0 (steady): The Pre-Charging relay output command is not active. 1: The Pre-Charging relay output command is active. |
| 7 | MCB Close Command | 0 (steady): The main circuit breaker closing relay output command is not active. 1: The main circuit breaker closing relay output command is active. |
| 8 | MCB Feedback | 0 (steady): The main circuit breaker is open. 1: The main circuit breaker is closed. |
| 9 | Switch Off Request | 0 (steady): Switch off interlock is not active. 1: Switch off interlock is active. |
| 10 | Pre-Charge Ready | 0: The unit is not pre-charged. 1: The unit is pre-charged. |
| 11...15 | Reserved | -- |

P1.1.6 Fault Status Word 1 **No. 6203**

Shows the fault status word 1. The meaning of the bits is described in the following table.

| Bit No. | Name | Description |
|---------|---------------------------------------|---|
| 0 | Over Current or IGBT Over Temperature | 0: None of the listed fault level events are active. 1: At least one of the listed fault level events is active. Event list: events number 4356, 4370, 4110, 4125, all events in group number 8977. |
| 1 | DC Link Over Voltage | 0: None of the listed fault level events are active. 1: At least one of the listed fault level events is active. Event list: events number 4144, 4145. |

| Bit No. | Name | Description |
|---------|------------------------|--|
| 2 | DC Link Under Voltage | 0: None of the listed fault level events are active. 1: At least one of the listed fault level events is active. Event list: event number 4146. |
| 3 | Reserved | -- |
| 4 | Unit Over Temperature | 0: None of the listed fault level events are active. 1: At least one of the listed fault level events is active. Event list: events number 4103, 4104, 4105. |
| 5 | Reserved | -- |
| 6 | Reserved | -- |
| 7 | Reserved | -- |
| 8 | Earth Fault | 0: None of the listed fault level events are active. 1: At least one of the listed fault level events is active. Event list: all events in group number 9008. |
| 9 | Reserved | -- |
| 10 | Fieldbus Error | 0: None of the listed fault level events are active. 1: At least one of the listed fault level events is active. Event list: events number 5120, 5121. |
| 11 | HMI Connection Lost | 0: None of the listed fault level events are active. 1: At least one of the listed fault level events is active. Event list: events number 5141, 5142. |
| 12 | Reserved | -- |
| 13 | Reserved | -- |
| 14 | Auxiliary Device Fault | 0: None of the listed fault level events are active. 1: At least one of the listed fault level events is active. Event list: events number 4200, 4201, 4204, 4205. |
| 15 | Reserved | -- |

P1.1.7 Fault Status Word 2

No. 6204

Shows the Fault Status Word 2. The meaning of the bits is described in the following table.

| Bit No. | Name | Description |
|---------|--------------------|---|
| 0 | Reserved | -- |
| 1 | Pre-Charge Failed | 0: None of the listed fault level events are active. 1: At least one of the listed fault level events is active. Event list: event number 5380. |
| 2 | MCB Feedback Error | 0: None of the listed fault level events are active. 1: At least one of the listed fault level events is active. Event list: event number 5376. |
| 3 | Quick Stop Active | 0: None of the listed fault level events are active. 1: At least one of the listed fault level events is active. Event list: event number 5130. |

| Bit No. | Name | Description |
|---------|-----------------------------|--|
| 4 | Thermistor Over Temperature | 0: None of the listed fault level events are active. 1: At least one of the listed fault level events is active. Event list: events number 5143, 5144, 5145. |
| 5 | MCB Trip | 0: None of the listed fault level events are active. 1: At least one of the listed fault level events is active. Event list: event number 5378. |
| 6 | External Event | 0: None of the listed fault level events are active. 1: At least one of the listed fault level events is active. Event list: events number 5123, 5124. |
| 7 | Cooling Supervision Fault | 0: None of the listed fault level events are active. 1: At least one of the listed fault level events is active. Event list: event number 1061. |
| 8 | Fieldbus Watchdog | 0: None of the listed fault level events are active. 1: At least one of the listed fault level events is active. Event list: event number 5120. |
| 9 | Line Synchronization Fault | 0: None of the listed fault level events are active. 1: At least one of the listed fault level events is active. Event list: events number 4160, 4161, 4166. |
| 10 | Not Applicable | Not used for AFE. |
| 11...15 | Reserved | -- |

P1.1.8 Warning Status Word 1 **No. 6203**

Shows the warning status word 1. The meaning of the bits is described in the following table.

| Bit No. | Name | Description |
|---------|---------------------------------------|---|
| 0 | Over Current or IGBT Over Temperature | 0: None of the listed warning level events are active. 1: At least one of the listed warning level events is active. Event list: events number 4356, 4370, 4110, 4125, all events in group number 8977. |
| 1 | DC Link Over Voltage | 0: None of the listed warning level events are active. 1: At least one of the listed warning level events is active. Event list: events number 4144, 4145. |
| 2 | DC Link Under Voltage | 0: None of the listed warning level events are active. 1: At least one of the listed warning level events is active. Event list: event number 4146. |
| 3 | Reserved | -- |
| 4 | Unit Over Temperature | 0: None of the listed warning level events are active. 1: At least one of the listed warning level events is active. Event list: events number 4103, 4104, 4105. |
| 5 | Reserved | -- |
| 6 | Reserved | -- |
| 7 | Reserved | -- |

| Bit No. | Name | Description |
|---------|------------------------|--|
| 8 | Earth Fault | 0: None of the listed warning level events are active. 1: At least one of the listed warning level events is active. Event list: all events in group number 9008. |
| 9 | Reserved | -- |
| 10 | Fieldbus Error | 0: None of the listed warning level events are active. 1: At least one of the listed warning level events is active. Event list: events number 5120, 5121. |
| 11 | HMI Connection Lost | 0: None of the listed warning level events are active. 1: At least one of the listed warning level events is active. Event list: events number 5141, 5142. |
| 12 | Reserved | -- |
| 13 | Reserved | -- |
| 14 | Auxiliary Device Fault | 0: None of the listed warning level events are active. 1: At least one of the listed warning level events is active. Event list: events number 4200, 4201, 4204, 4205. |
| 15 | Reserved | -- |

P1.1.9 Warning Status Word 2 No. 6204

Shows the Warning Status Word 2. The meaning of the bits is described in the following table.

| Bit No. | Name | Description |
|---------|-----------------------------|--|
| 0 | Reserved | -- |
| 1 | Pre-Charge Failed | 0: None of the listed warning level events are active. 1: At least one of the listed warning level events is active. Event list: event number 5380. |
| 2 | MCB Feedback Error | 0: None of the listed warning level events are active. 1: At least one of the listed warning level events is active. Event list: event number 5376. |
| 3 | Quick Stop Active | 0: None of the listed warning level events are active. 1: At least one of the listed warning level events is active. Event list: event number 5130. |
| 4 | Thermistor Over Temperature | 0: None of the listed warning level events are active. 1: At least one of the listed warning level events is active. Event list: events number 5143, 5144, 5145. |
| 5 | MCB Trip | 0: None of the listed warning level events are active. 1: At least one of the listed warning level events is active. Event list: event number 5378. |
| 6 | External Event | 0: None of the listed warning level events are active. 1: At least one of the listed warning level events is active. Event list: events number 5123, 5124. |

| Bit No. | Name | Description |
|---------|----------------------------|--|
| 7 | Cooling Supervision Fault | 0: None of the listed warning level events are active. 1: At least one of the listed warning level events is active. Event list: event number 1061. |
| 8 | Fieldbus Watchdog | 0: None of the listed warning level events are active. 1: At least one of the listed warning level events is active. Event list: event number 5120. |
| 9 | Line Synchronization Fault | 0: None of the listed warning level events are active. 1: At least one of the listed warning level events is active. Event list: events number 4160, 4161, 4166. |
| 10 | Not Applicable | Not used for AFE. |
| 11...15 | Reserved | -- |

P1.1.10 Last Fault Number No. 1610

Shows the number of the most recent active fault.

P1.1.11 Last Warning Number No. 1609

Shows the number of the most recent active warning.

P1.1.12 Grid Ctrl. Status Word No. 6540

Shows the current state of Grid Control Status Word. The meaning of the bits is described in the following table.

| Bit No. | Name | Description |
|---------|-----------------------------|---|
| 0 | Ready | 0: Converter is not ready (one of the bits of Grid Ctrl. Ready Status word is not true, or McbClosed is false). 1: Converter is ready. |
| 1 | Running | 0: Converter is not running. 1: Converter is running. |
| 2 | Reserved | -- |
| 3 | Fault Active | 0: No faults are active. 1: One or more faults are active. |
| 4 | Reserved | -- |
| 5 | Reserved | -- |
| 6 | DC-Link Pre-Charge Ready | 0: DC-link pre-charge is not ready. 1: DC-link pre-charge is ready. |
| 7 | LCL-Filter Pre-Charge Ready | 0: LCL-filter pre-charge is not ready. 1: LCL-filter pre-charge is ready. |
| 8...15 | Reserved | -- |

P1.1.13 Grid Ctrl. Ready Status Word No. 5096

Shows the current state of Grid Control Ready Status Word. The meaning of the bits is described in the following table.

| Bit No. | Name | Description |
|---------|--|---|
| 0 | Run Enabled | 0: Run enabled is missing. 1: Run enabled is active. |
| 1 | Fault Active Inverse | 0: One or more faults are active. 1: No active faults. |
| 2 | Pre-Charged | 0: Pre-charge is not completed. 1: Pre-charge is completed. |
| 3 | DC-Link Voltage Supervision | 0: DC-link voltage is not within the undervoltage and overvoltage fault limits. 1: DC-link voltage is within the undervoltage and overvoltage fault limits. |
| 4 | Power Unit Ready | 0: Power unit is not ready. 1: Power unit is ready. |
| 5 | Successful Phase Sync. | 0: Error in grid voltage phase-locked loop. 1: No error in grid voltage phase-locked loop. |
| 6 | Frequency Supervision | 0: Grid frequency is not within the instantaneous trip limits. 1: Grid frequency is within the instantaneous trip limits. |
| 7 | Grid Voltage Supervision | 0: Grid voltage is not within the instantaneous stop limits. 1: Grid voltage is within the instantaneous stop limits. |
| 8 | Correct Voltage Measurement Option Wiring | 0: The phase orders of the converter terminal voltage and the voltage measurement option are different. 1: The phase orders of the converter terminal voltage and the voltage measurement option are the same. |
| 9 | Valid LCL Filter Values | 0: LCL-filter data is not correct. 1: LCL-filter data is correct. |
| 10...15 | Reserved | -- |

P1.1.14 Application Ready Status Word No. 6525

Shows the status of the application in regards to the ability to start modulating.

| Bit No. | Name | Description |
|---------|------------------------------------|--|
| 0 | Switch On Enabled | 0: The "Switch On Enabled" signal (par. No. 4728) is inactive. 1: The "Switch On Enabled" signal (par. No. 4728) is active. |
| 1 | Main Circuit Breaker Close Enabled | 0: The "Main Circuit Breaker Close Enable" (par. No. 6557) signal is inactive. 1: The "Main Circuit Breaker Close Enable" (par. No. 6557) signal is active. |
| 2 | Main Circuit Breaker Ready | 0: Main Circuit Breaker is either open, or the LCL Filter is not energized if the MCB Closing Mode (par. No. 6559) is set to be based on it 1: Main Circuit Breaker is closed, or the LCL Filter is energized if the MCB Closing Mode (par. No. 6559) is set to be based on it. |
| 3 | Quick Stop | 0: "Quick Stop" signal (par. No. 212) is active. 1: "Quick Stop" signal (par. No. 212) is inactive. |
| 4...15 | Reserved | -- |

7.2.2 Control Mode and Reference Monitoring

P1.2.1 Reactive Current Ref. No. 2875

Reactive current reference in % of grid nominal current.

P1.2.2 DC-link Voltage Ref. % Actual No. 6543

Shows the actual DC-link voltage reference in % of the grid nominal voltage (peak amplitude).

7.2.3 Limit Monitoring

P1.3.1 Current Limit (Actl.) No. 2882

Grid total output current limit in % of the grid nominal current.

P1.3.2 Neg. Active Current Limit (Actl.) No. 2878

Shows the active current limit in negative direction in % of the grid nominal current.
See parameter No. 2947 for sign convention to be used for positive current direction.

P1.3.3 Pos. Active Current Limit (Actl.) No. 2880

Shows the active current limit in positive direction in % of the grid nominal current.
See parameter No. 2947 for sign convention to be used for positive current direction.

P1.3.4 Neg. Active Power Limit (Actl.) No. 2879

Shows the active power limit in negative direction in % of the grid nominal power.
See parameter No. 2947 for sign convention to be used for positive power direction.

P1.3.5 Pos. Active Power Limit (Actl.) No. 2881

Shows the active power limit in positive direction in % of the grid nominal power.
See parameter No. 2947 for sign convention to be used for positive power direction.

7.2.4 Start and Stop Monitoring

P1.4.1 Pre-Charge Active No. 6561

Shows when pre-charge is active.

P1.4.2 Pre-Charge Ready No. 6562

Shows when pre-charge is ready.

P1.4.3 MCB Close Active No. 171

Shows main circuit breaker close request.

P1.4.4 MCB Feedback No. 172

Show Main circuit breaker close feedback.

7.2.5 Control Place Monitoring

P1.5.1 Active Control Place No. 113

Shows the control place that controls the converter. The indication numbers are presented in the following table.

| Number | Name | Description |
|--------|------------------|---|
| 0 | PC control | PC (MyDrive® Insight) is the active control place commanding the converter. |
| 1 | Local control | Local (control panel) is the active control place commanding the converter. |
| 2 | Fieldbus control | Fieldbus is the active control place commanding the converter. |
| 3 | I/O control | I/O is the active control place commanding the converter. |

P1.5.2 FB Forcing Requested **No. 116**

Shows the status of the fieldbus control place forcing request.

| Number | Name | Description |
|--------|----------|------------------------------|
| 0 | Inactive | FB forcing is not requested. |
| 1 | Active | FB forcing is requested. |

P1.5.3 I/O Forcing Requested **No. 117**

Shows the status of the I/O-control place forcing request.

| Number | Name | Description |
|--------|----------|-------------------------------|
| 0 | Inactive | I/O forcing is not requested. |
| 1 | Active | I/O forcing is requested. |

P1.5.4 Local Control Forcing Requested **No. 124**

Shows the status of the local control place forcing request (made from control panel REM/LOC button).

| Number | Name | Description |
|--------|----------|---|
| 0 | Inactive | Local (panel) control forcing is not requested. |
| 1 | Active | Local (panel) control forcing is requested. |

7.2.6 Converter Output Monitoring

P1.6.1 Converter Output Current **No. 9000**

Shows the converter output current.

P1.6.2 Converter Output Current % **No. 9001**

Shows the converter output current in % of grid nominal current.

P1.6.3 Converter Output Voltage **No. 9005**

Shows the converter output voltage.

7.2.7 Grid Monitoring

P1.7.1 Grid Frequency **No. 9041**

Shows the actual grid frequency. If the converter is equipped with a voltage measurement option OC7V0 the frequency is measured via the option board. Otherwise, the frequency is measured from drive output terminals.

P1.7.2 Grid Voltage **No. 9040**

Shows grid line-to-line voltage (RMS) at the point of common coupling. If the converter is equipped with a voltage measurement option OC7V0 the voltage is measured via the option board. Otherwise, the voltage is measured from drive output terminals.

P1.7.3 Grid Voltage Imbalance **No. 9047**

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

P1.7.4 Grid Current **No. 9060**

Shows the current at the point of common coupling.

P1.7.5 Grid Current % **No. 9061**

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

P1.7.6 Grid Active Current % **No. 9062**

Shows the active current in % of grid nominal current.

P1.7.7 Grid Reactive Current % **No. 9063**

Shows the reactive current in % of grid nominal current.

P1.7.8 Grid Active Power **No. 9064**

Shows grid active power.

P1.7.9 Grid Active Power % **No. 9065**

Shows grid active power in % of grid nominal power.

P1.7.10 Grid Reactive Power % **No. 9052**

Shows grid reactive power in % of grid nominal power.

7.2.8 DC-Link Monitoring**P1.8.1 DC-link Voltage** **No. 9044**

Shows the actual DC-link voltage.

P1.8.2 DC-link Voltage % **No. 6542**

Shows the actual DC-link voltage in % of the grid nominal voltage rectified value.

7.2.9 Converter Control Monitoring**P1.9.1 Actual Switching Frequency** **No. 2923**

Shows the actual switching frequency. The actual switching frequency of the converter can vary because of some of the internal overriding functions (derating, for example). This value shows the actual switching frequency after the override functions.

P1.9.2 Modulation Index **No. 5101**

Shows the modulation index, which is the ratio between the peak value of phase-to-phase voltage fundamental wave and DC-link voltage.

P1.9.3 Control Unit Temperature **No. 2952**

Shows the temperature of the control unit.

7.2.10 Protection Monitoring**7.2.10.1 Measured Temp. Protection Status**

This group contains the readout values for the temperature values measured by the temperature sensors, which are connected to the temperature measurement option board OC7T0.

P1.10.1.1 Protection 1 Temp. **No. 5200**

Shows the temperature measured for the temperature protection.

P1.10.1.2 Protection 2 Temp. **No. 5201**

Shows the temperature measured for the temperature protection.

P1.10.1.3 Protection 3 Temp. **No. 5202**

Shows the temperature measured for the temperature protection.

P1.10.1.4 Protection 4 Temp. **No. 5203**

Shows the temperature measured for the temperature protection.

P1.10.1.5 Protection 5 Temp. **No. 5204**

Shows the temperature measured for the temperature protection.

P1.10.1.6 Protection 6 Temp. **No. 5205**

Shows the temperature measured for the temperature protection.

P1.10.1.7 Protection 7 Temp. **No. 5273**

Shows the temperature measured for the temperature protection.

P1.10.1.8 Protection 8 Temp. **No. 5274**

Shows the temperature measured for the temperature protection.

P1.10.1.9 Protection 9 Temp. **No. 5275**

Shows the temperature measured for the temperature protection.

P1.10.1.10 Protection 10 Temp. **No. 5276**

Shows the temperature measured for the temperature protection.

7.2.11 Power Unit Monitoring**P1.11.1 Power Capacity** **No. 2836**

Shows the power capacity of the converter as a percentage. The value is derived from the number of active power units compared to the nominal power unit count of the converter.

P1.11.2 Unit Nominal Voltage **No. 2830**

Shows the nominal voltage setting as a result of the setting of parameter Unit Voltage Class (No. 2832).

P1.11.3 Unit Nominal Current No. 2831

Shows the nominal current of the unit.

P1.11.4 Heat Sink Temperature No. 2950

Shows the temperature of the power unit heat sink.

7.2.12 Cooling Fan Monitoring

P1.12.1 Main Fan Speed No. 2931

Shows the speed of the main cooling fan.

P1.12.2 Internal Fan Speed No. 2926

Shows the speed of the internal cooling fan.

7.2.13 Fieldbus Process Data Monitoring

P1.13.1 Fieldbus Control Word No. 1335

Shows the fieldbus control word process data signal value. See 2.3.1 Fieldbus Control Word and Bit Description for further information.

P1.13.2 FB Status Word No. 1307

Shows the fieldbus status word process data signal value. See 2.3.2 Fieldbus Status Word and Bit Description for further information.

P1.13.3 FB DC-link Voltage Ref. No. 6533

Shows the incoming fieldbus process data DC-link voltage reference in % of the grid nominal voltage (peak amplitude).

7.3 G2 Parameters

This group houses most of the converter settings.

7.3.1 Basic Parameters

This group contains a collection of the basic parameters needed to get the converter operational. Grid nominal values, converter nominal values, feedback sources for grid and filter voltages, overload mode, current/power positive direction and paralleling synchronization handling are configured in this group.

P2.1.1 Grid Nominal Frequency No. 6536

Set the nominal grid voltage frequency for grid control in Hz.

P2.1.2 Grid Nominal Voltage No. 6537

Set the nominal grid voltage for grid control in V. It is automatically updated if parameter Unit Voltage Class (No. 2832) is changed.

P2.1.3 Grid Nominal Current **No. 6538**

Set the nominal grid current for grid control.

P2.1.4 Grid Voltage Feedback Source **No. 6539**

Set the grid external voltage measurement configuration. Informs whether grid voltage measurement can be used in grid control. AFE can use the grid voltage feedback for the following operations:

- o monitoring of the grid voltage and frequency
- o to help AFE to better handle grid voltage dips without tripping
- o to help AFE to better handle resonance damping (in some special scenarios)

| Number | Name | Description |
|--------|----------|---|
| 0 | Disabled | Local (panel) control forcing is not requested. |
| 1 | X52 | Channel 1 on voltage measurement option is used for feedback. |
| 2 | X53 | Channel 2 on voltage measurement option is used for feedback. |

NOTICE

This function requires that a voltage measurement option board (OC7V0) is installed in the converter.

P2.1.5 Filter Voltage Feedback Source **No. 6541**

Set the filter external voltage measurement configuration. Informs whether filter voltage measurement can be used in grid control.

| Number | Name | Description |
|--------|----------|---|
| 0 | Disabled | Local (panel) control forcing is not requested. |
| 1 | X52 | Channel 1 on voltage measurement option is used for feedback. |
| 2 | X53 | Channel 2 on voltage measurement option is used for feedback. |

AFE can use the voltage feedback for the line filter (LCL) energization. AFE can charge the filter capacitors and synchronize to the voltage measured from the other side of the main circuit breaker. This way the inrush currents and voltage transients typically occurring after the breaker closes are effectively avoided.

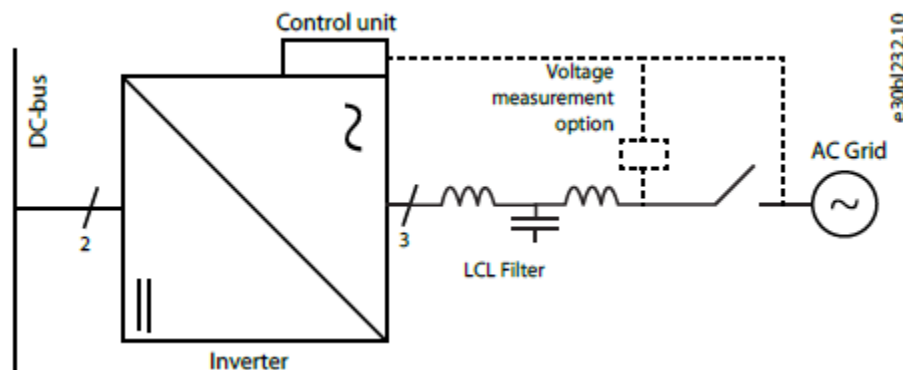


Figure 49. AFE with filter voltage feedback and grid voltage feedback measured by Voltage Measurement option.

NOTICE

This function requires that a voltage measurement option board (OC7V0) is installed to the converter.

P2.1.6 Unit Voltage Class No. 2832

Select the unit voltage class to optimize the performance of the converter. Each power unit is rated for a wide voltage range which the converter can operate in. This parameter is used to specify a narrower band within that range to determine optimized values for the unit's nominal voltage and current. Set this parameter according to the AC mains voltage. The selected voltage class can be seen from readout parameter Unit Nominal Voltage (No. 2830)

| No. | Name | Description |
|-----|--------------------|--|
| 1 | Low-voltage range | Unit nominal voltage and current are set according to the lowest end of the unit's voltage range. <ul style="list-style-type: none"> • For example for T5-units this range is 380-440 Vac. • For example for T7-units this range is 525-550 Vac. |
| 2 | Mid-voltage range | Unit nominal voltage and current are set according to the middle of the unit's voltage range. <ul style="list-style-type: none"> • For example for T5-units this range is 440-480 Vac. • For example for T7-units this range is 550-600 Vac. |
| 3 | High-voltage range | Unit nominal voltage and current are set according to the highest end of the unit's voltage range. <ul style="list-style-type: none"> • For example for T5-units this range is 480-500 Vac. • For example for T7-units this range is 600-690 Vac. |
| 4 | Wide-voltage range | Unit nominal voltage and current are set according to the unit's whole voltage range. <ul style="list-style-type: none"> • For example for T5-units this range is 380-500 Vac. • For example for T7-units this range is 525-690 Vac. |

P2.1.7 Overload Mode No. 2833

Select the overload mode. Overloading mode selects an overtemperature protection profile for the converter, effecting current limits and protection activation times. With a higher overloading mode, the converter operates in a greater degree of overloading before protections take effect. Specific limits and activation delays depend on the conditions.

| No. | Name | Description |
|-----|------------------------------------|--|
| 0 | Automatic | The converter automatically determines whether to use the Low or High Overload Mode. |
| 1 | Low overload (LO) | The converter uses the lower overloading profile. Overtemperature protection is activated with a lesser degree of overload. |
| 2 | High overload (HO1) | The converter uses a higher overloading profile. Overtemperature protection is activated with a higher degree of overload. |
| 3 | High overload increased duty (HO2) | The converter uses the highest overloading profile. Overtemperature protection is activated with the highest degree of overload. |

P2.1.8 Current/Power Positive Direction No. 2947

Select the sign convention to be used for current and power.

| No. | Name | Description |
|-----|----------------------|---|
| 0 | From DC-link to Grid | Current and power are positive when flowing from DC-link side to grid side. |
| 1 | From Grid to DC-Link | Current and power are positive when flowing from grid side to DC-link side. |

P2.1.9 Paralleling Sync. Mode No. 9654

Enable synchronization controller for parallel-connected converters without galvanic isolation to reduce circulating common mode current.

| No. | Name | Description |
|-----|----------|-------------|
| 0 | Disabled | |
| 1 | Enabled | |

7.3.2 Control Mode and References

This group contains parameters for configuring the control mode and references for the converter.

7.3.2.1 Grid Current Reference

P2.2.1.1 Reactive Current Ref. No. 233

Set the reactive current reference in % of grid nominal current.

7.3.2.2 DC-Link Voltage Reference

P2.2.2.1 DC-link Voltage Ref. Source No. 2916

Select the source for the DC-link voltage reference. The source of the DC-link voltage reference does not follow the control place selection.

| No. | Name | Description |
|-----|-----------|--|
| 0 | Parameter | DC-link voltage reference is taken from parameter No. 2910. |
| 1 | Fieldbus | DC-link voltage reference is taken from fieldbus via parameter No. 6533. |

P2.2.2.2 DC-link Voltage Ref. No. 2910

Set the DC-link voltage reference. Select the reference mode with parameter No. 2888.

P2.2.2.3 DC-link Voltage Droop Gain No. 2912

Set the DC-link voltage drooping gain; change of DC voltage reference per (active) current change. Refer to chapter 2.1.1 General Features and the subchapter Paralleling AFEs for additional information regarding DC-link voltage drooping.

P2.2.2.4 DC-link Voltage Ref. Filter Tc No. 2894

Set the DC-link voltage reference low pass filter time constant.

P2.2.2.5 DC-link Voltage Ref. Float Filter Tc No. 2895

Filtering time constant of actual grid voltage when floating reference is used.

P2.2.2.6 DC-link Voltage Ref. Mode No. 2888

DC link voltage reference mode selection. This parameter selects the representation of the DC-link Voltage Reference parameter (No. 2910).

| No. | Name | Description |
|-----|--|---|
| 0 | In % of grid nominal voltage rectified value | DC-link Voltage Reference = $\sqrt{2}$ * Grid Nominal Voltage (No. 6537) * DC-Link Voltage Ref (No. 2910) |
| 1 | In % of actual rectified grid voltage (floating) | Dc-Link Voltage Reference = $\sqrt{2}$ * Grid Voltage (No. 9040) * DC-Link Voltage Ref (No. 2910) |

7.3.3 Limits

This group contains parameters for configuring different limits for the converter.

7.3.3.1 Grid Current Limit

P2.3.1.1 Neg. Active Current Limit No. 2855

Set the active current limit in negative direction in % of the grid nominal current.

P2.3.1.2 Pos. Active Current Limit No. 2858

Set the active current limit in positive direction in % of the grid nominal current.

7.3.3.2 Grid Power Limit

P2.3.2.1 Neg. Active Power Limit No. 2862

Set the active power limit in negative direction in % of the grid nominal power.

P2.3.2.2 Pos. Active Power Limit No. 2865

Set the active power limit in positive direction in % of the grid nominal power.

7.3.4 Digital and Analog Inputs

7.3.4.1 Digital Inputs

This group is a collection of all the digital input sink selection parameters. All these parameters have the following options:

| No. | Name | Description |
|-----|--|---|
| 0 | False | No input is selected. A virtual value of FALSE is applied. |
| 1 | True | No input is selected. A virtual value of TRUE is applied. |
| * | Fieldbus control word digital input bits | Fieldbus CTW digital input bits 12-15. |
| * | Available digital input terminals | A dynamically generated selection of available digital input terminals is presented as an option. The specific set depends on the type and number of I/O options installed in the system. |

P2.4.1.1 Run Enable Input No. 103

Select a digital input for enabling the converter to run. This signal must be active for the converter to be in the ready state. If the signal is deactivated while the converter is running, the converter stops modulating immediately.

P2.4.1.2 External Event 1 Input No. 4557

Select an input for the external event.

P2.4.1.3 External Event 2 Input No. 4560

Select an input for the external event.

P2.4.1.4 Cooling Monitor Input No. 2400

Select the input for the negated cooling monitor signal.

P2.4.1.5 Force I/O Control Input No. 4513

Select an input terminal for forcing the control place to I/O.

P2.4.1.6 Force FB Control Input No. 4511

Select an input terminal for forcing the control place to Fieldbus.

P2.4.1.7 I/O Start Input No. 200

Set the input source for starting the unit when the active control place is I/O Control.

P2.4.1.8 I/O Stop Input No. 201

Set the input source for stopping the unit when the active control place is I/O Control. It is activated when the input becomes LOW, FALSE or 0.

P2.4.1.9 I/O Reset Input No. 203

Select the input source for the reset command for when the converter operates in I/O control.

P2.4.1.10 Switch On Enable Input No. 4728

Select a digital input to allow the converter to perform DC-link pre-charging, close the main circuit breaker and to enter running state. If this signal becomes low all these actions are prevented or interrupted and the MCB is opened if closed.

P2.4.1.11 Pre Charge Request Inp. No. 6567

Set the digital input for the pre-charge request.

P2.4.1.12 MCB Close Enable Input No. 6557

Set the digital input for main circuit breaker closing enable.

P2.4.1.13 MCB Feedback Close Input No. 6552

Set the digital input for main circuit breaker closing feedback.

P2.4.1.14 MCB Feedback Open Input No. 6553

Set the digital input for main circuit breaker opening feedback.

P2.4.1.15 MCB Tripped Input No. 6554

Set the digital input for main circuit breaker tripped feedback.

P2.4.1.16 Quick Stop Input No. 212

Select an input terminal for the Quick Stop. It is activated when the input becomes LOW, FALSE or 0.

P2.4.1.17 Quick Stop Input 2 No. 5104

Select an input terminal for the Quick Stop. It is activated when the input becomes LOW, FALSE or 0.

P2.4.1.18 Input Section Overtemp. Input No. 5310

Select an input terminal for the mains input section overtemperature event. It is activated when the input becomes LOW, FALSE or 0.

7.3.5 Digital and Analog Outputs**7.3.5.1 Digital Outputs**

This group is a collection of all the digital output sink selection parameters. All these parameters have the following options:

| No. | Name | Description |
|-----|--|--|
| 0 | None | No output is selected. |
| * | Available digital output and relay terminals | A dynamically generated selection of available digital output and relay terminals is presented as an option. The specific set depends on the type and number of I/O options installed in the system. |

P2.5.1.1 Ready Output No. 205

Select an output for the Ready-signal.

P2.5.1.2 Run Output No. 206

Select an output for the Run-signal.

P2.5.1.3 Static Fault Output No. 208

Select an output for the Static Fault Active-signal.

P2.5.1.4 Static Warning Output No. 209

Select an output for the Static Warning Active-signal.

P2.5.1.5 Toggling Fault Output No. 5180

Select an output for the Toggling Fault-signal. This signal goes down for 1 second whenever a new fault is registered while another fault was already active.

P2.5.1.6 Toggling Warning Output No. 5181

Select an output for the Toggling Warning-signal. This signal goes down for 1 second whenever a new warning is registered while another warning was already active.

P2.5.1.7 FB CTW Bit 12 Output No. 5193

Select an output for the status of the fieldbus control word bit 12.

P2.5.1.8 FB CTW Bit 13 Output No. 5194

Select an output for the status of the fieldbus control word bit 13.

P2.5.1.9 FB CTW Bit 14 Output No. 5198

Select an output for the status of the fieldbus control word bit 14.

P2.5.1.10 FB CTW Bit 15 Output No. 5191

Select an output for the status of the fieldbus control word bit 15.

P2.5.1.11 DC-link Voltage Superv. Output No. 5157

Select an output for the status of the DC-link Voltage Supervision. Output is activated when the DC-link voltage exceeds Param. DC-link Voltage Superv. Limit (No. 5158).

P2.5.1.12 DC-link Voltage Superv. Limit No. 5158

Set the DC-link Voltage Supervision Limit for monitoring the DC-link Voltage with a digital output (No. 5157).

P2.5.1.13 Local Control Active Output No. 5178

Select an output terminal indicating that the converter is in local control.

P2.5.1.14 I/O Control Active Output No. 5177

Select an output terminal indicating that the converter is in I/O control.

P2.5.1.15 Fieldbus Control Active Output No. 5197

Select an output terminal indicating that the converter is in fieldbus control.

P2.5.1.16 Active Event 1 Output No. 5189

Select an output for monitoring the event activation status (output high = event active).

P2.5.1.17 Event 1 Number No. 5188

Set the number of the event to be assigned for Active Event 1 output.

P2.5.1.18 Active Event 2 Output No. 5190

Select an output for monitoring the event activation status (output high = event active).

P2.5.1.19 Event 2 Number No. 5290

Set the number of the event to be assigned for Active Event 2 output.

P2.5.1.20 No Warning Output No. 217

Select an output for the No Warning Active-signal.

P2.5.1.21 No Fault Output No. 218

Select an output for the No Fault Active-signal.

P2.5.1.22 Local Control Forcing Requested Output No. 125

Select an output terminal for the indication that the control place forcing to Local Control has been requested with REM/LOC button of control panel (output high = requested).

P2.5.1.23 I/O Forcing Requested Output No. 121

Select an output terminal for the indication that the control place forcing to I/O Control has been requested (output high = requested).

P2.5.1.24 FB Forcing Requested Output No. 120

Select an output terminal for the indication that the control place forcing to Fieldbus Control has been requested (output high = requested).

7.3.5.2 Analog Outputs

This group is a collection of all the analog output terminal selection parameters of the converter. All these parameters have the following options:

| No. | Name | Description |
|-----|-----------------------------------|---|
| 0 | None | No output is selected for the associated parameter. |
| * | Available analog output terminals | A dynamically generated selection of available analog output terminals is presented as an option. The specific set depends on the type and number of I/O options installed in the system. |

P2.5.2.1 Output Current Output No. 2453

Select an analog output for the output current %.

Scaling:

- -200% = Terminal Minimum Value
- 200% = Terminal Maximum Value

P2.5.2.2 Absolute Active Power Output No. 2456

Select an analog output for the grid active power %.

Scaling:

- 0% = Terminal Minimum Value
- 100% = Terminal Maximum Value

P2.5.2.3 Active Power Output No. 2455

Select an analog output for the grid active power (kW). Define the scaling with parameters No. 2458 and 2459.

P2.5.2.4 Active Power Output Max. No. 2458

Set the maximum active power value for analog output scaling maximum.

P2.5.2.5 Active Power Output Min. No. 2459

Set the minimum active power value for analog output scaling minimum.

P2.5.2.6 DC-link Voltage Output No. 2454

Select an analog output for the DC-link voltage %. Define the scaling with parameters No. 2460 and 2461.

P2.5.2.7 DC-link Voltage Output Max. No. 2460

Set the maximum DC-link voltage value for analog output scaling maximum.

P2.5.2.8 DC-link Voltage Output Min. No. 2461

Set the minimum DC-link voltage value for analog output scaling minimum.

P2.5.2.9 Main Fan Speed Output No. 2462

Select an analog output for the main fan speed signal. Define the scaling with parameters No. 2463 and 2464.

P2.5.2.10 Main Fan Speed Output Max. No. 2463

Set the maximum main fan speed value for analog output scaling maximum.

P2.5.2.11 Main Fan Speed Output Min. No. 2464

Set the minimum main fan speed value for analog output scaling minimum.

7.3.6 Start and Stop Settings

7.3.6.1 Start Settings

This group contains parameters for start related settings. For general information about starting the unit, refer to section 2.2 Start and Stop Sequence.

P2.6.1.1 Start Delay No. 4718

Set a delay to start the converter. This delay is applied after all "Ready to Run" conditions have been met (check parameter No. 6525).

P2.6.1.2 Run Enable Input No. 103

Select a digital input for enabling the converter to run. This signal must be active for the converter to be in the ready state. If the signal is deactivated while the converter is running, the converter stops modulating immediately.

| No. | Name | Description |
|-----|--|---|
| 0 | False | No input is selected. A virtual value of FALSE is applied. |
| 1 | True | No input is selected. A virtual value of TRUE is applied. |
| * | Fieldbus control word digital input bits | Fieldbus CTW digital input bits 12-15. |
| * | Available digital input terminals | A dynamically generated selection of available digital input terminals is presented as an option. The specific set depends on the type and number of I/O options installed in the system. |

P2.6.1.3 Switch On Enable Input

No. 4728

Select a digital input to allow the converter to perform DC-link pre-charging, close the main circuit breaker and to enter running state. All these actions are prevented or interrupted if this signal becomes low.

| No. | Name | Description |
|-----|--|---|
| 0 | False | No input is selected. A virtual value of FALSE is applied. |
| 1 | True | No input is selected. A virtual value of TRUE is applied. |
| * | Fieldbus control word digital input bits | Fieldbus CTW digital input bits 12-15. |
| * | Available digital input terminals | A dynamically generated selection of available digital input terminals is presented as an option. The specific set depends on the type and number of I/O options installed in the system. |

7.3.6.2 Quick Stop

The Quick Stop function can be used as a special stop method in exceptional situations, for instance in emergencies. With parameters No. 212 and No. 5104, the operator can select two inverted inputs for activating this function. Besides these inputs the operator can also give a quick stop command via fieldbus control word bit 2.

Quick Stop can also be configured to trigger an event, the type of which the operator can configure with parameter No. 4587. Note that the quick stop command is a separate function from the quick stop event.

NOTICE

Once activated, Quick Stop blocks starting, until all active start commands are removed. In other words, a new start command is always required after a Quick Stop.

Quick Stop is not a Functional Safety feature.

P2.6.2.1 Quick Stop Input

No. 212

Select an input terminal for the Quick Stop. The functionality is inverted so Quick Stop is activated when the input becomes low.

| No. | Name | Description |
|-----|--|---|
| 0 | False | No input is selected. A virtual value of FALSE is applied. |
| 1 | True | No input is selected. A virtual value of TRUE is applied. |
| * | Fieldbus control word digital input bits | Fieldbus CTW digital input bits 12-15. |
| * | Available digital input terminals | A dynamically generated selection of available digital input terminals is presented as an option. The specific set depends on the type and number of I/O options installed in the system. |

P2.6.2.2 Quick Stop Input 2 No. 5104

Select a second input terminal for Quick Stop. The functionality is inverted so quick stop is activated when the input becomes low.

| No. | Name | Description |
|-----|--|---|
| 0 | False | No input is selected. A virtual value of FALSE is applied. |
| 1 | True | No input is selected. A virtual value of TRUE is applied. |
| * | Fieldbus control word digital input bits | Fieldbus CTW digital input bits 12-15. |
| * | Available digital input terminals | A dynamically generated selection of available digital input terminals is presented as an option. The specific set depends on the type and number of I/O options installed in the system. |

P2.6.2.3 Quick Stop Response No. 4587

Select the response to a Quick Stop event. The converter stops regardless of the event setting.

| No. | Name | Description |
|-----|-----------------|---|
| 0 | No response | Quick stop does not trigger an event. Note that a quick stop command can still be given to stop the converter. |
| 1 | Info | The converter issues an info event and stop modulation. |
| 3 | Warning | The converter issues a warning event and stop modulation. |
| 10 | Fault | The converter issues a fault event and stop modulation. |
| 11 | Fault, Open MCB | The converter issues a fault event, stop modulation, and open the main circuit breaker. |

7.3.6.3 Pre Charge

This group contains parameters for pre-charge related settings. For general information about pre-charging the unit, refer to section 2.2 Start and Stop Sequence.

P2.6.3.1 Pre-Charge Request Output No. 6563

Set the pre-charge command digital output.

| No. | Name | Description |
|-----|--|--|
| 0 | None | No output is selected. |
| * | Available digital output and relay terminals | A dynamically generated selection of available digital output and relay terminals is presented as an option. The specific set depends on the type and number of I/O options installed in the system. |

P2.6.3.2 Pre-Charge Ready Level No. 6566

Set the DC-link voltage level in % of nominal voltage above which the pre-charge becomes ready.

P2.6.3.3 Pre Charge Request Inp.**No. 6567**

Set the digital input for the pre charge request.

| No. | Name | Description |
|-----|--|---|
| 0 | False | No input is selected. A virtual value of FALSE is applied. |
| 1 | True | No input is selected. A virtual value of TRUE is applied. |
| * | Fieldbus control word digital input bits | Fieldbus CTW digital input bits 12-15. |
| * | Available digital input terminals | A dynamically generated selection of available digital input terminals is presented as an option. The specific set depends on the type and number of I/O options installed in the system. |

P2.6.3.4 Pre-charge Allowed Output**No. 6569**

Set the digital output terminal for pre-charge allowed.

| No. | Name | Description |
|-----|--|--|
| 0 | None | No output is selected. |
| * | Available digital output and relay terminals | A dynamically generated selection of available digital output and relay terminals is presented as an option. The specific set depends on the type and number of I/O options installed in the system. |

P2.6.3.5 Pre-Charge Allowed Level**No. 5510**

Set the level (DC Voltage in % of the nominal dc voltage) below which pre-charge is allowed.

7.3.6.4 Main Circuit Breaker

The main circuit breaker control allows the operator to open, close, and monitor the main circuit breaker installed between the converter and the grid.

P2.6.4.1 MCB Close Output**No. 6551**

Set the digital output for the main circuit breaker closing command.

| No. | Name | Description |
|-----|--|--|
| 0 | None | No output is selected. |
| * | Available digital output and relay terminals | A dynamically generated selection of available digital output and relay terminals is presented as an option. The specific set depends on the type and number of I/O options installed in the system. |

P2.6.4.2 MCB Feedback Close Input No. 6552

Set the digital input for main circuit breaker closed-status feedback.

| No. | Name | Description |
|-----|--|---|
| 0 | False | No input is selected. A virtual value of FALSE is applied. |
| 1 | True | No input is selected. A virtual value of TRUE is applied. |
| * | Fieldbus control word digital input bits | Fieldbus CTW digital input bits 12-15. |
| * | Available digital input terminals | A dynamically generated selection of available digital input terminals is presented as an option. The specific set depends on the type and number of I/O options installed in the system. |

P2.6.4.3 MCB Feedback Open Input No. 6553

Set the digital input for the main circuit breaker open-status feedback.

| No. | Name | Description |
|-----|--|---|
| 0 | False | No input is selected. A virtual value of FALSE is applied. |
| 1 | True | No input is selected. A virtual value of TRUE is applied. |
| * | Fieldbus control word digital input bits | Fieldbus CTW digital input bits 12-15. |
| * | Available digital input terminals | A dynamically generated selection of available digital input terminals is presented as an option. The specific set depends on the type and number of I/O options installed in the system. |

P2.6.4.4 MCB Tripped Input No. 6554

Set the digital input for main circuit breaker tripped feedback.

| No. | Name | Description |
|-----|--|---|
| 0 | False | No input is selected. A virtual value of FALSE is applied. |
| 1 | True | No input is selected. A virtual value of TRUE is applied. |
| * | Fieldbus control word digital input bits | Fieldbus CTW digital input bits 12-15. |
| * | Available digital input terminals | A dynamically generated selection of available digital input terminals is presented as an option. The specific set depends on the type and number of I/O options installed in the system. |

P2.6.4.5 MCB Close Pulse Output No. 6555

Set the digital output for main circuit breaker closing pulse command.

| No. | Name | Description |
|-----|--|--|
| 0 | None | No output is selected. |
| * | Available digital output and relay terminals | A dynamically generated selection of available digital output and relay terminals is presented as an option. The specific set depends on the type and number of I/O options installed in the system. |

P2.6.4.6 MCB Open Pulse Output No. 6556

Set the digital output for main circuit breaker opening pulse command.

| No. | Name | Description |
|-----|--|--|
| 0 | None | No output is selected. |
| * | Available digital output and relay terminals | A dynamically generated selection of available digital output and relay terminals is presented as an option. The specific set depends on the type and number of I/O options installed in the system. |

P2.6.4.7 MCB Close Enable Input No. 6557

Set the digital input for main circuit breaker closing enable.

| No. | Name | Description |
|-----|--|---|
| 0 | False | No input is selected. A virtual value of FALSE is applied. |
| 1 | True | No input is selected. A virtual value of TRUE is applied. |
| * | Fieldbus control word digital input bits | Fieldbus CTW digital input bits 12-15. |
| * | Available digital input terminals | A dynamically generated selection of available digital input terminals is presented as an option. The specific set depends on the type and number of I/O options installed in the system. |

P2.6.4.8 MCB Feedback Fault Delay No. 6558

Delay in seconds after which the main circuit feedback fault becomes active when the feedback is missing.

P2.6.4.9 MCB Closing Mode No. 6559

Set the main circuit breaker closing mode configuration.

| No. | Name | Description |
|-----|---|---|
| 0 | DC-link Pre-Charge Ready | MCB close command is given after the DC-link pre-charge is ready. |
| 1 | Start Command | MCB close command is given after the DC-link pre-charge is ready and a start command is given. |
| 2 | DC-link Pre-Charge Ready or Start Command | In normal operation MCB close command is given after both the DC-link is pre-charged and a start command is active. When recovering from a fault, the MCB is immediately closed if the DC-link voltage is still above the pre-charge level. |
| 3 | LCL Filter Energized | MCB close command is given after the DC-link pre-charge is ready, start command is given, and the LCL filter has been energized. |

P2.6.4.10 MCB Opening Mode No. 6560

Set the main circuit breaker opening mode.

| No. | Name | Description |
|-----|--|--|
| 0 | DC Voltage Level | MCB open command is sent if the DC-link voltage is below the Pre-Charge Ready Level (No. 6566). |
| 1 | Stop Command or DC Voltage Level | MCB open command is sent if the stop command is given or the DC-link voltage is below the Pre-Charge Ready Level (No. 6566). |
| 2 | Fault Active or DC Voltage Level | MCB open command is sent if a fault is active or the DC-link voltage is below the Pre-Charge Ready Level (No. 6566). |
| 3 | Fault Active or Stop Command or DC Voltage Level | MCB open command is sent if a fault is active, a stop command is given, or the DC-link voltage is below the Pre-Charge Ready Level (No. 6566). |

7.3.6.5 LCL-Filter Energization

This group contains parameters for LCL-Filter energization-related settings. For general information about pre-charging the unit, refer to section 2.2 Start and Stop Sequence.

P2.6.5.1 Filter Voltage Ramp Time No. 5161

Set the ramp time (from 0 V to nominal grid voltage) for the filter voltage. The ramping is performed during LCL-filter energization when it is controlled by the converter.

P2.6.5.2 Max. Filter Energization Time No. 5162

Set maximum allowed time for filter energization. If this is exceeded a filter pre-charge timeout fault is declared and the main circuit breaker is opened.

7.3.7 Control Places

The AFE application features four different control places for determining how basic converter commands and references are interfaced. These control places are the MyDrive® Insight (PC Control), Local Control (via control panel), Fieldbus Control, and I/O Control.

Selection:

There are two methods for selecting which control place is active, or in other words in command of the converter. The first is a simple parameter selection, while the second is a set of signals that can be used to force or request for a specific control place to be in command.

Commands:

A control place is a source for basic control commands (start, stop, reset, and so on). When operating in I/O control, for instance, the converter cannot be started from the local or fieldbus control places. Control places do not dictate all possible commands. Specific features such as Quick Stop can be used regardless of the control place and must be configured separately.

7.3.7.1 Control Place Settings

This group contains general control place settings that mainly have to do with control place selection. The following figure presents the control place selection chain diagram. The default method for

selecting the control place is by using the parameter No. 114 Control Place Selection. It can be used to select the active control place between Local, Fieldbus, and I/O control.

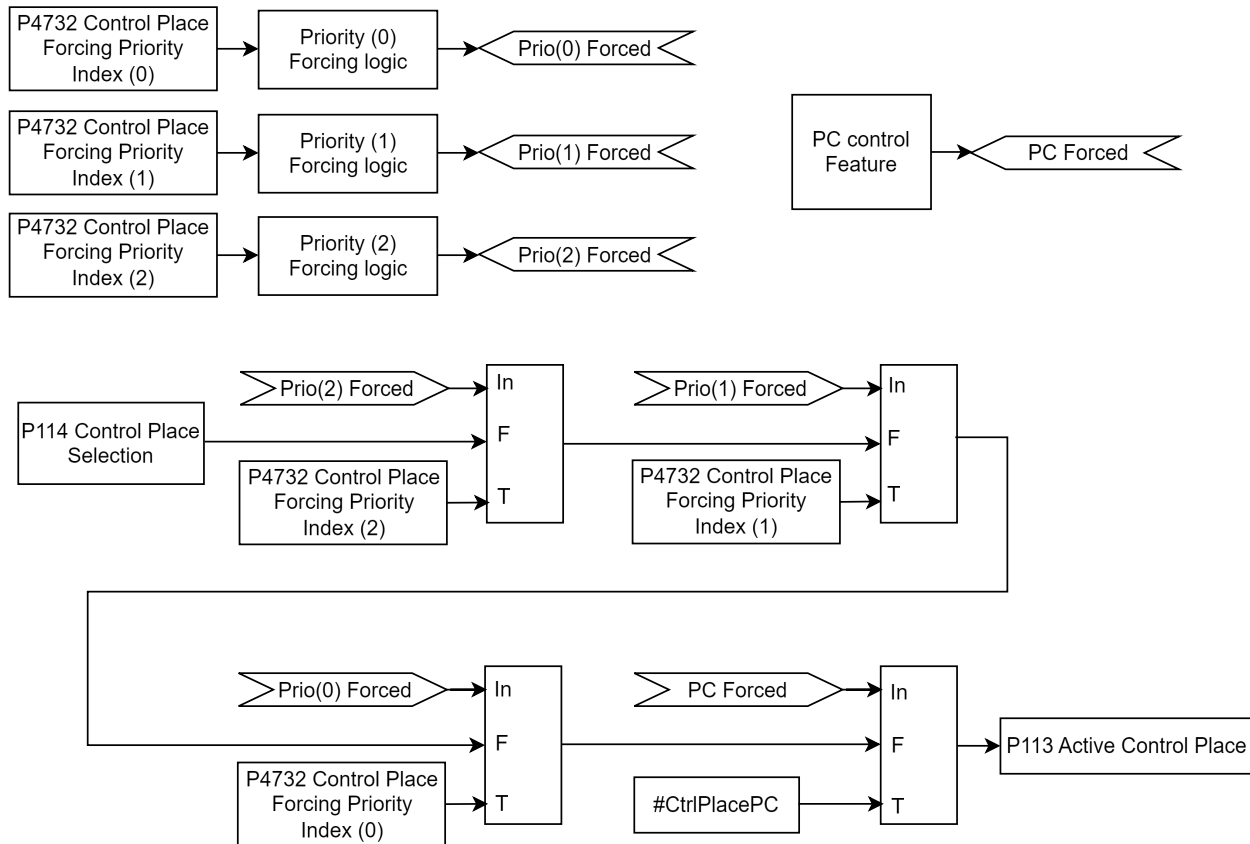


Figure 50: Control place selection chain diagram.

The second option for control place selection is to use control place forcing signals, which overrides the selection made with the parameter, and can be used to swap between different control places, for example via external push buttons or switches. The forcing signals for Fieldbus and I/O control can be mapped to digital inputs or fieldbus, and the Local control forcing is activated with the REM/LOC button of the control panel.

The priority order for the forceable control places is configured with parameter No. 4732. The priority order affects the final control place selection if two or more control places are forced on simultaneously. For example: if Fieldbus is selected for highest priority with Index-0, and I/O for the next highest priority with index-1, and both control places are forced on simultaneously, fieldbus is selected as the active control place. After Fieldbus forcing is removed, the control place falls to I/O because it has higher priority than the parameter selection.

The only control place which can take over the control from any other control place regardless of forcing inputs is the MyDrive® Insight. Control is overtaken by requesting it via the tool itself. By default, the converter uses the following control place priority order:
MyDrive® Insight > Local Control > I/O > Fieldbus > Parameter Selection

Forcing can be further configured with parameter No. 1972 which defines whether each forcing signal is treated as a state sensitive or toggled signal.

Parameter No. 4800 can also be used to define how the converter behaves when an active control place releases control. The options are to either release control immediately or only if another control place requests control.

When a control place is changed, the converter either stops or continues operating (modulation) based on the settings defined with parameters No. 108, No. 5112, and No. 5111, respectively for each control place.

P2.7.1.1 Control Place Selection No. 114

Select the active control place.

| No. | Name | Description |
|-----|------------------|-------------|
| 0 | PC control | |
| 1 | Local control | |
| 2 | Fieldbus control | |
| 3 | I/O control | |

P2.7.1.2 Force FB Control Input No. 4511

Select an input terminal for forcing the control place to Fieldbus.

| No. | Name | Description |
|-----|--|---|
| 0 | False | No input is selected. A virtual value of FALSE is applied. |
| 1 | True | No input is selected. A virtual value of TRUE is applied. |
| * | Fieldbus control word digital input bits | Fieldbus CTW digital input bits 12-15. |
| * | Available digital input terminals | A dynamically generated selection of available digital input terminals is presented as an option. The specific set depends on the type and number of I/O options installed in the system. |

P2.7.1.3 Force I/O Control Input No. 4513

Select an input terminal for forcing the control place to I/O.

| No. | Name | Description |
|-----|--|---|
| 0 | False | No input is selected. A virtual value of FALSE is applied. |
| 1 | True | No input is selected. A virtual value of TRUE is applied. |
| * | Fieldbus control word digital input bits | Fieldbus CTW digital input bits 12-15. |
| * | Available digital input terminals | A dynamically generated selection of available digital input terminals is presented as an option. The specific set depends on the type and number of I/O options installed in the system. |

P2.7.1.4 Control Place Forcing Mode **No. 1972**

Select whether each control place forcing signal is treated as a state sensitive or a toggled signal. With toggling enabled, the forcing is activated by the first rising edge, and deactivated by the second rising edge of the forcing signal.

| No. | Name | | Description |
|-----|------------|-------------|-------------|
| 0 | FB: State | I/O: State | |
| 1 | FB: Toggle | I/O: State | |
| 2 | FB: State | I/O: Toggle | |
| 3 | FB: Toggle | I/O: Toggle | |

P2.7.1.5 Control Place Independent Reset **No. 109**

Enable faults to be reset from all control places. The reset command goes through regardless of whether it was given from the active control place or not.

| No. | Name | Description |
|-----|----------|---|
| 0 | Disabled | Reset goes through only from active control place. |
| 1 | Enabled | Reset goes through from all control places regardless of whether it was given from the active control place or not. |

P2.7.1.6 Control Place Release Mode **No. 4800**

Select the action after the control place is released from the forced control places, as well as from control panel or PC control. When set to "Change After Release" the control place is changed after releasing to other forced place highest in priority order, or in case no forced places are used, to the place defined with parameter "Control Place Selection". When set to "Retain After Release" the control place is not changed after releasing, but only after the operator changes the control place by forcing or from parameter "Control Place Selection".

| No. | Name | Description |
|-----|----------------------|---|
| 0 | Retain After Release | When the forcing of the currently active control place is released, a new forcing command is required from another control place, for the active control place to change. |
| 1 | Change After Release | When the forcing of the currently active control place is released, the control place is changed immediately. |

P2.7.1.7 Control Place Forcing Priority No. 4732

Set the control place priority when using control place forcing inputs. The parameter is an array where the priority is specified in decreasing order of the array members (Index 0-2). Therefore, in case multiple control places are requested simultaneously, the selection made with Index 0 prevails on the selection made with Index 1, and so on. If a control place is not assigned any priority, its forcing signal is disabled.

| Index | Name | Description |
|-------|------------------------------------|---|
| 0 | Highest priority control place | Select the control place with the highest priority from the following list: <ul style="list-style-type: none"> • Local control • Fieldbus • I/O |
| 1 | 2nd highest priority control place | Select the control place with the second highest priority from the following list: <ul style="list-style-type: none"> • Local control • Fieldbus • I/O |
| 2 | Lowest priority control place | Select the control place with the lowest priority from the following list: <ul style="list-style-type: none"> • Local control • Fieldbus • I/O |

7.3.7.2 Local Control

Local control, also known as panel control, can be selected by the Selection parameter or by overriding control by pressing the REM/LOC button on the panel. When control is released from the panel, the control place is determined by the Selection parameter or forcing signals. The converter offers a protection feature for monitoring the connection between the converter and the panel (parameter No. 5420). If the connection is lost while the panel is in control of the converter, the converter will force-release the control to the next control place in line. Do note that if Local control has not been given any priority with parameter No. 4732 the change to Local control is disabled with the REM/LOC button.

P2.7.2.1 Local Control Mode No. 107

Select restrictions of local control by the control panel. Use this parameter to influence the amount of control anyone accessing the control panel can have on the operation of the converter.

| No. | Name | Description |
|-----|---------------------|---|
| 0 | Allow Local Control | Local Control can become the active control place. Local control can both start and stop the converter. |
| 1 | Deny Local Start | Local Control can become the active control place. Local control cannot start the converter, but it can stop it. |
| 2 | Deny Local Control | Local Control cannot become the active control place. |

P2.7.2.2 Continue Operation in Local Control No. 108

Select whether the start request is retained when the converter is running, and the control place is changed to local control.

| No. | Name | Description |
|-----|----------|---|
| 0 | Disabled | The drive stops when the active control place is changed. |
| 1 | Enabled | The drive continues operating through the control place transition. |

7.3.7.3 I/O Control

The I/O control place is designed to give basic commands (start, stop, reset, and so on) to the converter via a set of digital input signals.

P2.7.3.1 I/O Start Input No. 200

Set the input source for starting the unit when the active control place is I/O Control.

| No. | Name | Description |
|-----|--|---|
| 0 | False | No input is selected. A virtual value of FALSE is applied. |
| 1 | True | No input is selected. A virtual value of TRUE is applied. |
| * | Fieldbus control word digital input bits | Fieldbus CTW digital input bits 12-15. |
| * | Available digital input terminals | A dynamically generated selection of available digital input terminals is presented as an option. The specific set depends on the type and number of I/O options installed in the system. |

P2.7.3.2 I/O Stop Input No. 201

Set the input source for stopping the unit when the active control place is I/O Control. The functionality is inverted so stop is activated when the input becomes low.

| No. | Name | Description |
|-----|--|---|
| 0 | False | No input is selected. A virtual value of FALSE is applied. |
| 1 | True | No input is selected. A virtual value of TRUE is applied. |
| * | Fieldbus control word digital input bits | Fieldbus CTW digital input bits 12-15. |
| * | Available digital input terminals | A dynamically generated selection of available digital input terminals is presented as an option. The specific set depends on the type and number of I/O options installed in the system. |

P2.7.3.3 I/O Reset Input **No. 203**

Select the input source for the reset command for when the converter operates in I/O control.

| No. | Name | Description |
|-----|--|---|
| 0 | False | No input is selected. A virtual value of FALSE is applied. |
| 1 | True | No input is selected. A virtual value of TRUE is applied. |
| * | Fieldbus control word digital input bits | Fieldbus CTW digital input bits 12-15. |
| * | Available digital input terminals | A dynamically generated selection of available digital input terminals is presented as an option. The specific set depends on the type and number of I/O options installed in the system. |

P2.7.3.4 I/O Start Mode **No. 213**

Select whether start commands for I/O control are state, rising-edge, or pulse sensitive.

| No. | Name | Description |
|-----|-------------------|--|
| 0 | State High Start | <p>A start is requested based on the high state of the signal.</p> <p>When the start signal is removed the converter stops modulation.</p> <p>In case the start signal is high when a fault is cleared, or a separate stop signal (quick stop, for example) is removed, the converter starts running immediately.</p> <p>If the converter is stopped from the control panel, a new start signal is needed.</p> <p>Any active stop signal blocks the start.</p> |
| 1 | Rising Edge Start | <p>A start is requested based on the combination of the rising-edge and the high-state of the signal.</p> <p>When the start signal is removed, the converter stops modulation.</p> <p>The converter does not start running in case the start signal is high when a fault is cleared, or a separate stop signal (quick stop, for example) is removed.</p> <p>Any active stop signal blocks the start.</p> |
| 2 | High Pulse Start | <p>A start is requested based on the rising edge of the signal.</p> <p>The converter is stopped with a rising edge of a separate stop signal.</p> <p>The converter does not start running in case the start signal is high when a fault is cleared, or a separate stop signal (quick stop, for example) is removed.</p> <p>Any active stop signal blocks the start.</p> |

P2.7.3.5 Continue Operation in I/O Control No. 5111

Select whether the start request is retained when the converter is running and the control place is changed to I/O, while using edge-sensitive start modes. Any active stop command or auxiliary function such as quick stop can still prohibit continuing the operation.

| No. | Name | Description |
|-----|----------|---|
| 0 | Disabled | The converter stops when the active control place is changed. |
| 1 | Enabled | The converter continues operating through the control place transition. |

7.3.7.4 Fieldbus Control

The converter can be controlled through a fieldbus master. When fieldbus is selected as the active control place, the converter monitors active fieldbus connections for control commands.

P2.7.4.1 Continue Operation in Fieldbus Control No. 5112

Select whether the start request is retained when the converter is running and the control place is changed to fieldbus. Any active stop command or auxiliary function such as quick stop can still prohibit continuing operation. Continuation is possible only if the start is requested from fieldbus before the control place is changed to it.

| No. | Name | Description |
|-----|----------|---|
| 0 | Disabled | The converter stops when the active control place is changed. |
| 1 | Enabled | The drive continues operating through the control place transition. |

P2.7.4.2 **Fieldbus Start Mode** **No. 5114**

Select whether start commands for Fieldbus Control are state or rising-edge sensitive.

| No. | Name | Description |
|-----|-------------------|---|
| 0 | State High Start | <p>A start is requested based on the high state of the signal.</p> <p>When the start signal is removed the converter stops modulation.</p> <p>In case the start signal is high when a fault is cleared, or a separate stop signal (quick stop, for example) is removed, the converter starts running immediately.</p> <p>If converter is stopped from control panel a new start signal is needed.</p> <p>Any active stop signal blocks the start.</p> |
| 1 | Rising Edge Start | <p>A start is requested based on the combination of the rising-edge and the high-state of the signal.</p> <p>When the start signal is removed the converter stops modulation.</p> <p>The converter does not start running in case the start signal is high when a fault is cleared, or a separate stop signal (quick stop, for example) is removed.</p> <p>Any active stop signal blocks the start.</p> |

7.3.8 **Converter Control**

This group holds settings related to the converter's modulation, advanced grid and DC-link control, power unit, fan control, and LCL-Filter.

7.3.8.1 **Modulation**

This group contains parameters for fine-tuning modulation settings.

P2.8.1.1 **Switching Frequency** **No. 2920**

Set the switching frequency. The actual switching frequency is regulated by the converter itself, and it can be derated by some protection functions.

P2.8.1.2 Modulator Options **No. 5093**

Advanced modulator options.

| Bit. No. | Name | Description |
|----------|---|-------------|
| 0 | Disable compensation of non-linearities | |
| 1 | Disable deadtime compensation based on feedback | |
| 2 | Use filtered DC voltage over the whole speed range | |
| 3 | Prohibit pulse dropping when reaching voltage ceiling | |
| 4 | Optimized minimum pulse logic for carrier synchronization | |

P2.8.1.3 Modulator Type **No. 5100**

Select the modulator type.

| No. | Name | Description |
|-----|----------------|---|
| 1 | SVPWM | Standard Space Vector Pulse Width Modulation. Use in special applications, where automatic change of PWM carrier frequency and modulation pattern can cause issues. Drive derating is required. |
| 4 | CMRPWM | The CMR modulator optimizes the common-mode voltage waveform. Can be useful with certain drive configurations to minimize motor or generator voltage spikes. The modulator does not support independent paralleling. If paralleling sync. is enabled (with param No. 9654) the modulator type is internally forced to Grid Converter. Recommended selection for Active Front-End drives. |
| 5 | Grid Converter | The modulator optimizes the trade-off between losses and harmonics. Recommended selection for most power conversion applications. Modulation parameters are automatically set. |

7.3.8.2 Advanced Grid Control

This group contains parameters for fine-tuning grid control settings.

P2.8.2.1 Active Current Kp **No. 2868**

Set scaling of internally computed active current controller proportional gain.

P2.8.2.2 Active Current Ti **No. 2869**

Set scaling of internally computed active current controller integral time.

P2.8.2.3 Grid PLL Tc **No. 9659**

Time constant defining the bandwidth of the grid synchronization PLL.

P2.8.2.4 Active Damping Kp No. 2871

Scaling of internally computed active damping gain used to control LCL filter resonance.

P2.8.2.5 Reactive Current Kp No. 2849

Scaling of internally computed reactive current controller proportional gain.

P2.8.2.6 Reactive Current Ti No. 2850

Scaling of internally computed reactive current controller integral time.

P2.8.2.7 Grid Control Options No. 9658

Set the grid control options word.

| Bit. No. | Name | Description |
|----------|---|-------------|
| 0 | Disable observer in control | |
| 1 | Enable LCL filter pre-charge | |
| 2 | Enable AFE current control voltage feedforward based on an external voltage measurement | |

P2.8.2.8 Paralleling Sync. Run Kp No. 9655

Proportional gain of the PWM carrier synchronization control in run state.

P2.8.2.9 Paralleling Sync. Stop Kp No. 9656

Proportional gain of the PWM carrier synchronization control in stop state.

P2.8.2.10 Paralleling Sync. Shift Kp No. 9657

Proportional gain of the common mode current control.

P2.8.2.11 Harmonic Current Control Gain No. 6519

Integrator gain of the Harmonic current control.

7.3.8.3 Advanced DC-Link Control

This group contains parameters for fine-tuning DC-link voltage control settings.

P2.8.3.1 DC-link Voltage Ctrl. Kp No. 2902

Scaling of internally computed DC voltage control proportional gain.

P2.8.3.2 DC-link Voltage Ctrl. Ti No. 2903

Scaling of internally computed DC-link voltage control integral time.

P2.8.3.3 DC-link Voltage Ctrl. Td No. 2907

Scaling of internally computed DC-link voltage control differential time.

P2.8.3.4 DC-link Voltage Droop. Tc No. 5095

Filtering time constant of active current when DC-link voltage drooping is used. Refer to chapter 2.1.1 General Features and the subchapter Paralleling AFEs for additional information regarding DC-link voltage drooping.

7.3.8.4 Power Unit Settings

This group contains parameters for setting up the converter's power units.

P2.8.4.1 Power Unit Enable Mask **No. 2835**

Select which of the commissioned power units are enabled.

The value is given bitwise per each unit. Bit 0 corresponds to the first port in the star coupler board, and bit 15 to the 16th port and so on. An active bit enables the corresponding power unit, and an inactive bit disables it.

This parameter is relevant only for drives with multiple power units, connected to the control board with the star coupler board. Faulty or redundant power units can be disabled temporarily to allow running with reduced capacity. All internal protection functions adjust to the number of enabled power units.

WARNING

Depending on the system's hardware configuration, it might be necessary to galvanically isolate the disabled units and all associated filters from the system. Failing to do so can increase the risk of resonance and damage the rest of the system. Contact Danfoss technical support for further instructions before using this functionality.

NOTICE

This parameter cannot be edited when the drive is running.

NOTICE

After Factory Reset or Node Commissioning, the drive automatically sets this parameter to activate the nominal number of power units starting sequentially from the first port of the star coupler board. If the drive has several power units, but this parameter does not have the correct value at initial start, it is recommended to run Factory Reset and power-cycle the drive. This operation resets the Power Unit Enable Mask to correspond with the nominal number of power units.

P2.8.4.2 DC-link Voltage Measurement Corr. Gain **No. 6535**

Set the DC-link voltage measurement correction gain for parallel units.

P2.8.4.3 DC-link Voltage Measurement Corr. Offset **No. 6534**

Set the DC-link voltage measurement correction offset for parallel units.

P2.8.4.4 HF DC-link Filter Mode **No. 2944**

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

| Bit. No. | Name | Description |
|----------|-----------------|-------------|
| 0 | Filter inactive | |
| 1 | Filter active | |

7.3.8.5 Cooling Fan Control

This group contains parameters for setting up the control of the converter's cooling fans. These parameters are relevant only for air-cooled units.

P2.8.5.1 Main Fan Minimum Speed **No. 2932**

Set the minimum speed of the main cooling fan. The main cooling fans handle the cooling demand for the power modules and passive components placed in the cooling channel. The fan's actual speed depends on the operating conditions of the drive.

7.3.8.6 LCL-Filter

This group contains parameters for the LCL-Filter inductors and capacitors.

P2.8.6.1 LCL Filter L1 **No. 2904**

Set the converter side filter inductance.

P2.8.6.2 LCL Filter Cf **No. 2905**

Set the filter capacitance.

P2.8.6.3 LCL Filter L2 **No. 2906**

Set the grid side filter inductance.

7.3.9 Protections and Responses

This group contains parameters for applying most the converter's protection related configurations.

7.3.9.1 General Settings

P2.9.1.1 Retry after Fault **No. 2927**

Enables retry functionality (ride-through) functionality for the following fault type events. The number of retry attempts and the retry window depend on the event and the size and rating of the power unit.

| No. | Name | Description |
|-----|----------|-------------|
| 0 | Disabled | |
| 1 | Enabled | |

The following fault type events are retry-capable:

| Name | Number | Name | Number | Name | Number |
|--------------------------|--------|-----------------------|--------|------------------------|--------|
| Ground Fault 2 | 4354 | Output Current High 1 | 4369 | Output Current High 2 | 4370 |
| Brake Ch. Switch Shorted | 4403 | DC-link Voltage Low | 4146 | DC-link Voltage High 2 | 4144 |

7.3.9.2 Misc. Responses

P2.9.2.1 DC-link Voltage Ripple Response No. 2929

Select the mode of excessive DC-link voltage ripple protection. Excessive voltage ripples are detected when the peak-to-peak amplitude of the DC voltage exceeds the converter's internal limit for too long a time. Both the limit and time depend on the power unit type and rating.

| No. | Name | Description |
|-----|------------------------------|---|
| 0 | Disabled | Effectively nothing is done when excessive rippling is detected. |
| 1 | Fault | After detecting excessive ripples for too long, the converter will issue a fault and stop modulation. |
| 2 | Automatically derate + Fault | After detecting excessive ripples, the converter will derate the maximum allowed output frequency. If the derating does not reduce the rippling soon enough, the converter issues a fault and stop modulation. The derating is released if the ripple amplitude is reduced below the detection limit. |

P2.9.2.2 LCL Fan Fail Response No. 2941

Select the converter response to an LCL Fan Fail.

| No. | Name | Description |
|-----|-----------------|---|
| 0 | No response | - |
| 1 | Info | The converter issues an info event. |
| 3 | Warning | The converter issues a warning event. |
| 10 | Fault | The converter issues a fault event and stops modulation. |
| 11 | Fault, Open MCB | The converter issues a fault event, stops modulation, and opens the main circuit breaker. |

7.3.9.3 External Event

External events are protection functions which the operator can configure to trigger converter events (warnings, faults, and so on) through inputs. Two separate events are available, both can be triggered with an active-high or active-low signals.

P2.9.3.1 External Event 1 Input No. 4557

Select an input for the external event.

| No. | Name | Description |
|-----|--|---|
| 0 | None (False) | No input is selected. A virtual value of FALSE is applied. |
| 1 | None (True) | No input is selected. A virtual value of TRUE is applied. |
| * | Fieldbus control word 1 digital input bits | Fieldbus CTW1 digital input bits 12-15 are presented as options. |
| * | Available digital input terminals | A dynamically generated selection of available digital input terminals is presented as an option. The specific set depends on the type and number of I/O options installed in the system. |

P2.9.3.2 Ext. Event 1 Inverse Input No. 4558

Select an inverted input for the external event 1 function.

| No. | Name | Description |
|-----|--|---|
| 0 | None (False) | No input is selected. A virtual value of FALSE is applied. |
| 1 | None (True) | No input is selected. A virtual value of TRUE is applied. |
| * | Fieldbus control word 1 digital input bits | Fieldbus CTW1 digital input bits 12-15 are presented as options. |
| * | Available digital input terminals | A dynamically generated selection of available digital input terminals is presented as an option. The specific set depends on the type and number of I/O options installed in the system. |

P2.9.3.3 External Event 1 Response No. 4559

Select the response to an external event.

| No. | Name | Description |
|-----|-----------------|---|
| 0 | No response | - |
| 1 | Info | The converter issues an info event. |
| 3 | Warning | The converter issues a warning event. |
| 10 | Fault | The converter issues a fault event and stops modulation. |
| 11 | Fault, Open MCB | The converter issues a fault event, stops modulation, and opens the main circuit breaker. |

P2.9.3.4 External Event 2 Input No. 4560

Select an input for the external event.

| No. | Name | Description |
|-----|--|---|
| 0 | None (False) | No input is selected. A virtual value of FALSE is applied. |
| 1 | None (True) | No input is selected. A virtual value of TRUE is applied. |
| * | Fieldbus control word 1 digital input bits | Fieldbus CTW1 digital input bits 12-15 are presented as options. |
| * | Available digital input terminals | A dynamically generated selection of available digital input terminals is presented as an option. The specific set depends on the type and number of I/O options installed in the system. |

P2.9.3.5 Ext. Event 2 Inverse Input**No. 4561**

Select an inverted input for the external event 2 function.

| No. | Name | Description |
|-----|--|---|
| 0 | None (False) | No input is selected. A virtual value of FALSE is applied. |
| 1 | None (True) | No input is selected. A virtual value of TRUE is applied. |
| * | Fieldbus control word 1 digital input bits | Fieldbus CTW1 digital input bits 12-15 are presented as options. |
| * | Available digital input terminals | A dynamically generated selection of available digital input terminals is presented as an option. The specific set depends on the type and number of I/O options installed in the system. |

P2.9.3.6 External Event 2 Response**No. 4562**

Select the response to an external event.

| No. | Name | Description |
|-----|-----------------|---|
| 0 | No response | - |
| 1 | Info | The converter issues an info event. |
| 3 | Warning | The converter issues a warning event. |
| 10 | Fault | The converter issues a fault event and stops modulation. |
| 11 | Fault, Open MCB | The converter issues a fault event, stops modulation, and opens the main circuit breaker. |

7.3.9.4 Cooling Monitor

The cooling monitor feature is relative for liquid-cooled converters. It is designed to allow the converter to receive a single digital signal from the cooling unit when it experiences errors. The converter then acts as the operator has configured.

P2.9.4.1 Cooling Monitor Input**No. 2400**

Select the input for the negated cooling monitor signal.

| No. | Name | Description |
|-----|--|---|
| 0 | None (False) | No input is selected. A virtual value of FALSE is applied. |
| 1 | None (True) | No input is selected. A virtual value of TRUE is applied. |
| * | Fieldbus control word 1 digital input bits | Fieldbus CTW1 digital input bits 12-15 are presented as options. |
| * | Available digital input terminals | A dynamically generated selection of available digital input terminals is presented as an option. The specific set depends on the type and number of I/O options installed in the system. |

P2.9.4.2 Cooling Monitor Fault Delay**No. 2401**

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

P2.9.4.3 Cooling Monitor Response

No. 2402

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

| No. | Name | Description |
|-----|---|---|
| 0 | Warning while running | The converter issues a warning if the cooling signal is lost, and the converter is running. |
| 1 | Warning | The converter issues a warning if the cooling signal is lost. |
| 2 | Warning, Fault after Timeout while running | The converter issues a warning if the cooling signal is lost. If the converter is running the event is escalated into a fault after the fault delay (No. 2401). |
| 3 | Warning and Fault after Timeout while running | The converter issues a warning if the cooling signal is lost, and the converter is running. After the fault delay (No. 2401) the event is escalated into a fault. |

7.3.9.5 Measured Temp. Protection

The measured temperature protection offers 10 individual protection channels for monitoring temperatures of external devices like filters or motor windings through temperature probes. Each protection can be configured to trigger an individual event, which can be used to identify the source of the high temperature measurement.

Each protection has two configurable stages, as illustrated in the following figure. Stage 1 is used to trigger a warning, while stage 2 can be used to trigger a more severe event, which can possibly stop the converter (fault). The operator can configure the activation levels of both stages and the event response of stage 2. The levels of both stages can be configured to be the same, if two stages are unnecessary.

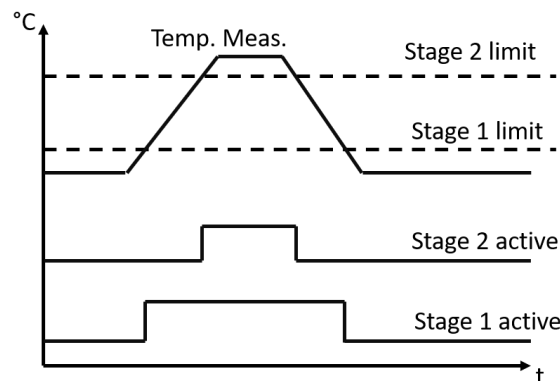


Figure 51: Operation principle of temperature measurement protection function.

Additionally, a temperature measurement range check feature is also available, as presented in the following figure. A range can be defined for checking the validity of each measured temperature protection. If the absolute measurement value of any protection exceeds this range, a separate event can be triggered.

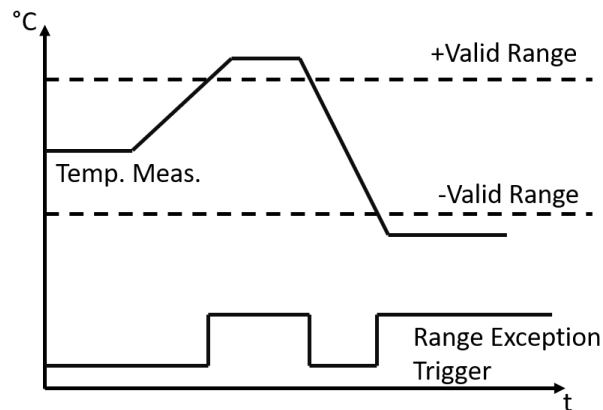


Figure 52: Operation principle of temperature measurement range check.

7.3.9.5.1 Temp. 1 Protection

P2.9.5.1.1 Temp. 1 Input **No. 5206**

Select the temperature sensor input for the temperature protection.

P2.9.5.1.2 Temp. 1 Limit 1 **No. 5207**

Set the temperature level for issuing a warning.

P2.9.5.1.3 Temp. 1 Limit 2 **No. 5208**

Set the temperature level for issuing a protection response.

P2.9.5.1.4 Temp. 1 Limit 2 Response **No. 5209**

Select the response for exceeding the limit.

| No. | Name | Description |
|-----|-----------------|---|
| 0 | No response | - |
| 1 | Info | The converter issues an info event. |
| 3 | Warning | The converter issues a warning event. |
| 10 | Fault | The converter issues a fault event and stops modulation. |
| 11 | Fault, Open MCB | The converter issues a fault event, stops modulation, and opens the main circuit breaker. |

7.3.9.5.2 Temp. 2 Protection

P2.9.5.2.1 Temp. 2 Input **No. 5210**

Select the temperature sensor input for the temperature protection.

P2.9.5.2.2 Temp. 2 Limit 1 **No. 5211**

Set the temperature level for issuing a warning.

P2.9.5.2.3 Temp. 2 Limit 2 **No. 5212**

Set the temperature level for issuing a protection response.

P2.9.5.2.4 Temp. 2 Limit 2 Response**No. 5213**

Select the response for exceeding the limit.

| No. | Name | Description |
|-----|-----------------|---|
| 0 | No response | - |
| 1 | Info | The converter issues an info event. |
| 3 | Warning | The converter issues a warning event. |
| 10 | Fault | The converter issues a fault event and stops modulation. |
| 11 | Fault, Open MCB | The converter issues a fault event, stops modulation, and opens the main circuit breaker. |

7.3.9.5.3 Temp. 3 Protection**P2.9.5.3.1 Temp. 3 Input No. 5214**

Select the temperature sensor input for the temperature protection.

P2.9.5.3.2 Temp. 3 Limit 1 No. 5215

Set the temperature level for issuing a warning.

| No. | Name | Description |
|-----|-----------------|---|
| 0 | No response | - |
| 1 | Info | The converter issues an info event. |
| 3 | Warning | The converter issues a warning event. |
| 10 | Fault | The converter issues a fault event and stops modulation. |
| 11 | Fault, Open MCB | The converter issues a fault event, stops modulation, and opens the main circuit breaker. |

P2.9.5.3.3 Temp. 3 Limit 2 No. 5216

Set the temperature level for issuing a protection response.

P2.9.5.3.4 Temp. 3 Limit 2 Response No. 5217

Select the response for exceeding the limit.

| No. | Name | Description |
|-----|-----------------|---|
| 0 | No response | - |
| 1 | Info | The converter issues an info event. |
| 3 | Warning | The converter issues a warning event. |
| 10 | Fault | The converter issues a fault event and stops modulation. |
| 11 | Fault, Open MCB | The converter issues a fault event, stops modulation, and opens the main circuit breaker. |

7.3.9.5.4 Temp. 4 Protection**P2.9.5.4.1 Temp. 4 Input No. 5218**

Select the temperature sensor input for the temperature protection.

P2.9.5.4.2 Temp. 4 Limit 1 No. 5219

Set the temperature level for issuing a warning.

P2.9.5.4.3 Temp. 4 Limit 2 No. 5220

Set the temperature level for issuing a protection response.

P2.9.5.4.4 Temp. 4 Limit 2 Response No. 5221

Select the response for exceeding the limit.

| No. | Name | Description |
|-----|-----------------|---|
| 0 | No response | - |
| 1 | Info | The converter issues an info event. |
| 3 | Warning | The converter issues a warning event. |
| 10 | Fault | The converter issues a fault event and stops modulation. |
| 11 | Fault, Open MCB | The converter issues a fault event, stops modulation, and opens the main circuit breaker. |

7.3.9.5.5 Temp. 5 Protection

P2.9.5.5.1 Temp. 5 Input No. 5222

Select the temperature sensor input for the temperature protection.

P2.9.5.5.2 Temp. 5 Limit 1 No. 5223

Set the temperature level for issuing a warning.

P2.9.5.5.3 Temp. 5 Limit 2 No. 5224

Set the temperature level for issuing a protection response.

P2.9.5.5.4 Temp. 5 Limit 2 Response No. 5225

Select the response for exceeding the limit.

| No. | Name | Description |
|-----|-----------------|---|
| 0 | No response | - |
| 1 | Info | The converter issues an info event. |
| 3 | Warning | The converter issues a warning event. |
| 10 | Fault | The converter issues a fault event and stops modulation. |
| 11 | Fault, Open MCB | The converter issues a fault event, stops modulation, and opens the main circuit breaker. |

7.3.9.5.6 Temp. 6 Protection

P2.9.5.6.1 Temp. 6 Input No. 5226

Select the temperature sensor input for the temperature protection.

P2.9.5.6.2 Temp. 6 Limit 1 No. 5227

Set the temperature level for issuing a warning.

P2.9.5.6.3 Temp. 6 Limit 2 No. 5228

Set the temperature level for issuing a protection response.

P2.9.5.6.4 Temp. 6 Limit 2 Response No. 5229

Select the response for exceeding the limit.

| No. | Name | Description |
|-----|-----------------|---|
| 0 | No response | - |
| 1 | Info | The converter issues an info event. |
| 3 | Warning | The converter issues a warning event. |
| 10 | Fault | The converter issues a fault event and stops modulation. |
| 11 | Fault, Open MCB | The converter issues a fault event, stops modulation, and opens the main circuit breaker. |

7.3.9.5.7 Temp. 7 Protection

P2.9.5.7.1 Temp. 7 Input No. 5239

Select the temperature sensor input for the temperature protection.

P2.9.5.7.2 Temp. 7 Limit 1 No. 5243

Set the temperature level for issuing a warning.

P2.9.5.7.3 Temp. 7 Limit 2 No. 5269

Set the temperature level for issuing a protection response.

P2.9.5.7.4 Temp. 7 Limit 2 Response No. 5235

Select the response for exceeding the limit.

| No. | Name | Description |
|-----|-----------------|---|
| 0 | No response | - |
| 1 | Info | The converter issues an info event. |
| 3 | Warning | The converter issues a warning event. |
| 10 | Fault | The converter issues a fault event and stops modulation. |
| 11 | Fault, Open MCB | The converter issues a fault event, stops modulation, and opens the main circuit breaker. |

7.3.9.5.8 Temp. 8 Protection

P2.9.5.8.1 Temp. 8 Input No. 5240

Select the temperature sensor input for the temperature protection.

P2.9.5.8.2 Temp. 8 Limit 1 No. 5247

Set the temperature level for issuing a warning.

P2.9.5.8.3 Temp. 8 Limit 2 No. 5270

Set the temperature level for issuing a protection response.

P2.9.5.8.4 Temp. 8 Limit 2 Response**No. 5236**

Select the response for exceeding the limit.

| No. | Name | Description |
|-----|-----------------|---|
| 0 | No response | - |
| 1 | Info | The converter issues an info event. |
| 3 | Warning | The converter issues a warning event. |
| 10 | Fault | The converter issues a fault event and stops modulation. |
| 11 | Fault, Open MCB | The converter issues a fault event, stops modulation, and opens the main circuit breaker. |

7.3.9.5.9 Temp. 9 Protection**P2.9.5.9.1 Temp. 9 Input No. 5241**

Select the temperature sensor input for the temperature protection.

P2.9.5.9.2 Temp. 9 Limit 1 No. 5249

Set the temperature level for issuing a warning.

P2.9.5.9.3 Temp. 9 Limit 2 No. 5271

Set the temperature level for issuing a protection response.

P2.9.5.9.4 Temp. 9 Limit 2 Response No. 5237

Select the response for exceeding the limit.

| No. | Name | Description |
|-----|-----------------|---|
| 0 | No response | - |
| 1 | Info | The converter issues an info event. |
| 3 | Warning | The converter issues a warning event. |
| 10 | Fault | The converter issues a fault event and stops modulation. |
| 11 | Fault, Open MCB | The converter issues a fault event, stops modulation, and opens the main circuit breaker. |

7.3.9.5.10 Temp. 10 Protection**P2.9.5.10.1 Temp. 10 Input No. 5242**

Select the temperature sensor input for the temperature protection.

P2.9.5.10.2 Temp. 10 Limit 1 No. 5268

Set the temperature level for issuing a warning.

P2.9.5.10.3 Temp. 10 Limit 2 No. 5272

Set the temperature level for issuing a protection response.

P2.9.5.10.4 Temp. 10 Limit 2 Response**No. 5238**

Select the response for exceeding the limit.

| No. | Name | Description |
|-----|-----------------|---|
| 0 | No response | - |
| 1 | Info | The converter issues an info event. |
| 3 | Warning | The converter issues a warning event. |
| 10 | Fault | The converter issues a fault event and stops modulation. |
| 11 | Fault, Open MCB | The converter issues a fault event, stops modulation, and opens the main circuit breaker. |

7.3.9.5.11 Common**P2.9.5.11.1 Meas. Valid Range****No. 5230**

Set a valid reading range for the temperature probe measurements. The first element of the array is the higher and the second element the lower limit. An event is triggered if 1 of the readings goes above the higher, or below the lower limit.

P2.9.5.11.2 Meas. Out of Range Response**No. 5231**

Select the converter response when 1 or more of the probes exceed the valid range.

| No. | Name | Description |
|-----|-----------------|---|
| 0 | No response | - |
| 1 | Info | The converter issues an info event. |
| 3 | Warning | The converter issues a warning event. |
| 10 | Fault | The converter issues a fault event and stops modulation. |
| 11 | Fault, Open MCB | The converter issues a fault event, stops modulation, and opens the main circuit breaker. |

7.3.9.6 Thermistor Monitoring

The thermistor monitoring function provides three input channels that can be connected to a Positive Temperature Coefficient (PTC) type sensor. After a threshold of 4 kilo-ohms is exceeded in the input, an event is triggered. The event response can be configured.

P2.9.6.1 Thermistor Monitoring Response**No. 5232**

Select the response to all thermistor monitoring events.

| No. | Name | Description |
|-----|-----------------|---|
| 0 | No response | - |
| 1 | Info | The converter issues an info event. |
| 3 | Warning | The converter issues a warning event. |
| 10 | Fault | The converter issues a fault event and stops modulation. |
| 11 | Fault, Open MCB | The converter issues a fault event, stops modulation, and opens the main circuit breaker. |

P2.9.6.2 Thermistor Monitor 1 Input **No. 1520**

Select a thermistor input for the thermistor monitor 1.

| No. | Name | Description |
|-----|--------------------------------------|--|
| 0 | None (False) | No input is selected. A virtual value of FALSE is applied. |
| 1 | None (True) | No input is selected. A virtual value of TRUE is applied. |
| * | Available thermistor input terminals | A dynamically generated selection of available thermistor input terminals is presented as an option. The specific set depends on the type and number of I/O options installed in the system. |

P2.9.6.3 Thermistor Monitor 2 Input **No. 1522**

Select a thermistor input for the thermistor monitor 2.

| No. | Name | Description |
|-----|--------------------------------------|--|
| 0 | None (False) | No input is selected. A virtual value of FALSE is applied. |
| 1 | None (True) | No input is selected. A virtual value of TRUE is applied. |
| * | Available thermistor input terminals | A dynamically generated selection of available thermistor input terminals is presented as an option. The specific set depends on the type and number of I/O options installed in the system. |

P2.9.6.4 Thermistor Monitor 3 Input **No. 1524**

Select a thermistor input for the thermistor monitor 3.

| No. | Name | Description |
|-----|--------------------------------------|--|
| 0 | None (False) | No input is selected. A virtual value of FALSE is applied. |
| 1 | None (True) | No input is selected. A virtual value of TRUE is applied. |
| * | Available thermistor input terminals | A dynamically generated selection of available thermistor input terminals is presented as an option. The specific set depends on the type and number of I/O options installed in the system. |

7.3.9.7 Fieldbus Protections

This group contains parameters for setting responses, delays, and other settings for fieldbus related protections.

P2.9.7.1 Fieldbus Fault Response**No. 1304**

Select the behavior when a fieldbus fault occurs.

| No. | Name | Description |
|-----|-----------------|---|
| 0 | No response | - |
| 1 | Info | The converter issues an info event. |
| 3 | Warning | The converter issues a warning event. |
| 10 | Fault | The converter issues a fault event and stops modulation. |
| 11 | Fault, Open MCB | The converter issues a fault event, stops modulation, and opens the main circuit breaker. |

P2.9.7.2 No Fieldbus Connection Response**No. 1305**

Select the response in case there is no fieldbus connection.

| No. | Name | Description |
|-----|-----------------|---|
| 0 | No response | - |
| 1 | Info | The converter issues an info event. |
| 3 | Warning | The converter issues a warning event. |
| 10 | Fault | The converter issues a fault event and stops modulation. |
| 11 | Fault, Open MCB | The converter issues a fault event, stops modulation, and opens the main circuit breaker. |

P2.9.7.3 Process Data Timeout Response**No. 1306**

Select the response to a process data timeout.

| No. | Name | Description |
|-----|-----------------|---|
| 0 | No response | - |
| 1 | Info | The converter issues an info event. |
| 3 | Warning | The converter issues a warning event. |
| 10 | Fault | The converter issues a fault event and stops modulation. |
| 11 | Fault, Open MCB | The converter issues a fault event, stops modulation, and opens the main circuit breaker. |

P2.9.7.4 Process Data Timeout Delay**No. 1340**

Set a delay for the triggering of the Process Data Timeout event. If process data has not been updated within this delay time the event is triggered.

P2.9.7.5 Fieldbus Watchdog Response No. 5244

Select the converter response for the fieldbus watchdog event.

| No. | Name | Description |
|-----|-----------------|---|
| 0 | No response | - |
| 1 | Info | The converter issues an info event. |
| 3 | Warning | The converter issues a warning event. |
| 10 | Fault | The converter issues a fault event and stops modulation. |
| 11 | Fault, Open MCB | The converter issues a fault event, stops modulation, and opens the main circuit breaker. |

P2.9.7.6 Fieldbus Watchdog Delay No. 5245

Set a delay for activating the fieldbus watchdog event.

P2.9.7.7 Fieldbus Watchdog Start Delay No. 5246

Set startup delay time for activating the fieldbus watchdog event. Counter begins when converter wakes up.

7.3.9.8 HMI Connection Loss

Selects the converter response for losing connection to MyDrive® Insight or the control panel while they are in control of the converter. Regardless of the response, the control is released to the control place with the next highest control priority.

P2.9.8.1 HMI Connection Loss No. 5420

Select the response after lost connection to control panel or PC tool while they are in control. The timeout occurs after 5 s.

| No. | Name | Description |
|-----|----------------------|---|
| 0 | No response | - |
| 2 | Info – persistent | The converter issues an info event that requires acknowledgment to reset. |
| 4 | Warning – persistent | The converter issues a warning event that requires acknowledgment to reset. |
| 10 | Fault | The converter issues a fault event and stops modulation. |
| 11 | Fault, Open MCB | The converter issues a fault event, stops modulation, and opens the main circuit breaker. |

7.3.9.9 Cooling Fan Supervision

P2.9.9.1 Main Fan Fail Response **No. 2939**

Select the converter response to a main fan fail.

| No. | Name | Description |
|-----|-----------------|---|
| 0 | No response | - |
| 1 | Info | The converter issues an info event. |
| 3 | Warning | The converter issues a warning event. |
| 10 | Fault | The converter issues a fault event and stops modulation. |
| 11 | Fault, Open MCB | The converter issues a fault event, stops modulation, and opens the main circuit breaker. |

P2.9.9.2 Internal Fan Fail Response **No. 2940**

Select the converter response to an internal fan fail.

| No. | Name | Description |
|-----|-----------------|---|
| 0 | No response | - |
| 1 | Info | The converter issues an info event. |
| 3 | Warning | The converter issues a warning event. |
| 10 | Fault | The converter issues a fault event and stops modulation. |
| 11 | Fault, Open MCB | The converter issues a fault event, stops modulation, and opens the main circuit breaker. |

7.3.9.10 Grid Frequency Supervision

P2.9.10.1 High Freq. Instant Fault Limit **No. 2840**

Set high limit for grid frequency. The converter trips when the actual grid frequency exceeds the limit; active only in run state.

P2.9.10.2 Low Freq. Instant Fault Limit **No. 2841**

Low limit for grid frequency; trips instantly if actual grid frequency is below this level; active only in run state.

7.3.9.11 Grid Voltage Supervision

P2.9.11.1 Grid Overvoltage Instant Fault Limit **No. 2842**

Overvoltage limit for grid voltage in % of nominal grid voltage; trips instantly if actual grid voltage exceeds this level; active only in run state.

P2.9.11.2 Grid Undervoltage Instant Fault Limit **No. 2843**

Undervoltage limit for grid voltage in % of nominal grid voltage; trips instantly if actual grid voltage is below this level; active only in run state.

7.3.9.12 Missing Grid Phase

P2.9.12.1 Phase Fault Limit Run **No. 266**

Imbalance needed in run state for missing phase condition to be true.

P2.9.12.2 Phase Fault Limit Stop No. 264

Imbalance needed in stop state for missing phase condition to be true.

P2.9.12.3 Phase Fault Delay No. 265

Time required for missing phase condition is true until trip is generated.

7.3.9.13 Pre-Charge Monitoring

P2.9.13.1 Max. Pre-Charge Time No. 6564

Set maximum allowed pre-charge time in seconds.

P2.9.13.2 Min. Pre-Charge Time No. 6565

Set minimum allowed pre-charge time in seconds.

P2.9.13.3 Ext. Pre-Charge Monitor Response No. 6568

Set the response of external pre-charge monitoring exception.

| No. | Name | Description |
|-----|-----------------|---|
| 0 | No response | - |
| 1 | Info | The converter issues an info event. |
| 3 | Warning | The converter issues a warning event. |
| 10 | Fault | The converter issues a fault event and stops modulation. |
| 11 | Fault, Open MCB | The converter issues a fault event, stops modulation, and opens the main circuit breaker. |

7.3.9.14 Input Section Over Temperature

P2.9.14.1 Input Section Overtemp. Input No. 5310

Select an input terminal for the mains input section overtemperature event. It is activated when the input becomes LOW, FALSE or 0.

P2.9.14.2 Input Section Overtemp. Response No. 5310

Select the response to the mains input section overtemperature event.

| No. | Name | Description |
|-----|-------------|--|
| 0 | No response | - |
| 1 | Info | The converter issues an info event. |
| 3 | Warning | The converter issues a warning event. |
| 10 | Fault | The converter issues a fault event and stops modulation. |

7.4 G3 Maintenance & Service

This group contains auxiliary parameters for monitoring, commissioning, and servicing the converter.

7.4.1 Software Information

This group houses details about the software.

P3.1.1 Application Version No. 151

Shows the version of the application software.

7.4.1.1 Manifest

This is the manifest screen showing detailed software information in the control panel. With MyDrive® Insight, the same information is available in the “Device Info” screen. Check the available information via the control panel or MyDrive® Insight.

7.4.2 Events

When encountering issues, the converter can issue events of the Info, Warning, or Fault response type. This group contains information and parameters for monitoring and simulating these events.

7.4.2.1 Active Events

This is an active events screen shown only in the control panel. With MyDrive® Insight, the same information is available in the “Events” screen. Check the available information via the control panel or MyDrive® Insight.

7.4.2.2 Event History

This is the event history screen shown only in the control panel. With MyDrive® Insight, the same information is available in the “Events” screen. Check the available information via the control panel or MyDrive® Insight.

7.4.2.3 Event Simulation

The event simulation feature can be used to trigger any converter event without meeting the event criteria. This can be used to safely preview how the converter behaves during specific events. For instance, some events may trigger other functions, such as indications through digital outputs. This feature is useful for checking the setup, configuration, and validity of such functions during specific events.

NOTICE

This feature is for commissioning and testing purposes. It is not meant for functional use.

WARNING

This feature can stop the converter and possibly trigger external events. Do not use without proper knowledge of the system.

How to simulate an event:

1. Refer to the Events Summary Table to get the event number and details for the specific event you are interested in.
2. Set the event number with parameter No. 1402.
3. Activate the simulation by setting parameter No. 1401 to your desired simulation response.
4. When you want to end the simulation, set parameter No. 1401 back to “Disabled”.
5. If required, give a Fault Reset command to acknowledge a simulated event.
6. If required, reboot the converter to acknowledge “Trip Locked” events.

P3.2.3.1 Event Simulation No. 1401

Simulates the selected event with the selected response. Simulation begins when changing value from Disabled. To reset a simulated event, this parameter must be set back to Disabled first.

| No. | Name | Description |
|-----|------------------|--|
| 0 | Disabled | Event simulator is inactive |
| 1 | Lowest Response | The event selected with parameter No. 1402 is activated with its lowest event response. Note that if the event can be configured with a response parameter, the response parameter's setting will apply to the simulation. |
| 10 | Highest Response | The event selected with parameter No. 1402 is activated with its highest event response. Note that if the event can be configured with a response parameter, the response parameter's setting will apply to the simulation. |

P3.2.3.2 Event Sim. Number No. 1402

Select an event to be simulated by its number. Refer to the **Error! Reference source not found.** section to check the number of each event.

7.4.3 Operational Counters

This group shows readouts of converter's operational counters.

P3.3.1 Control Unit On Time No. 2000

Shows the total operating time for the control unit.

P3.3.2 Power Unit On Time No. 2001

Shows the total operating time for the power unit. The counter only increments if the DC link is powered.

P3.3.3 Energy Consumption No. 2002

Shows the energy consumed.

P3.3.4 Ground Faults No. 2004

Shows the total number of ground faults.

P3.3.5 Overvoltage Faults No. 2005

Shows the total number of overvoltage faults.

P3.3.6 Overcurrent Faults No. 2006

Shows the total number of overcurrent faults.

P3.3.7 Short Circuit Faults No. 2007

Shows the total number of short-circuit faults.

7.4.4 Backup & Restore

This menu is used to access the backup and restore functions from the control panel.

7.4.4.1 Backup

This is a menu screen for creating parameter backups from the control panel. With MyDrive® Insight, similar options are available via the “Backup” button within the “Parameters” screen. Check the available settings via the control panel or MyDrive® Insight.

7.4.4.2 Restore

This is a menu for restoring parameter backups from the control panel. With MyDrive® Insight, similar options are available via the “Restore” button within the “Parameters” screen. Check the available settings via the control panel or MyDrive® Insight.

7.5 G5 Customization

7.5.1 Basic Settings

P5.1.1 Date and Time **No. 2800**

Set the actual time and date. Format is YYYY-MM-DD and HH:MM:SS.

7.5.2 Control Panel

The parameters in this group allow the operator to select 1-5 signals for monitoring in the two control panel readout screens. These screens are visible in the panel’s home screen, which can be accessed by pressing the “Home”-button (the house icon). Readout Screen 1 appears first. By navigating downwards with the arrow buttons, Readout Screen 2 appears.

7.5.2.1 Readout Screen 1

P5.2.1.1 Readout Field 1.1 **No. 300**

Select the parameter for readout field (screen 1 field 1).

| No. | Name | Description |
|------|--------------------------|-------------|
| 0 | None | |
| 9044 | DC-link Voltage | |
| 9041 | Grid Frequency | |
| 9040 | Grid Voltage | |
| 2950 | Heat Sink Temperature | |
| 2952 | Control Unit Temperature | |
| 9053 | Grid Power Factor | |
| 5115 | DC-link Current | |
| 5117 | DC-link Power | |
| 9060 | Grid Current | |
| 9064 | Grid Active Power | |
| 9051 | Grid Reactive Power | |

P5.2.1.2 Readout Field 1.2 No. 301

Select the parameter for readout field (screen 1 field 2).
Same selection as Field 1.1 (No. 300).

P5.2.1.3 Readout Field 1.3 No. 302

Select the parameter for readout field (screen 1 field 3).
Same selection as Field 1.1 (No. 300).

P5.2.1.4 Readout Field 1.4 No. 303

Select the parameter for readout field (screen 1 field 4).
Same selection as Field 1.1 (No. 300).

P5.2.1.5 Readout Field 1.5 No. 304

Select the parameter for readout field (screen 1 field 5).
Same selection as Field 1.1 (No. 300).

7.5.2.2 Readout Screen 2**P5.2.2.1 Readout Field 2.1 No. 310**

Select the parameter for readout field (screen 2 field 1).
Same selection as Field 1.1 (No. 300).

P5.2.2.2 Readout Field 2.2 No. 311

Select the parameter for readout field (screen 2 field 2).
Same selection as Field 1.1 (No. 300).

P5.2.2.3 Readout Field 2.3 No. 312

Select the parameter for readout field (screen 2 field 3).
Same selection as Field 1.1 (No. 300).

P5.2.2.4 Readout Field 2.4 No. 313

Select the parameter for readout field (screen 2 field 4).
Same selection as Field 1.1 (No. 300).

P5.2.2.5 Readout Field 2.5 No. 314

Select the parameter for readout field (screen 2 field 5).
Same selection as Field 1.1 (No. 300).

7.6 G9 Option Board Settings

This group contains readouts and parameters for setting up input and output options such as digital and analog I/O, feedback signals, or thermal measurements. The associated parameters appear in this menu based on the options connected to the converter. The following is not a definitive set of all iC7 compatible options, but just a collection of the most common and relevant options for the Active Front End application.

7.6.1 I/O And Relay

Note that this group and its subgroups appear only if an I/O And Relay OC7C1 option is included in the converter. This menu appears as many times as there are these options in the system. Each menu and its parameters have the suffix of their option slot.

7.6.1.1 I/O And Relay Status

P9.3.1 Digital Input Bit Word **No. 1614**

Shows the bitwise status of each digital input of this card.

| Bit No. | Name | Description |
|---------|-------------------|---|
| 0 | Digital Input T13 | TRUE = Over 15 Vdc is applied between X13 T13 and Digital Input GND. FALSE = Less than 5 Vdc is applied between X13 T13 and Digital Input GND. |
| 1 | Digital Input T14 | TRUE = Over 15 Vdc is applied between X13 T14 and Digital Input GND. FALSE = Less than 5 Vdc is applied between X13 T14 and Digital Input GND. |
| 2 | Digital Input T15 | TRUE = Over 15 Vdc is applied between X13 T15 and Digital Input GND. FALSE = Less than 5 Vdc is applied between X13 T15 and Digital Input GND. |
| 3 | Digital Input T16 | TRUE = Over 15 Vdc is applied between X13 T16 and Digital Input GND. FALSE = Less than 5 Vdc is applied between X13 T16 and Digital Input GND. |
| 4 | Digital Input T17 | TRUE = Over 15 Vdc is applied between X13 T17 and Digital Input GND. FALSE = Less than 5 Vdc is applied between X13 T17 and Digital Input GND. |
| 5 | Digital Input T18 | TRUE = Over 15 Vdc is applied between X13 T18 and Digital Input GND. FALSE = Less than 5 Vdc is applied between X13 T18 and Digital Input GND. |
| 6-11 | Reserved | |
| 12 | Thermistor T71 | TRUE = More than 4 k Ω is connected between X51 T71 and T72. FALSE = Less than 4 k Ω is connected between X51 T71 and T72. |
| 13-15 | Reserved | |

P9.3.2 Digital Output Bit Word **No. 1615**

Shows the bitwise status of each digital output of this card.

| Bit No. | Name | Description |
|---------|--------------------|---|
| 0-1 | Reserved | |
| 2 | Digital Output T21 | TRUE = Connection between X13 T21 and I/O GND is active. FALSE = Connection between X13 T21 and I/O GND is active. |
| 3 | Digital Output T22 | TRUE = Connection between X13 T22 and I/O GND is active. FALSE = Connection between X13 T22 and I/O GND is active. |
| 4-11 | Reserved | |
| 12 | Relay T02 | TRUE = Connection between X101 T01 (COM) and T02 (NO) is active. FALSE = Connection between X101 T01 (COM) and T03 (NC) is active. |
| 13 | Relay T05 | TRUE = Connection between X102 T04 (COM) and T05 (NO) is active. FALSE = Connection between X102 T04 (COM) and T06 (NC) is active. |
| 14 | Relay T08 | TRUE = Connection between X103 T04 (COM) and T08 (NO) is active. FALSE = Connection between X103 T04 (COM) and T08 (NO) is inactive. |
| 15 | Reserved | |

P9.3.3 T31 Analog Output Value **No. 1613**

Shows the actual value of the terminal.

P9.3.4 T33 Analog Input Value **No. 1611**

Shows the actual value of the terminal.

P9.3.5 T34 Analog Input Value **No. 1612**

Shows the actual value of the terminal.

7.6.1.2 Digital Inputs/Outputs

7.6.1.2.1 Input T13

P9.4.1.1 T13 Terminal Mode **No. 2015**

Select the mode for the terminal.

| No. | Name | Description |
|-----|---------------|-------------|
| 0 | Inactive | |
| 3 | Digital Input | |

P9.4.1.2 T13 Signal Inversion **No. 2291**

Select whether the signal of the terminal is inverted.

| No. | Name | Description |
|-----|------------------|-------------|
| 0 | Non-Inverted | |
| 1 | Digital Inverted | |

P9.4.1.3 T13 Standard Debounce Filtering Time**No. 2024**

Set the standard debounce filtering time for the terminal.

7.6.1.2.2 Input T14**P9.4.2.1 T14 Terminal Mode No. 2016**

Select the mode for the terminal.

| No. | Name | Description |
|-----|---------------|-------------|
| 0 | Inactive | |
| 3 | Digital Input | |

P9.4.2.2 T14 Signal Inversion No. 2292

Select whether the signal of the terminal is inverted.

| No. | Name | Description |
|-----|------------------|-------------|
| 0 | Non-Inverted | |
| 1 | Digital Inverted | |

P9.4.2.3 T14 Standard Debounce Filtering Time**No. 2029**

Set the standard debounce filtering time for the terminal.

7.6.1.2.3 Input T15**P9.4.3.1 T15 Terminal Mode No. 2022**

Select the mode for the terminal.

| No. | Name | Description |
|-----|---------------|-------------|
| 0 | Inactive | |
| 3 | Digital Input | |

P9.4.3.2 T15 Signal Inversion No. 2295

Select whether the signal of the terminal is inverted.

| No. | Name | Description |
|-----|------------------|-------------|
| 0 | Non-Inverted | |
| 1 | Digital Inverted | |

P9.4.3.3 T15 Standard Debounce Filtering Time**No. 2297**

Set the standard debounce filtering time for the terminal.

7.6.1.2.4 Input T16

P9.4.4.1 T16 Terminal Mode No. 2298

Select the mode for the terminal.

| No. | Name | Description |
|-----|---------------|-------------|
| 0 | Inactive | |
| 3 | Digital Input | |

P9.4.4.2 T16 Signal Inversion No. 2296

Select whether the signal of the terminal is inverted.

| No. | Name | Description |
|-----|------------------|-------------|
| 0 | Non-Inverted | |
| 1 | Digital Inverted | |

P9.4.4.3 T16 Standard Debounce Filtering Time No. 2260

Set the standard debounce filtering time for the terminal.

7.6.1.2.5 Input T17

P9.4.5.1 T17 Terminal Mode No. 2017

Select the mode for the terminal.

| No. | Name | Description |
|-----|---------------|-------------|
| 0 | Inactive | |
| 3 | Digital Input | |

P9.4.5.2 T17 Signal Inversion No. 2293

Select whether the signal of the terminal is inverted.

| No. | Name | Description |
|-----|------------------|-------------|
| 0 | Non-Inverted | |
| 1 | Digital Inverted | |

P9.4.5.3 T17 Standard Debounce Filtering Time No. 2034

Set the standard debounce filtering time for the terminal.

7.6.1.2.6 Input T18

P9.4.6.1 T18 Terminal Mode No. 2018

Select the mode for the terminal.

| No. | Name | Description |
|-----|---------------|-------------|
| 0 | Inactive | |
| 3 | Digital Input | |

P9.4.6.2 T18 Signal Inversion No. 2294

Select whether the signal of the terminal is inverted.

| No. | Name | Description |
|-----|------------------|-------------|
| 0 | Non-Inverted | |
| 1 | Digital Inverted | |

P9.4.6.3 T18 Standard Debounce Filtering Time No. 2039

Set the standard debounce filtering time for the terminal.

7.6.1.2.7 Output T21

P9.4.7.1 T21 Terminal Mode No. 4015

Select the mode for the terminal.

| No. | Name | Description |
|-----|----------------|-------------|
| 0 | Inactive | |
| 1 | Digital Output | |

P9.4.7.2 T21 Digital Output Type No. 4013

Select the operating logic for the digital output.

| No. | Name | Description |
|-----|-----------------------------|-------------|
| 0 | Tri state | |
| 1 | Open collector sink (NPN) | |
| 2 | Open collector source (PNP) | |
| 3 | Push pull | |

7.6.1.2.8 Output T22

P9.4.8.1 T22 Terminal Mode No. 4016

Select the mode for the terminal.

| No. | Name | Description |
|-----|----------------|-------------|
| 0 | Inactive | |
| 1 | Digital Output | |

P9.4.8.2 T22 Digital Output Type**No. 4014**

Select the operating logic for the digital output.

| No. | Name | Description |
|-----|-----------------------------|-------------|
| 0 | Tri state | |
| 1 | Open collector sink (NPN) | |
| 2 | Open collector source (PNP) | |
| 3 | Push pull | |

7.6.1.3 Analog Inputs/Outputs**7.6.1.3.1 Output T31****P9.5.1.1 T31 Terminal Mode****No. 2019**

Select the mode for the terminal.

| No. | Name | Description |
|-----|---------------|-------------|
| 0 | Inactive | |
| 5 | Analog Output | |

P9.5.1.2 T31 Terminal Type**No. 2284**

Select the type of the terminal. If voltage is selected, the unit is V. If current is selected, the unit is mA.

| No. | Name | Description |
|-----|---------|-------------|
| 0 | Off | |
| 1 | Voltage | |
| 2 | Current | |

P9.5.1.3 T31 Minimum Value**No. 2283**

Set the voltage or current representing 0% of the signal.

P9.5.1.4 T31 Maximum Value**No. 2282**

Set the voltage or current representing 100% of the signal.

7.6.1.3.2 Input T33**P9.5.2.1 T33 Terminal Mode****No. 2020**

Select the mode for the terminal.

| No. | Name | Description |
|-----|--------------|-------------|
| 0 | Inactive | |
| 6 | Analog Input | |

P9.5.2.2 T33 Terminal Type No. 2273

Select the type of the terminal. If voltage is selected, the unit is V. If current is selected, the unit is mA.

| No. | Name | Description |
|-----|---------|-------------|
| 1 | Voltage | |
| 2 | Current | |

P9.5.2.3 T33 Minimum Value No. 2272

Set the voltage or current representing 0% of the signal.

P9.5.2.4 T33 Maximum Value No. 2271

Set the voltage or current representing 100% of the signal.

P9.5.2.5 T33 Filter Time No. 2270

Set the filter time for the terminal.

P9.5.2.6 T33 Live Zero Threshold Value No. 2274

Set the live zero threshold value for the terminal. The response to a live zero event is defined with parameter No. 4555 "Live Zero Response".

P9.5.2.7 T33 Live Zero Timeout Value No. 2275

Set the live zero timeout value for the terminal. The response to a live zero event is defined with parameter No. 4555 "Live Zero Response".

7.6.1.3.3 Input T34

P9.5.3.1 T34 Terminal Mode No. 2021

Select the mode for the terminal.

| No. | Name | Description |
|-----|--------------|-------------|
| 0 | Inactive | |
| 6 | Analog Input | |

P9.5.3.2 T34 Terminal Type No. 2279

Select the type of the terminal. If voltage is selected, the unit is V. If current is selected, the unit is mA.

| No. | Name | Description |
|-----|---------|-------------|
| 1 | Voltage | |
| 2 | Current | |

P9.5.3.3 T34 Minimum Value No. 2278

Set the voltage or current representing 0% of the signal.

P9.5.3.4 T34 Maximum Value No. 2277

Set the voltage or current representing 100% of the signal.

P9.5.3.5 T34 Filter Time No. 2276

Set the filter time for the terminal.

P9.5.3.6 T34 Live Zero Threshold Value No. 2280

Set the live zero threshold value for the terminal. The response to a live zero event is defined with parameter No. 4555 "Live Zero Response".

P9.5.3.7 T34 Live Zero Timeout Value No. 2281

Set the live zero timeout value for the terminal. The response to a live zero event is defined with parameter No. 4555 "Live Zero Response".

7.6.2 Temperature Measurement

This group and its subgroups appear only if a Temperature Measurement OC7T0 option is included in the converter. This menu appears as many times as there are these options in the system. Each menu and its parameters have the suffix of their option slot.

7.6.2.1 Temperature Measurement Status

P9.3.2 T4 Temperature Value No. 4040

Shows the measured temperature of the terminal.

P9.3.3 T8 Temperature Value No. 4041

Shows the measured temperature of the terminal.

P9.3.4 T12 Temperature Value No. 4042

Shows the measured temperature of the terminal.

P9.3.5 T16 Temperature Value No. 4043

Shows the measured temperature of the terminal.

P9.3.6 T20 Temperature Value No. 4044

Shows the measured temperature of the terminal.

7.6.2.2 Temperature inputs

7.6.2.2.1 Input T4

P9.4.1.1 T4 Terminal Mode No. 4045

Select the mode for the terminal.

| No. | Name | Description |
|-----|-------------------|-------------|
| 0 | Inactive | |
| 7 | Temperature input | |

P9.4.1.2 T4 Connection Type No. 4046

Select the connection type for the sensor.

| No. | Name | Description |
|-----|-----------|-------------|
| 0 | No sensor | |
| 2 | 2-wire | |
| 3 | 3-wire | |
| 4 | 4-wire | |

P9.4.1.3 T4 Temperature Sensor Type No. 4047

Select which type of temperature sensor is connected to the terminal.

| No. | Name | Description |
|-----|--------------|-------------|
| 0 | No sensor | |
| 1 | Pt100 | |
| 2 | 2xPt100 | |
| 3 | 3xPt100 | |
| 4 | Pt1000 | |
| 5 | Ni1000Tk5000 | |
| 6 | Ni1000Tk6180 | |
| 7 | KTY84-1x0 | |
| 8 | KTY84-151 | |
| 9 | KTY84-152 | |
| 10 | KTY81/82-1x0 | |
| 11 | KTY81/82-121 | |
| 12 | KTY81/82-122 | |
| 13 | KTY81/82-151 | |
| 14 | KTY81/82-152 | |
| 15 | KTY81/82-2x0 | |
| 16 | KTY81/82-221 | |
| 17 | KTY81/82-222 | |
| 18 | KTY81/82-251 | |
| 19 | KTY81/82-252 | |

P9.4.1.4 T4 Offset No. 4048

Set the offset of the temperature measured.

7.6.2.2.2 Input T8

P9.4.2.1 T8 Terminal Mode No. 4049

Select the mode for the terminal.

| No. | Name | Description |
|-----|-------------------|-------------|
| 0 | Inactive | |
| 7 | Temperature input | |

P9.4.2.2 T8 Connection Type No. 4050

Select the connection type for the sensor.

| No. | Name | Description |
|-----|-----------|-------------|
| 0 | No sensor | |
| 2 | 2-wire | |
| 3 | 3-wire | |
| 4 | 4-wire | |

P9.4.2.3 T8 Temperature Sensor Type No. 4051

Select which type of temperature sensor is connected to the terminal.

| No. | Name | Description |
|-----|--------------|-------------|
| 0 | No sensor | |
| 1 | Pt100 | |
| 2 | 2xPt100 | |
| 3 | 3xPt100 | |
| 4 | Pt1000 | |
| 5 | Ni1000Tk5000 | |
| 6 | Ni1000Tk6180 | |
| 7 | KTY84-1x0 | |
| 8 | KTY84-151 | |
| 9 | KTY84-152 | |
| 10 | KTY81/82-1x0 | |
| 11 | KTY81/82-121 | |
| 12 | KTY81/82-122 | |
| 13 | KTY81/82-151 | |
| 14 | KTY81/82-152 | |
| 15 | KTY81/82-2x0 | |
| 16 | KTY81/82-221 | |
| 17 | KTY81/82-222 | |
| 18 | KTY81/82-251 | |
| 19 | KTY81/82-252 | |

P9.4.2.4 T8 Offset No. 4052

Set the offset of the temperature measured.

7.6.2.2.3 Input T12

P9.4.3.1 T12 Terminal Mode No. 4053

Select the mode for the terminal.

| No. | Name | Description |
|-----|-------------------|-------------|
| 0 | Inactive | |
| 7 | Temperature input | |

P9.4.3.2 T12 Connection Type No. 4054

Select the connection type for the sensor.

| No. | Name | Description |
|-----|-----------|-------------|
| 0 | No sensor | |
| 2 | 2-wire | |
| 3 | 3-wire | |
| 4 | 4-wire | |

P9.4.3.3 T12 Temperature Sensor Type**No. 4055**

Select which type of temperature sensor is connected to the terminal.

| No. | Name | Description |
|-----|--------------|-------------|
| 0 | No sensor | |
| 1 | Pt100 | |
| 2 | 2xPt100 | |
| 3 | 3xPt100 | |
| 4 | Pt1000 | |
| 5 | Ni1000Tk5000 | |
| 6 | Ni1000Tk6180 | |
| 7 | KTY84-1x0 | |
| 8 | KTY84-151 | |
| 9 | KTY84-152 | |
| 10 | KTY81/82-1x0 | |
| 11 | KTY81/82-121 | |
| 12 | KTY81/82-122 | |
| 13 | KTY81/82-151 | |
| 14 | KTY81/82-152 | |
| 15 | KTY81/82-2x0 | |
| 16 | KTY81/82-221 | |
| 17 | KTY81/82-222 | |
| 18 | KTY81/82-251 | |
| 19 | KTY81/82-252 | |

P9.4.3.4 T12 Offset**No. 4056**

Set the offset of the temperature measured.

7.6.2.2.4 Input T16**P9.4.4.1 T16 Terminal Mode****No. 2298**

Select the mode for the terminal.

| No. | Name | Description |
|-----|-------------------|-------------|
| 0 | Inactive | |
| 7 | Temperature input | |

P9.4.4.2 T16 Connection Type No. 4058

Select the connection type for the sensor.

| No. | Name | Description |
|-----|-----------|-------------|
| 0 | No sensor | |
| 2 | 2-wire | |
| 3 | 3-wire | |
| 4 | 4-wire | |

P9.4.4.3 T16 Temperature Sensor Type No. 4059

Select which type of temperature sensor is connected to the terminal.

| No. | Name | Description |
|-----|--------------|-------------|
| 0 | No sensor | |
| 1 | Pt100 | |
| 2 | 2xPt100 | |
| 3 | 3xPt100 | |
| 4 | Pt1000 | |
| 5 | Ni1000Tk5000 | |
| 6 | Ni1000Tk6180 | |
| 7 | KTY84-1x0 | |
| 8 | KTY84-151 | |
| 9 | KTY84-152 | |
| 10 | KTY81/82-1x0 | |
| 11 | KTY81/82-121 | |
| 12 | KTY81/82-122 | |
| 13 | KTY81/82-151 | |
| 14 | KTY81/82-152 | |
| 15 | KTY81/82-2x0 | |
| 16 | KTY81/82-221 | |
| 17 | KTY81/82-222 | |
| 18 | KTY81/82-251 | |
| 19 | KTY81/82-252 | |

P9.4.4.4 T16 Offset No. 4060

Set the offset of the temperature measured.

7.6.2.2.5 Input T20

P9.4.5.1 T20 Terminal Mode No. 4017

Select the mode for the terminal.

| No. | Name | Description |
|-----|-------------------|-------------|
| 0 | Inactive | |
| 7 | Temperature input | |

P9.4.5.2 T20 Connection Type No. 4062

Select the connection type for the sensor.

| No. | Name | Description |
|-----|-----------|-------------|
| 0 | No sensor | |
| 2 | 2-wire | |
| 3 | 3-wire | |
| 4 | 4-wire | |

P9.4.5.3 T20 Temperature Sensor Type No. 4063

Select which type of temperature sensor is connected to the terminal.

| No. | Name | Description |
|-----|--------------|-------------|
| 0 | No sensor | |
| 1 | Pt100 | |
| 2 | 2xPt100 | |
| 3 | 3xPt100 | |
| 4 | Pt1000 | |
| 5 | Ni1000Tk5000 | |
| 6 | Ni1000Tk6180 | |
| 7 | KTY84-1x0 | |
| 8 | KTY84-151 | |
| 9 | KTY84-152 | |
| 10 | KTY81/82-1x0 | |
| 11 | KTY81/82-121 | |
| 12 | KTY81/82-122 | |
| 13 | KTY81/82-151 | |
| 14 | KTY81/82-152 | |
| 15 | KTY81/82-2x0 | |
| 16 | KTY81/82-221 | |
| 17 | KTY81/82-222 | |
| 18 | KTY81/82-251 | |
| 19 | KTY81/82-252 | |

P9.4.5.4 T20 Offset No. 4064

Set the offset of the temperature measured.

7.6.3 Voltage Measurement

This group and its subgroups appear only if a Voltage Measurement OC7V0 option is included in the converter. This menu appears as many times as there are these options in the system. Each menu and its parameters have the suffix of their option slot.

7.6.3.1 Voltage Measurement Status**P9.3.1 X52 Voltage No. 4086**

Shows the voltage vector length in the external voltage measurement board channel X52.

P9.3.2 X52 Frequency No. 4087

Shows the frequency in the external voltage measurement board channel X52.

P9.3.3 X52 Phase Diff. No. 4088

Shows the phase difference between external voltage measurement board channel X52 phase and control's coordinate system.

P9.3.4 X52 Voltage L1 No. 4082

Shows the voltage of pin L1 of connector X52 of the external voltage measurement board.

P9.3.5 X52 Voltage L3 No. 4083

Shows the voltage of pin L3 of connector X52 of the external voltage measurement board.

P9.3.6 X53 Voltage No. 4089

Shows the voltage vector length in the external voltage measurement board channel X53.

P9.3.7 X53 Frequency No. 4090

Shows the frequency in the external voltage measurement board channel X53.

P9.3.8 X53 Phase Diff. No. 4091

Shows the phase difference between external voltage measurement board channel X53 phase and control's coordinate system.

P9.3.9 X53 Voltage L1 No. 4084

Shows the voltage of pin L1 of connector X53 of the external voltage measurement board.

P9.3.10 X53 Voltage L3 No. 4085

Shows the voltage of pin L3 of connector X53 of the external voltage measurement board.

7.6.3.2 Voltage Input X52

P9.4.1 X52 Terminal Mode **No. 4099**

Select operation mode of terminals on connector X52.

| No. | Name | Description |
|-----|------------|--|
| 0 | Inactive | Connector X52 does not measure anything. |
| 1 | AC Voltage | Connector X52 is configured to measure AC voltage. |
| 2 | DC Voltage | Connector X52 is configured to measure DC voltage. |

P9.4.2 X52 Terminal Voltage Range **No. 4100**

Set the terminal voltage range for voltage measurement option connector X52.

P9.4.3 X52 Meas. Transformer Grid-Side Voltage **No. 4101**

Set the grid-side winding nominal voltage of measurement transformer connected to voltage measurement option X52.

P9.4.4 X52 Meas. Transformer Converter-Side Voltage **No. 4102**

Set the converter-side winding nominal voltage of measurement transformer connected to voltage measurement option X52.

P9.4.5 X52 Meas. Transformer Phase Shift **No. 4103**

Set the phase shift of converter-side voltage to grid-side voltage of measurement transformer connected to voltage measurement option X52. Positive values (counterclockwise) phase-lead. Negative values (clockwise) phase-lag.

7.6.3.3 Voltage Input X53

P9.5.1 X53 Terminal Mode **No. 4104**

Select the operation mode of terminals on connector X53.

| No. | Name | Description |
|-----|------------|--|
| 0 | Inactive | Connector X53 does not measure anything. |
| 1 | AC Voltage | Connector X53 is configured to measure AC voltage. |
| 2 | DC Voltage | Connector X53 is configured to measure DC voltage. |

P9.5.2 X53 Terminal Voltage Range **No. 4105**

Set the terminal voltage range for voltage measurement option connector X53.

P9.5.3 X53 Meas. Transformer Grid-Side Voltage **No. 4106**

Set the grid-side winding nominal voltage of measurement transformer connected to voltage measurement option X53.

P9.5.4 X53 Meas. Transformer Converter-Side Voltage **No. 4107**

Set the converter-side winding nominal voltage of measurement transformer connected to voltage measurement option X53.

7.7.1.1.4 Ethernet port X0

7.7.1.1.4.1 X0 Settings

P10.1.1.4.1.1 Link configuration X0 **No. 7047**

Select the configuration of the Ethernet link parameters.

| No. | Name | Description |
|-----|----------------------|-------------|
| 0 | Auto negotiation | |
| 1 | 10 Mbps full duplex | |
| 2 | 10 Mbps half duplex | |
| 3 | 100 Mbps full duplex | |
| 4 | 100 Mbps half duplex | |

7.7.1.1.5 Ethernet port X1

7.7.1.1.5.1 X1 Settings

P10.1.1.5.1.1 Link Configuration X1 **No. 7048**

Select the configuration of the Ethernet link parameters.

| No. | Name | Description |
|-----|----------------------|-------------|
| 0 | Auto negotiation | |
| 1 | 10 Mbps full duplex | |
| 2 | 10 Mbps half duplex | |
| 3 | 100 Mbps full duplex | |
| 4 | 100 Mbps half duplex | |

7.7.1.1.6 Ethernet port X2

7.7.1.1.6.1 X2 Settings

P10.1.1.6.1.1 Link Configuration X2 **No. 7049**

Select the configuration of the Ethernet link parameters.

| No. | Name | Description |
|-----|----------------------|-------------|
| 0 | Auto negotiation | |
| 1 | 10 Mbps full duplex | |
| 2 | 10 Mbps half duplex | |
| 3 | 100 Mbps full duplex | |
| 4 | 100 Mbps half duplex | |

7.7.1.1.7 Port Mirroring

This is a menu screen for enabling and disabling the port-mirroring function for network troubleshooting with a network analyzer tool. Check the available configurations via the control panel or MyDrive® Insight.

7.7.1.2 Protocols

7.7.1.2.1 PROFINET®

7.7.1.2.1.1 Status

7.7.1.2.1.1.1 PROFINET® Report

This is the PROFINET® report screen showing active PROFINET® connection and configuration information. Check the available information via the control panel or MyDrive® Insight.

7.7.1.2.1.1.2 Configuration

P10.1.2.1.2.1 Name of Station **No. 7080**

Set the name of station. The PROFINET® device is identified by its name of station. Each name must be unique in the network.

7.7.1.2.1.1.3 Diagnosis

P10.1.2.1.3.1 Diagnostic Fault **No. 7081**

Enables diagnostic fault. When disabled the device will not send any PROFINET® diagnosis message with severity "Fault" when a fault is present on device.

| No. | Name | Description |
|-----|----------|--|
| 0 | Disabled | Fault diagnosis messages are not sent. |
| 1 | Enabled | Fault diagnosis messages are sent. |

P10.1.2.1.3.2 Diagnostic Warning **No. 7083**

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.

| No. | Name | Description |
|-----|----------|--|
| 0 | Disabled | Warning diagnosis messages are not sent. |
| 1 | Enabled | Warning diagnosis messages are sent. |

7.7.1.2.1.2 Modbus® TCP

7.7.1.2.1.2.1 Configuration

P10.1.2.2.1.1 Persistent Storage **No. 7061**

Select if persistent storage is active for Modbus® writes.

| No. | Name | Description |
|-----|----------|---|
| 0 | Disabled | When writing to configuration parameters via a Modbus® protocol, the latest written value is not stored to memory. If the converter is rebooted the latest written value is lost. |
| 1 | Enabled | When writing to configuration parameters via a Modbus® protocol, the latest written value is stored to memory. If the converter is rebooted the latest written value is retained. |

P10.1.2.2.1.2 Byte Order**No. 7062**

Select the byte order.

| No. | Name | Description |
|-----|---------------|--|
| 0 | Big Endian | <ul style="list-style-type: none"> Decreasing byte order. The value being read/written starts from the most significant byte and ends with the least significant byte of the source value. |
| 1 | Little Endian | <ul style="list-style-type: none"> Increasing byte order. The value being read/written starts from the least significant byte and ends with the most significant byte of the source value. |

P10.1.2.2.1.3 Word Order**No. 7063**

Select the word order.

| No. | Name | Description |
|-----|---------------|--|
| 0 | Big Endian | <ul style="list-style-type: none"> Decreasing word order. The value being read/written starts from the most significant word and ends with the least significant word of the source value. |
| 1 | Little Endian | <ul style="list-style-type: none"> Increasing word order. The value being read/written starts from the least significant word and ends with the most significant word of the source value. |

8 Troubleshooting

8.1 Viewing and Resetting Events

The iC7 power converter series can produce three types of events. Info, Warning, and Fault type events.

Info events are events for mainly notifying the user of a situation, or to log events into the history log. Info events are not highlighted through any indicator LEDs, for example. An active info and its details can be viewed in the Active Events list and the same information is stored into the Event History. An info event is reset automatically once the triggering conditions are no longer active.

When a warning event occurs, status indicators on the control panel and control board LEDs turn yellow, and a yellow, triangular warning symbol appears in the device status panel of MyDrive® Insight. An active warning and its details can be viewed in the Active Events list and the same information is stored into the Event History. When a warning is active the converter remains operational. A warning event is reset automatically once the triggering conditions are no longer active.

When a fault event occurs, status indicators on the control panel and control board LEDs turn red, and a red, bell-shaped fault symbol appears in the device status panel of MyDrive® Insight. An active fault and its details can be viewed in the Active Events list and the same information is stored into the Event History. When a fault becomes active, the converter stops operation. Depending on the fault and user settings, the main circuit breaker can also be opened. To reset a fault event, the fault triggering conditions must be inactive, and a reset command (fault acknowledgment) must be given to the converter.

To access the Active Events on the control panel, press the info button on the home screen, or navigate to **“3.2.1 Active Events”** in the parameter menu. With MyDrive® Insight, establish a connection to the drive and navigate to “Events > Live”.

To access the Event History on the control panel, navigate to **“3.2.2 Event History”** in the parameter menu. With MyDrive® Insight, establish a connection to the drive and navigate to “Events > Live”.

8.2 Reading the Event Summary Table

The following chapter contains a summarized table of all the events in an Active Front End converter.

Events in iC7 converters have 2 different identifiers: Group numbers and Individual numbers. The group numbers for iC7 converters follow the DRIVECOM industry standard error code specification. The specification originated with the Interbus communication profile. The [Interbus V3.0 base profile](#) was released on 2018-04-19. The [inverter specific profile](#) was released on 1997-12-15. The error code specification was adopted by CAN in Automation and ODVA and is used within their respective Converter Profile. The list of standardized error codes can be found within [IEC 61800-7-201](#).

Unlike individual numbers, the group numbers are not unique since multiple errors can be related to each other. An example is different ground faults which share the Group Number 0x2330.

The rest of the table shows a display name, a brief description, possible causes for the event, and associated mitigation actions (if applicable).

8.3 Events Summary for Active Front End

| Group | Number | Name | Description | Possible causes | Mitigation Actions |
|--------|--------|-----------------------------|---|---|--|
| 0x2110 | 4379 | CM Current High | An excessive common mode current has been detected in the LCL-filter. | Faulty components. Loose cable connection. Faulty cables. | Check the components, cables, and connections. |
| 0x2212 | 4374 | DC-link Resonance | A resonance on the DC link with excessive RMS current values has been detected. | Switching frequency or its 2nd multiple is in the range of system resonance frequency. | Contact Danfoss service. |
| 0x2221 | 4384 | Thermal Overload Rectifier | The rectifier is thermally overloaded. Mission profile is too demanding. | Too high loading on the rectifier. | Check the load profile. |
| 0x2222 | 4373 | DC-link Overcurrent | An overcurrent on the main DC-link capacitors has been detected. | Faulty DC-link capacitor. | Contact Danfoss service. |
| 0x2311 | 4097 | Inverter Overload | Thermal overload is detected in the inverter of the drive. | Too high loading of the inverter. | Reduce the output load. Consider applying limits. |
| | 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. |
| | 4369 | Output Current High 1 | The output current of the drive has exceeded its normal range. | | Check that the motor shaft can be turned. |
| | 4375 | Excessive Current Limiting | The output current of the drive has exceeded the current limit multiple times. | Motor and drive mismatch. Motor misconfiguration. Too high loading of the inverter. Blocked motor shaft. | Check that the motor size matches the drive, and the motor data is correct. Check that the motor shaft can be turned. |
| | 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. |
| | 4380 | Current Limit Setting Fault | The actual current limit setting is too high relative to the selected constant control frequency level. | Incorrect current limit or modulation settings. | Reduce the control frequency setting or reduce the current limit setting. |
| | 5129 | Overload Event | Overload is detected based on motor current, torque, or power. | Too high loading of the inverter. | Reduce the output load. Consider applying limits. |

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| Group | Number | Name | Description | Possible causes | Mitigation Actions |
|--------|--------|------------------------|---|--|---|
| 0x2330 | 4352 | Ground Fault 0 | A high-impedance ground fault is detected on the output. | Damaged motor cable or motor. | Check the insulation of motor cable and motor. |
| | 4353 | Ground Fault 1 | | | |
| | 4354 | Ground Fault 2 | A low-impedance ground fault is detected on the output. | | |
| | 4355 | Ground Fault 21 | A high or low-impedance ground fault is detected on the output. | | |
| 0x2340 | 4356 | Inverter Short Circuit | A short circuit at the inverter output is detected. | Damaged motor cable or motor. | Check the motor and motor cable. |
| | 4370 | Output Current High 2 | A critical output overcurrent has been detected. | Damaged motor cable or motor. | Check for short circuits on the output. |
| | 4649 | Desat Gate Driver | The gate driver has detected desaturation condition. | Faulty component. Extremely high overcurrent. | Contact your local Danfoss service. If the fault occurs the same time as Overcurrent fault, check installations and components from AC output to load. |
| 0x23fe | 4371 | Current Imbalance | A current imbalance between paralleled power units has been detected. | Faulty current measurement. Impedance mismatch from parallel modules to point of common coupling. Transistor switching time compensation disabled. | Check installation connections. Contact your local Danfoss distributor. |
| 0x3110 | 4162 | Grid Voltage Spikes | Excessive spikes on the grid voltage have been detected. | Faulty grid supply. Loose cable connection. Faulty cables or fuses. | Check the grid supply, cables, connections, and fuses. |
| | 4164 | Grid Voltage High | Grid voltage (RMS) above the normal operating range is detected. | Faulty grid supply. Loose cable connection. Faulty cables or fuses. Wrong unit voltage class selection. | Check unit voltage class selection. Check the grid supply, cables, connections, and fuses. |
| 0x3120 | 4165 | Grid Voltage Low | A grid voltage (RMS) below the normal operating range is detected. | Faulty grid supply. Loose cable connection. Faulty cables or fuses. Wrong unit voltage class selection. | Check unit voltage class selection. Check the grid supply, cables, connections, and fuses. |
| 0x3130 | 4160 | Missing Grid Phase | A missing phase is | Faulty grid supply. | Check the grid supply, |

| Group | Number | Name | Description | Possible causes | Mitigation Actions |
|--------|--------|-----------------------------|--|--|---|
| | 4163 | Grid Imbalance | detected on the grid side. A large imbalance of the grid voltages is detected. | Loose cable connection. Faulty cables or fuses. | cables, connections, and fuses. |
| 0x3140 | 4161 | Grid Frequency Out of Range | A grid frequency outside the normal operating range is detected. | Input line phase is missing. Rated current of supply is too low compared to the AFE unit. | Check the grid supply, cables, connections, and fuses. |
| | 4166 | Grid Synchronization Error | The drive is unable to maintain the synchronization to the grid voltage. | Grid frequency is too high or too low. Main Circuit Breaker is open. | |
| 0x3211 | 4145 | DC-link Voltage High 1 | The voltage of the DC link is above the normal operating range and has reached a critical level. | Too fast motor braking. Grid transients. | Increase deceleration time, enable the overvoltage controller, use AC brake, or use a brake resistor while braking. |
| 0x3212 | 4144 | DC-link Voltage High 2 | The voltage of the DC link is above the normal operating range and has reached a critical level. | | |
| 0x3221 | 4146 | DC-link Voltage Low | The DC-link voltage is below the normal operating range. | Fault in DC-voltage supply (rectifier or front-end converter). | Check the DC-supply unit. Try to enable undervoltage protection to keep the drive running as long as possible. |
| 0x32ff | 4147 | DC-link Voltage Ripple | Excessive voltage ripple has been detected on the main DC-link capacitors. | Grid voltage imbalance. | Reduce the output power. |
| | 4148 | DC-link Imbalance | An imbalance across the DC-link capacitors is detected. If the fault remains after resetting the drive, service is required. | The imbalance can be caused by a component fault of the DC link. | Try resetting the drive. Inspect the drive. Service the drive. Contact Danfoss service. |
| 0x4110 | 4099 | Ambient Temp. High | The ambient temperature is too high. | Excessive heating or insufficient cooling of the drive's ambient temperature. | Check the temperature and cooling conditions. Lower the temperature or improve the cooling conditions. |
| 0x4280 | 5132 | Temp. Protection 1 | Temperature protection 1 is triggered. The temperature has exceeded the configured value. | | Check the status of the monitored device. Check the probe connection. |

| Group | Number | Name | Description | Possible causes | Mitigation Actions |
|-------|--------|---------------------------------|--|--|---------------------|
| | 5133 | Temp. Protection 2 | Temperature protection 2 is triggered. The temperature has exceeded the configured value. | The device under measurement is heating up. The probe connection is faulty. | |
| | 5134 | Temp. Protection 3 | Temperature protection 3 is triggered. The temperature has exceeded the configured value. | | |
| | 5135 | Temp. Protection 4 | Temperature protection 4 is triggered. The temperature has exceeded the configured value. | | |
| | 5136 | Temp. Protection 5 | Temperature protection 5 is triggered. The temperature has exceeded the configured value. | | |
| | 5137 | Temp. Protection 6 | Temperature protection 6 is triggered. The temperature has exceeded the configured value. | | |
| | 5147 | Temp. Protection 7 | Temperature protection 7 is triggered. The temperature has exceeded the configured value. | | |
| | 5148 | Temp. Protection 8 | Temperature protection 8 is triggered. The temperature has exceeded the configured value. | | |
| | 5149 | Temp. Protection 9 | Temperature protection 9 is triggered. The temperature has exceeded the configured value. | | |
| | 5154 | Temp. Protection 10 | Temperature protection 10 is triggered. The temperature has exceeded the configured value. | | |
| | 5138 | Temperature Sensor Out of Range | One of the temperature sensor readings is outside of set range. | | |
| | 5241 | Input Section | An overtemperature is | Insufficient enclosure | Check the enclosure |

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| Group | Number | Name | Description | Possible causes | Mitigation Actions |
|--------|--------|---------------------------------|--|---|--|
| | | Overtemperature | detected in the mains input section of the enclosure. | cooling. Converter overloading. Faulty overtemperature signal wiring or connection. | cooling. Reduce converter load. Check the signal wiring and connection. |
| 0x4281 | 5143 | Thermistor Monitor 1 | The input of thermistor monitor 1 has exceeded the 4 kilo ohm threshold. | The device under measurement is heating up. The thermistor connection is faulty. | Check the status of the monitored device. Check the thermistor connection. |
| | 5144 | Thermistor Monitor 2 | The input of thermistor monitor 2 has exceeded the 4 kilo ohm threshold. | | |
| | 5145 | Thermistor Monitor 3 | The input of thermistor monitor 3 has exceeded the 4 kilo ohm threshold. | | |
| 0x42ff | 4200 | Power Option Temp. High 1 | The temperature of a power option has exceeded the normal temperature range. | Excessive loading of the power option. Insufficient cooling of the ambient temperature around the power option. | Check the cooling conditions. Reduce the load or the ambient temperature. |
| | 4201 | Power Option Temp. High 2 | The temperature of a power option has reached a critical level. | | |
| | 4202 | Power Option Temp. Low | The temperature of a power option component is too low. | Excessive heating or insufficient cooling of the ambient temperature around the power option. | Check the ambient temperature. Increase the ambient temperature around the power option. |
| | 4203 | Power Option Temp. Limit | The temperature of a power option component is at the upper limit of the normal temperature. | Excessive loading of the power option. Insufficient cooling of the ambient temperature around the power option. | Check the cooling conditions. Reduce the load or the ambient temperature. |
| | 4204 | Power Option Temp. Imbal. 1 | The thermal imbalance between the power option components exceeds the normal operating range. | Faulty installation of the power option or its thermal measurement components. Defective power option or its thermal measurement components. | Check the power option component for installation errors or defects. |
| | 4205 | Power Option Temp. Imbal. 2 | An excessive thermal imbalance between power option components has been detected. | | Check the option's thermal measurement components for installation errors, connection issues or defects. |
| | 4206 | Power Option Temp. Imbal. Limit | The thermal imbalance between the power option components is at the upper limit of the normal operating range. | | |

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| Group | Number | Name | Description | Possible causes | Mitigation Actions |
|--------|--------|-------------------------|--|---|---|
| 0x4310 | 4103 | Inverter Temp. Limit | The temperature of the inverter heat sink is at the upper limit of the normal temperature range. | High ambient temperature. Insufficient cooling. Overloading of the drive. | Check cooling and heat sink conditions. Reduce the output current or ambient temperature. The drive may derate if the temperature is not lowered. |
| | 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. | High ambient temperature. Insufficient cooling. Overloading of the drive. | Check cooling and heat sink conditions. Reduce the output current to avoid a protected fault. |
| | 4105 | Inverter Temp. High 2 | The temperature of the inverter heat sink has reached a critical level. | | |
| | 4110 | IGBT Temp. High | An inverter IGBT overtemperature has been detected. | High ambient temperature. Insufficient cooling. Overloading of the drive. | Reduce the ambient temperature, the output current and/or the switching frequency. Check the cooling and the condition of the heat sink. |
| | 4113 | Rectifier Temp. Limit | The temperature of the rectifier heat sink is at the upper limit of the normal temperature range. | High ambient temperature. Insufficient cooling. Overloading of the drive. | Check cooling and heat sink conditions. Reduce the output power (torque, speed) or the ambient temperature. |
| | 4114 | Rectifier Temp. High 1 | The temperature of the rectifier heat sink has exceeded the normal temperature range. | | |
| | 4115 | Rectifier Temp. High 2 | The temperature of the rectifier heat sink has reached a critical level. | | |
| | 4117 | Power Unit Temp. Limit | The internal air temperature of the drive is at the upper limit of the normal temperature range. | | |
| | 4118 | Power Unit Temp. High 1 | The internal air temperature of the drive has exceeded its normal temperature range. | High ambient temperature. Insufficient cooling. Overloading of the drive. | Check cooling and heat sink conditions. Reduce the output power (torque, speed) or the ambient temperature. |
| | 4119 | Power Unit Temp. High 2 | The internal air temperature of the drive has reached a critical value. | | |

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| Group | Number | Name | Description | Possible causes | Mitigation Actions |
|--------|--------|----------------------------|---|---|--|
| | 4125 | IGBT Temp. High | An inverter IGBT temperature has reached a critical value. | High ambient temperature. Insufficient cooling. Overloading of the drive. | Reduce the drive's output current if possible to avoid a protected fault. |
| 0x4320 | 4102 | Ambient Temp. Low | The drive is operated at a too low ambient temperature. | Low ambient temperature. Insufficient heating or excessive cooling. | Check the ambient temperature. Increase the ambient temperature or consider an external heater to increase the temperature around the drive. |
| | 4112 | Rectifier Temp. Low | The temperature of the rectifier heat sink is too low. | Low ambient temperature. Insufficient heating or excessive cooling. | Check the ambient temperature. Increase the ambient temperature or consider an external heater to increase the temperature around the drive. |
| | 4116 | Power Unit Temp. Low | The internal air temperature of the drive is below the normal operating range. | Low ambient temperature. Insufficient heating or excessive cooling. | The drive is operated at a too low ambient temperature. Consider an external heater to avoid this warning or fault. |
| 0x4380 | 5240 | Cooling Monitor | The cooling signal to an external cooling unit is missing. | Faulty external cooling unit. Faulty external cooling unit signal. | Check the external cooling unit. Check the signal wiring and connections to the cooling unit. |
| 0x43fe | 4120 | Control Board Temp. Low | The temperature of the control board is below the normal temperature range. | Low ambient temperature. Insufficient heating or excessive cooling. | Check the ambient temperature. Increase the ambient temperature or consider an external heater to increase the temperature at the drive. |
| | 4121 | Control Board Temp. Limit | The temperature of the control board is at the upper limit of the normal temperature range. | High ambient temperature. Insufficient cooling. Overloading of the control board. | Check cooling conditions and load of the control board. Reduce the load on the control board or the ambient temperature. To reduce load, consider reducing switching frequency or number of active features. |
| | 4122 | Control Board Temp. High 1 | The temperature of the control board has exceeded its normal temperature range. | | |
| | 4123 | Control Board Temp. High 2 | The temperature of the control board has | | |

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| Group | Number | Name | Description | Possible causes | Mitigation Actions |
|--------|--------|----------------------------|---|---|--|
| | | | reached a critical level. | | |
| | 4126 | IGBT Temperature Imbalance | There is a temperature imbalance between 1 or more IGBTs. | Defective IGBTs. Insufficient cooling. | Check the condition of IGBT modules and their connections. |
| | 4127 | IGBT Temperature Imbalance | An excessive thermal imbalance between the IGBT modules has been detected. | Defective driver boards. | Check the cooling of the power unit. Check the driver boards. |
| 0x5100 | 4641 | 24V Backup Mode | The drive is in 24V backup mode. The control section (including parameter configurations) and installed options are kept operational. | No connection to the power unit. | Establish or inspect the connection to the power unit. |
| 0x5110 | 4224 | Analog Input Overload | Analog input overload detected. | High input voltage or current from external source. Short circuit. | Check the input voltage supply and prefer using the I/O option's own 10V source for analog inputs. Check the connections. |
| 0x5112 | 4640 | 24V Supply Fault | The 24V supply is outside its normal operating range for the control board. | Faulty supply, connection, or cables in the control board +24V external power supply. | Inspect the supply source. Inspect the supply connections and cables. |
| | 4226 | Supply Overload 24V | 24V supply overload detected in an I/O option board. | Short circuit in the digital I/O +24V control voltage terminal. | Check the connections. |
| 0x5114 | 4642 | 3.3V Supply Low | The voltage of the power board internal 3.3V supply is below its normal operating range. | Faulty or insufficient supply voltage for the power board. | Check the power board power supply. Check the power board. |
| 0x5118 | 4643 | 28V Supply Low | The voltage of the power board internal 28V supply is below its normal operating range. | Defective power board components. | Contact Danfoss service. |
| 0x511a | 4227 | Supply Overload 10V | 10V supply overload detected in an I/O option. | Short circuit in the analog I/O +10V reference voltage terminal. | Check the connections. |
| 0x5160 | 4225 | Digital Output Overload | Digital output overload detected. | Overcurrent in the output due to low resistive loading or short circuit. | Inspect the output connections. Consider adding pull-down resistors to reduce the current. |
| 0x51fe | 4644 | Gate Driver Voltage Fault | The gate driver supply voltage is outside its normal operating range. | Faulty IGBT driver board. | Contact Danfoss service. |
| | 4653 | Gate Driver Fault | A gate driver fault is | Faulty IGBT driver board | Contact Danfoss service. |

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| Group | Number | Name | Description | Possible causes | Mitigation Actions |
|--------|--------|----------------------------|--|---|---|
| | | | detected or a link to the gate driver is broken. | or its connection | |
| 0x51ff | 4645 | Power Board Supply Fault | A power supply fault on the power board has been detected. | Faulty supply, connection, or cables in the power board +24V auxiliary power supply. | Inspect the supply source. Inspect the supply connections and cables. |
| | 4646 | Power Supply Voltage | A power supply voltage is outside its normal operating range. | | |
| 0x5210 | 4378 | Current Sensor Fault | A defective current sensor or an error in the calibration of the current sensors has been detected. | A defective current sensor. Sensor calibration error. | Service the drive. Contact Danfoss service. |
| 0x54fd | 4647 | Function Disabled | The protection logic keeps the trip active until the configuration of the power unit protection levels is ready. | The Functional Safety module is misconfigured. | Check the Functional Safety Settings. |
| 0x54fe | 4628 | STO Activated | The Safe Torque-Off (STO) is activated and an unintended restart is prevented until the STO-request has been reset. | An STO command was given to the drive. The STO signal or its connection is faulty. Functional Safety module is faulty or installed incorrectly. | Check the validity of the command from its source. Check the health and connection of the STO signal and the Functional Safety module. |
| | 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. | | |
| | 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. | | |
| 0x54ff | 4149 | DC-link Short Circuit | An internal short circuit is detected in the DC link. | Faulty DC-link components. | Service the drive. Contact Danfoss service. |
| | 4150 | DC Capacitor Short Circuit | A short circuit in a DC-link capacitor is detected. | | |
| | 4151 | DC-link Short Circuit 2 | A short circuit in the DC-link capacitor is detected. | | |
| 0x5530 | 4790 | Control Data Error | A data error is detected in the control data database EEPROM. | Control Data does not match what the current version of the control software expects. | Contact Danfoss service. |

| Group | Number | Name | Description | Possible causes | Mitigation Actions |
|--------|--------|--------------------------------|---|--|--|
| | 4791 | Invalid PUD | A data error has been detected in the power unit database EEPROM. | Power Unit Data does not match what the current version of the control software expects. | Contact Danfoss service. |
| 0x6100 | 4134 | System Time Adjust | System time has been adjusted. | Event for logging. | No action. |
| | 4135 | Real Time Clock Hardware Error | Hardware error has been detected in the real-time clock. | RTC battery missing or with low charge. | Install or replace RTC battery. |
| | 4304 | License Missing | A required license is missing. | A fieldbus connection from an unlicensed protocol was attempted. | Use a licensed protocol. Acquire a license. |
| | 4349 | Authenticity Error | Files authenticity verification error occurred. | The application within the drive is either missing or unauthenticated. | Upload an authenticated application. |
| | 4351 | System Fault | A system fault has been detected. See additional information for details. | Software issue. Control board overloading. | Cycle power. Check that all boards are properly powered, installed, connected, and wired together. |
| | 4357 | Firmware Crash | A firmware crash occurred and detailed information is provided. | Faulty connection to one or more nodes. Faulty circuit boards. | Check the condition of all circuit boards. Reduce control board loading. Contact the Danfoss supplier or the service department if the fault persists. |
| | 4567 | Restore Status | Provides information about the restore operation of a setting. | Event for logging. | No action. |
| | 4568 | Automatic Reset | All event conditions have cleared and triggered events have been automatically reset. | Event for logging. | No action. |
| | 4816 | PLC Task Overrun | The high CPU load is inhibiting normal operation of the application (PLC task overrun). | Software issue. Control board overloading. Faulty connection to one or more nodes. | Cycle power. Check that all boards are properly powered, installed, connected, and wired together. |
| | 4817 | PLC Runtime Error | The PLC runtime has stopped responding. The application has been halted. | Faulty circuit boards. | Check the condition of all circuit boards. Reduce control board loading. Contact the Danfoss |

| Group | Number | Name | Description | Possible causes | Mitigation Actions |
|--------|--------|---|--|--|---|
| | | | | | supplier or the service department if the fault persists. |
| | 4832 | Node Discovery | Node discovery and configuration are in progress. The modulation is inhibited. | Event for logging. | No action. |
| | 4833 | Node Commissioning | Nodes are being commissioned. | Event for logging. | No action. |
| | 4834 | Node Missing | A previously commissioned node is no longer available. The drive is waiting for the node to be available. | Node is without power. Connection to node is faulty. | Check that the node is powered on. Check the connection to the node. If the node has been intentionally removed, recommission the drive. |
| | 4851 | Restart Required | A configuration change requires a soft-cycle or power-cycle to take effect. Modulation is inhibited. | Configuration change. | Soft- or power-cycle the drive. |
| | 4855 | Internal Fault | An internal fault has been detected related to temporal operations. Note the occurrence number for further troubleshooting directions. | Software issue. Control board overloading. Faulty connection to one or more nodes. Faulty circuit boards. | Cycle power. Check that all boards are properly powered, installed, connected, and wired together. Check the condition of all circuit boards. |
| | 4856 | Internal Fault | An internal fault has been detected related to asynchronous operations. Note the occurrence number for further troubleshooting directions. | | Reduce control board loading. Contact the Danfoss supplier or the service department if the fault persists. |
| | 4857 | Software Update | The drive is currently performing an update of the software. | Event for logging. | No action. |
| | 5130 | Quick Stop Event | A quick stop has been requested. | The user has requested a quick stop, or the quick stop signal is faulty. | Check why quick stop was requested. Check the fieldbus or digital input signal health and connection. |
| 0x6180 | 5260 | Event Simulation | The event with the number 5260 is simulated. | The event simulator was activated with its dedicated test event. | No action. |
| 0x6181 | 4980 | A Digital Input terminal is unknown by system | A digital input terminal has been selected that is unknown by system. | An I/O option has been moved or removed. | Check I/O options. Reconfigure the |

| Group | Number | Name | Description | Possible causes | Mitigation Actions |
|--------|--------|--|--|---|--|
| | 4981 | A Digital Output terminal is unknown by system | A digital output terminal has been selected that is unknown by system. | | function that is using the terminal in question. |
| | 4982 | An Analog Input terminal is unknown by system | An analog input terminal has been selected that is unknown by system. | | |
| | 4983 | An Analog Output terminal is unknown by system | An analog output terminal has been selected that is unknown by system. | | |
| | 4984 | A Digital Output occupied | A digital output is in use by another function or fieldbus. If a Fieldbus has taken control over a terminal, it has priority over parameter selection. | Several entities (fieldbus or I/O) have been configured to use the same terminal. | Reconfigure I/O and fieldbus functions to use their individual terminals. |
| | 4985 | An Analog Output occupied | An analog output is in use by another function or fieldbus. If a Fieldbus has taken control over a terminal, it has priority over parameter selection. | | |
| 0x61f7 | 4800 | Low Storage Space | The available storage space for the file system is low. | Too many parameter backups, datalogger or event log files within the drive's file system. | Transfer parameter backups, logs and or datalogger files to external memory to free up space. |
| | 4801 | Data Logger Storage | Volume restriction limits are preventing additional datalogger capture files from being stored. | Low storage space. Demanding datalogger settings. | Transfer files to external memory to free up space. Reduce the sampling time, logging window or number of signals. |
| | 4802 | Event Logger Storage | Volume restriction limits are preventing additional event log capture files from being stored. | Low storage space. | Transfer files to external memory to free up space. |
| 0x61fb | 4600 | Option Communication Fault | A fault of the communication with an option or other node has been detected. Note the occurrence number for further troubleshooting directions. | Faulty connection to the node. Faulty circuit boards. | Cycle power. Check that all boards are properly powered, installed, connected, and wired together. Check the condition of all circuit boards. Contact the Danfoss |
| | 4601 | Internal Communication | An internal | | |

| Group | Number | Name | Description | Possible causes | Mitigation Actions |
|--------|--------|------------------------------|---|---|---|
| | | Fault | communication fault has been detected in the auxiliary bus. Note the occurrence number for further troubleshooting directions. | | supplier or the service department if the fault persists. |
| | 4602 | Option Communication Fault | A fault of the communication with an option has been detected. | | |
| | 4607 | Internal Communication Fault | An internal communication fault has been detected between different nodes. Note the occurrence number for further troubleshooting directions. | | |
| | 4631 | Internal Communication Fault | An internal communication fault to a power node has been detected. Note the occurrence number for further troubleshooting directions. | | |
| | 4632 | Internal Communication Fault | An internal communication fault to an optional node has been detected. Note the occurrence number for further troubleshooting directions. | | |
| | 4654 | Control Node Disconnected | Internal communication route to one or more control nodes have been disconnected in a drive-to-drive system. | Control board or extender board is not powered. Faulty connection. Faulty control node or extender board. | Check the control board and associated extender board for power, connection, or defect issues. |
| 0x61fc | 4605 | Internal Communication Fault | An internal communication fault has been detected with high-speed bus to power system. Note the occurrence number for further troubleshooting directions. | Faulty connection to the node. Faulty circuit boards. | Cycle power. Check that all boards are properly powered, installed, connected, and wired together. Check the condition of all circuit boards. |
| | 4606 | Internal Communication Fault | An internal communication fault has been detected. Cycle power, check the | | Contact the Danfoss supplier or the service department if the fault persists. |

| Group | Number | Name | Description | Possible causes | Mitigation Actions |
|-------|--------|---------------------------|--|-----------------|--------------------|
| | | | wiring if applicable, contact the Danfoss supplier or the service department if the fault persists. Note the occurrence number for further troubleshooting directions. | | |
| | 4639 | High Speed Bus Sync Error | Internal synchronization error detected with high-speed bus connection to parallel control unit. | | |
| | 4648 | High Speed Bus Error | Internal error detected with high-speed bus connection to parallel control unit. Unexpected time adjustment. | | |
| | 4858 | Internal Fault | An internal fault has been detected. The power system has not received the required reference for modulation. Note the occurrence number for further troubleshooting directions. | | |
| | 4859 | Internal Fault | An internal fault (connection from power system) has been detected. Note the occurrence number for further troubleshooting directions. | | |
| | 4860 | Unexpected Time Adjust | An internal fault (unexpected time adjustment) has been detected. Note the occurrence number for further troubleshooting directions. | | |
| | 4861 | Synchronization Fault | An internal fault (time synchronization error between controller and power system) has been detected. Note the occurrence number for further troubleshooting directions. | | |
| | 4862 | PDS | Internal error detected with high-speed bus | | |

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| Group | Number | Name | Description | Possible causes | Mitigation Actions |
|--------|--------|--|---|--|--|
| | 4863 | Internal Fault | connection from controller. An internal fault (connection with power system) has been detected. Note the occurrence number for further troubleshooting directions. | | |
| 0x6320 | 4350 | Configuration Error | An invalid system configuration has been detected. | Incompatible motor type and control principle. | Check motor type and motor control principle. Check DC-link voltage controller levels. |
| | 5301 | Invalid Control Config. | An invalid control configuration is preventing operation. | Too narrow DC-link voltage bandwidth. | |
| 0x7180 | 5380 | Pre-Charge Failed | DC-link voltage failed to reach the minimum level within the allowed pre-charge time | Fault in the pre-charge circuit. Faulty wiring or connection in the pre-charge command. Timing issue. | Check the pre-charge circuit. Check the pre-charge command wiring and connection. Adjust the pre-charge time. |
| | 5250 | Filter energization failure | The filter failed to energize within the timeout period. | Faulty filter components or connections. Timing issue. | Check the filter and its connections. Adjust the filter energization time. |
| | 5381 | External Pre-Charge Failed | DC-link is expected to be externally pre-charged, but the voltage level failed to rise within the timeout period. | Faulty in the external charging system. Timing issue. | Check the external system. Adjust the pre-charge time. |
| 0x7082 | 5378 | Main Circuit Breaker Tripped | An external main circuit breaker tripping signal is active. | Fault in the circuit breaker. Tripping signal's wiring or connection is faulty. | Check the circuit breaker. Check the tripping signal's wiring and connection. |
| | 5377 | Main Circuit Breaker Feedback Conflict | The two main circuit breaker feedback signals conflict with each other. | Fault in the circuit breaker. One or both feedback signals have faulty wiring or connections. Signal timing issue. | Check the circuit breaker. Check the feedback signals' wiring and connection. Adjust the feedback fault delay. |
| | 5376 | Main Circuit Breaker Feedback Failure | The main circuit breaker feedback was not received within the timeout limit, or it was lost during operation. | Fault in the circuit breaker. Feedback signal has faulty wiring or connections. | Check the circuit breaker. Check the feedback signal's wiring and connection. |

| Group | Number | Name | Description | Possible causes | Mitigation Actions |
|--------|--------|--------------------------------|--|--|---|
| | | | | Signal timing issue. | Adjust the feedback fault delay. |
| 0x70ff | 4128 | Control Fan Failure | The control board cooling fan is not running at the commanded speed. | Blocked or faulty fan. Faulty fan wiring. | Check the fan's wiring and whether its blocked or polluted. Replace the fan if necessary. |
| | 4129 | Main Fan Failure | The main cooling fan is not following its reference speed. | | |
| | 4130 | Internal Fan Failure | The internal fan is running below its reference speed. Check the fan's wiring and whether its blocked or polluted. Replace the fan if necessary. | | |
| | 4133 | LCL Fan Speed Fault | LCL cooling fan not tracking commanded output. | | |
| 0x7500 | 4638 | Drive to Drive Connection Lost | Drive to drive connection is lost. | Fault in the connection between drives. Fault in the extender board. | Check the connection between the drives. Check the status of the extender boards. |
| 0x7502 | 4416 | Analog Input Live Zero | A live zero event detected in an analog input terminal. | A faulty wire or connection. | Check the analog input wiring or connections. |
| 0x7580 | 5141 | Control Panel Connection Lost | The connection to the control panel was lost. Panel control has been released. | Fault in the panel connection. Error in the panel. | Check the connection to the panel. Check the panel. |
| | 5142 | PC Tool Connection Lost | The connection to the PC tool was lost. PC control has been released. | Fault in the PC connection. Error in the PC software or software was closed. | Check the connection to the PC. Check the status of the PC software. |
| 0x8080 | 5125 | Limit Supervision Event 1 | A user define signal is over/under a supervision limit. | The drive is in an undesirable operating point. | Check the operating point. Consider applying speed, current, torque, or power limits. |
| | 5126 | Limit Supervision Event 2 | | | |
| | 5127 | Limit Supervision Event 3 | | | |
| 0x8100 | 4256 | Address Conflict | The fieldbus has identified an Address Conflict on the network which made the device back off. | Two or more devices in the service or fieldbus networks have the same address. | Change the address of the conflicting devices. |
| | 4257 | Ethernet Cable Fault | At link down a measurement is done to measure the distance to the far end of the cable, | The service or fieldbus ethernet connection is faulty due to cable or connection issues. | Check the cables and connections. Utilize the detailed event info. |

| Group | Number | Name | Description | Possible causes | Mitigation Actions |
|-------|--------|--------------------------------|---|--|--|
| | | | indicating where the fault has occurred. This warning occurs at distances > 4 m and Link State Change Down. Actual distance shown in detailed info. | | |
| | 4258 | Invalid Fieldbus Configuration | An issue due to an invalid configuration of the fieldbus connection has been detected. See additional detail info. | Features not supported by the device. Mismatch between configured and available features. Modules not available in the device. | Depending on the protocol: Check the custom Modbus® mapping. Check for mismatches in the used device and device description files. |
| | 4260 | Redundant Controller Missing | One or more of the expected fieldbus controllers are missing. | | Check the fieldbus connection or the status of the fieldbus master. |
| | 4261 | Fieldbus Topology Mismatch | The current fieldbus topology does not match the topology provided at commissioning time. | Wiring mistake. Fieldbus master configuration mistake. | Reconfigure the fieldbus master or change the connection between X1/X2 ports. |
| | 4263 | Ethernet Link Status Changed | There has been detected a change of the Ethernet link status. Additional info has details about which port and state. | Event for logging. | No action. |
| | 4265 | Ethernet Redundancy Error | Primary or backup physical path has been detected to be missing. | Connection or cable fault. Wrong interface settings | Check the connection. Check the interface settings. |
| | 4266 | X1 Cable Redundancy | Indicates that physical path from X1 interface to the controller is missing or wrongly configured. | | |
| | 4267 | X2 Cable Redundancy | Indicates that physical path from X2 interface to the controller is missing or wrongly configured. | | |
| | 4269 | Network Time Protocol | Information of Network Time Protocol server. See detailed info. | Event for logging. | No action. |
| | 4280 | Controller Not in Run | Controller not in RUN state. | Event for logging. | No action. |
| | 4281 | Interface Configuration Change | Interface configuration changed. See detailed info. | Event for logging. | No action. |

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| Group | Number | Name | Description | Possible causes | Mitigation Actions |
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| 0x8100 | 5161 | Fieldbus Watchdog Supervision | Fieldbus watchdog supervision has detected too long delay between fieldbus data updates. | Fieldbus master has lost control, or the current transferred I/O data from the master is not valid. The fieldbus master is not updating the data. | Check the fieldbus connection, the status of any ethernet switches or the status of the fieldbus master. |
| 0x8100 | 5163 | 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 direct fieldbus connection to the drive has lost control, or the current received I/O data is not valid. | Check the fieldbus connection directly to the drive or the status of the fieldbus master. |
| 0x8100 | 5165 | Fieldbus Faulted | One or more of the Fieldbus IO connections has failed from any protocol. | An established Fieldbus I/O Connection has been disrupted by e.g cable break or power cut of PLC or other infrastructure components. | Check the fieldbus connection or the status of the fieldbus master. |
| 0x81fd | 4270 | No Modbus® TCP Connection | No Modbus® TCP communication is currently established. | Can happen during startup until first connection is established or if all connections have stopped (gracefully or disruptive). | Establish a connection. |
| | 4271 | No PROFINET® Connection | No PROFINET® I/O communication is currently established. | | |
| | 4272 | No EtherNet/IP® Connection | No EtherNet/IP® communication is currently established. | | |
| | 4273 | No EtherCAT® Connection | No EtherCAT® communication is currently established. | | |
| | 4282 | No Modbus® TCP Connection | No Modbus® RTU communication is currently established. | | |
| 0x81fe | 4274 | Loss of Modbus TCP I/O | One or more of the Fieldbus I/O connections has failed. | Event for logging. | No action. |
| | 4275 | Loss of PROFINET® I/O | | | |
| | 4276 | Loss of EtherNet/IP® I/O | | | |
| | 4277 | Loss of EtherCAT® Connection | | | |
| | 4283 | Loss of Modbus® RTU Connection | | | |
| 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 (Watchdog1/2). | Event for logging. | No action. |
| | 4279 | Secondary Process Data Timeout | | | |

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| Group | Number | Name | Description | Possible causes | Mitigation Actions |
|--------|--------|------------------|--|--|---------------------------------|
| 0xff01 | 5123 | External Event 1 | An external signal has activated an event. | An external system is requesting for the drive to log an event or to stop running. | Check the external system. |
| | 5124 | External Event 2 | | The event triggering signal is faulty. | Check the health of the signal. |

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