ENGINEERING TOMORROW

Application Guide

iC7 Series Motion

for iC7-Automation

DESIGN AWARD 2023

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1 Introduction to the Application Guide

1.1 Version History

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

The original language of this guide is English.

Version	Remarks
AB318753549016en, doc version 02	Information in this version of the guide corresponds to Motion application software version 2.2.5.

1.2 Purpose of this Application Guide

This Application Guide is intended for qualified personnel such as:

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

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

1.3 Additional Resources

Additional resources are available with related information.

iC7-Automation Frequency Converters Design Guide provides information about the capability and functionality to design motor control systems for Danfoss iC7 series.

iC7 Series Frequency Converters Installation Safety Guide, which provides important safety information related to iC7 drives.

iC7-Automation Frequency Converters Installation Guides, which cover the mechanical and electrical installation of drives.

1.4 Safety Symbols

⚠ D A N G E R ⚠

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

⚠ W A R N I N G ⚠

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

⚠ C A U T I O N ⚠

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

N O T I C E

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

2 Motion Application Overview

2.1 Motion Application Software Overview

The Motion application enables position control with all motor control principles and motor types supported by iC7-Automation.

The following main functions are included in the Motion application:

- Basic functions
- Speed control
- Torque control
- Position controller for both linear and rotary systems, including scaling of position unit and limit handling.
- Positioning mode with relative, absolute, and touch probe positioning.
- Gear mode for the synchronizing of 2 or more shafts.
- Homing for defining the machine zero point.
- Superimposed movement: Positioning on top of any underlying movement.
- Touch probe handling including measurement of distance between sensors.

2.1.1 Basic Functions

The basic functions of iC7 Series Motion application include reference handling, I/O control and readouts, and mechanical brake control, among many others. This section briefly describes the basic functions which enable the drive to control any application.

2.1.1.1 I/O Control and Readouts

Depending on the hardware configuration of the drive, digital and analog inputs, as well as digital, analog, and relay outputs are available. The I/O's can be configured and used to control the application from the drive.

If functional extension options are installed in the drive, the relevant parameters and I/O selections are automatically visible in the parameter structure.

2.1.1.2 Reference Handling

References from multiple sources can be defined, depending on the needs of the application.

Reference sources are:

- Analog inputs
- Digital inputs either as pulse input or digital potentiometer
- Reference from a fieldbus
- Up to 8 Preset References (selectable by parameter, fieldbus, or digital inputs)
- Local reference from control panel

Reference signals can be added, subtracted, and multiplied, generating the reference to the drive. The final reference is scaled from -100% to 100%.

2.1.1.3 Ramps

Linear and S-ramps are supported. Linear ramps provide a constant acceleration and deceleration. S-ramps provide a non-linear acceleration and deceleration, with a soft transition at the start and end of the acceleration and deceleration process.

2.1.1.4 Quick Stop

In some situations, the application may have to stop quickly. For this purpose, the drive supports a specific deceleration ramp time from motor speed to 0 RPM.

2.1.1.5 Limit Rotation Direction

The rotational direction of the motor can be preset to run in one direction only (positive or negative), avoiding unintended rotation direction.

2.1.1.6 Inching with Jogging modes

Predefined speed settings are available for use during commissioning, maintenance, or service. The features cover Slow Down mode (operation at decreased speed), Jogging Mode (operation at preset speed) and Override Mode (operation overrides any reference settings).

2.1.1.7 Frequency Bypass

Specific motor frequencies can be bypassed during operation. The feature helps to minimize and avoid mechanical resonance of the machine, limiting vibration and system noise.

2.1.1.8 Mains Dropout

If there is mains dropout, where the drive cannot continue operation, it is possible to select predefined actions, for example trip, coast, or performing a controlled ramp down.

2.1.1.9 Load Drooping

The load droop function ensures that multiple motors, each controlled by a drive, and connected to a common mechanical shaft, share the load. The function is typically used in cranes, winches, or larger conveyor systems controlled by 2 or more motors.

2.1.2 Controllers

The drive has three different controllers which provide optimized control of the actual application. The controllers cover the following:

- Speed Control
- Torque Control
- Position Control

2.1.2.1 Speed Controller

A built-in speed PID controller provides accurate control of the motor's rotational speed. The controller offers control in both open-loop and closed-loop control.

Open-loop mode does not require an external sensor for measuring the feedback signal. This allows easy installation and commissioning and eliminates the risk of defective sensors.

In closed loop, a speed sensor is added, offering highly accurate control.

The parameters of the speed controller can be optimized by the built-in **auto tuning** function.

2.1.2.2 Torque Controller

A built-in torque controller provides optimized control of torque. Typical usage is in tension control for winches or extruders. The drive offers both open-loop control where the current sensors provide the feedback, and a closed-loop feedback supported by an external torque sensor.

2.1.2.3 Position Controller

A built-in position controller provides accurate position control of linear or rotating movement. Position control is always closed loop, based on a PID controller, but the position feedback can be:

- The position measured by a physical device, for example an encoder
- The rotor position estimated by Motor Control, referred to as "sensorless position control"

This position controller is the basis for the integrated motion control features like Positioning and Gear mode.

2.1.3 Motor Control Features

The motor control in the iC7 series covers a wide range of applications, control from the most basic applications to applications requiring high performance motor control.

2.1.3.1 Motor Types

The drive supports standard available motors like:

- Asynchronous motors
- Permanent magnet motors

2.1.3.2 Torque Characteristics

Different load characteristics are supported to match the actual application needs:

- **Variable torque:** Typical load characteristic of fans and centrifugal pumps, where the load is proportional to the square of the speed.
- **Constant torque:** Load characteristic used in machinery where torque is needed across the full speed range. Typical application examples are conveyors, extruders, decanters, compressors, and winches.

2.1.3.3 Motor Control Principle

Different control principles can be selected to control the motor, matching the application needs:

- U/f control for simple open-loop operation.
- VVC+ (Voltage Vector Control) in both open and closed loop, for the general-purpose application needs.
- FVC+ (Flux Vector Control) in both open and closed loop, for demanding application needs.

2.1.3.4 Motor Nameplate Data

Typical motor data for the actual drive are preset from factory, allowing operation of most motors. During commissioning, actual motor data are entered in the settings of the drive, to optimize the motor control.

2.1.3.5 Automatic Motor Adaptation (AMA)

Automatic Motor Adaptation (AMA) is an automated test procedure that provides optimization of motor parameters for improved shaft performance. Using measurements based on motor name plate data in parameter group 4.2.2, AMA recalculates motor type specific parameters in parameter group 4.2.3 or .4.2.4, and uses them to fine-tune the motor control algorithm. AMA also maximizes the automatic energy optimization (AEO) feature of the drive.

AMA allows automatic detection of the motor type based on the name plate data.

Important considerations:

- AMA must be run on a cold motor. Note that running AMA multiple times will increase the motor temperature.
- AMA must be run with the motor at standstill.
- Avoid generating external torque during the AMA procedure.
- AMA cannot be run with a single sine-wave filter connected to the drive.
- It is not necessary to uncouple the load from the motor.
- The duraton of the AMA procedure depends on the power rating of the motor.
- Changing the name plate data in parameter group 4.2.2 will also modify the data in parameter group 4.2.3 or 4.2.4.

2.1.3.6 Automation Energy Optimization (AEO)

The Automatic Energy Optimization (AEO) feature optimizes the control with focus on lowering energy consumption at the actual load point.

2.1.4 Braking of Load

For controlled load braking performed by the drive, various functions can be used. The specific function is selected based on the application and the needs for how fast it should be stopped.

2.1.4.1 Resistor Braking

In applications which require fast or continuous braking, a drive fit with a brake chopper is typically used. Excess energy, generated by the motor during braking of the application, is dissipated in a connected brake resistor. Braking performance depends on the specific drive rating and selected brake resistor.

2.1.4.2 Overvoltage Control (OVC)

If braking time is not critical or the load is varying, the Over Voltage Control (OVC) feature is used to control stopping the application. The drive extends the ramp down time when it is not possible to brake within the defined ramp down period. The feature must not be used in hoisting applications, high inertia systems, or applications where continuous braking is required.

2.1.4.3 DC Brake

When braking at low speed, the braking of the motor can be improved by using the DC brake feature. The software offers a configurable DC-braking for induction motor control. It injects a DC current defined by the user.

2.1.4.4 AC Brake

In applications with non-cyclic operation of the motor, AC braking can be used to shorten the braking time. Excess energy is dissipated by increasing losses in the motor during braking. Performance is motor type dependent and offers best performance on asynchronous motors.

2.1.4.5 DC Hold

The software offers the possibility to configure the feature DC Start for DC holding before entering normal motor control.

2.1.4.6 Load Sharing

In some applications two or more drives are controlling the application at the same time. If one of the drives is braking a motor, the excess energy can be fed to the DC-link of a drive driving a motor, with a reduction of the total energy consumption. This feature is typically useful in, for example, decanters and carding machines, where smaller power sized drive operates in generator mode.

2.1.5 Protection Features

The drive offers various features protecting against unexpected conditions on the grid, motor, external connected components, and the drive.

2.1.5.1 Grid Protections

The drive protects against conditions on the power grid that can affect proper operation. The grid is monitored for phase imbalance and phase loss. When the imbalance exceeds specified limits, a configurable response takes place and the user can initiate proper actions.

The supply frequency is also monitored, and when the drive is outside acceptable limits, the drive reacts in the configured way. Furthermore, the software of the drive offers an optional protection against undervoltage and a configurable response to grid spikes.

2.1.5.2 Drive Protection Features

The drive is monitored and protected during operation.

Built-in temperature sensors measure the actual temperature and provide relevant information to protect the drive. If the temperature exceeds its nominal temperature conditions, derating of operational parameters is applied. If the temperature is outside the allowed operating range, the drive stops operation.

The motor current is continuously monitored on all three phases. If there is a short circuit between two phases or a fault to ground, the drive detects the short circuit and immediately turns off. If the output current is exceeding its nominal values during operation for longer periods than allowed, the overload capability is reduced until the conditions are restored.

The DC link voltage of the drive is monitored. If it exceeds critical levels, a warning is issued and if the situation is not resolved, the drive stops operation.

2.1.5.3 Motor Protection Features

The drive provides various features to protect the motor and the application.

The output current measurement provides information to protect the motor. Overcurrent, short circuit, earth faults and lost motor phase connections can be detected and relevant protections initiated.

Monitoring of speed, current and torque limits provides an extra protection of the motor and the application. Under extreme load conditions, it also provides motor stall protection.

Locked rotor protection ensures that the drive is not starting with a blocked rotor of the motor.

Motor thermal protection is provided, either as a calculation of the motor temperature based on the actual load, or by external temperature sensors connected to the Temperature Measurement Option. Supported sensor types are Pt100, Pt1000, Ni1000, KTY84, and KTY81.

2.1.5.4 Protection of External Filters or Brake Resistors

Brake resistors are monitored for thermal overload (calculated thermal load or by external sensor), short circuit, and missing connection.

The drive allows to monitor the temperature of externally connected filters.

2.1.5.5 Automatic Derating

Automatic derating of the drive allows continued operation even if the nominal operation conditions are exceeded. Typical factors affecting the operating conditions are temperature, high DC link voltage, high motor load or operation close to 0 Hz. Derating is typically applied as a reduction in switching frequency or change in switching pattern, resulting in lower thermal losses.

2.1.6 Monitoring, Logging, and History Log

The drive offers monitoring features, logging possibilities and access to historical data from operation. The information provides help to analyze operational conditions and identification of faults.

2.1.6.1 Monitoring Features

The drive offers a wide range of monitoring features that provides information of actual operation conditions. Some examples are:

Speed Monitoring
The motor speed can be monitored during operation. If the speed exceeds minimum or maximum limits, the user is notified and can initiate appropriate actions.

Temperature Monitoring
Temperatures of the drive and external connected sensors can be monitored. This provides the opportunity to monitor the operational conditions of the drive and related application.

Grid Monitoring
During operation the drive is able to monitor the grid conditions. It measures the grid voltage for each supply phase and the grid frequency and calculates the grid voltage imbalance and total harmonic distortion (THDv).

2.1.6.2 Event Log

An event log provides access to the latest registered warnings and faults, providing relevant information for analysis of events that occur in the drive.

2.1.6.3 Logging and Storage of Data

Logging of operational data from the drive and related process is possible during running. Logging can be continuous or triggered by specific events. Data is stored to the microSD card placed in the drive, or transferred directly to MyDrive Insight. The feature provides the opportunity to collect data for detailed analysis of operation and events happening during operation.

2.1.7 Functional Safety

A Safe Torque Off function with dual input is available as standard in the drive. An additional Safe Torque Off feedback signal indicates the status of the drive.

More functional safety features are available as optional selections. The set of features covers a wide range of functional safety features that can operate in both sensorless and closed-loop setup. Safe fieldbus is also supported as an option.

2.1.8 Software Tools

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

APIs and the Danfoss Device Interface make it possible to integrate the tools into proprietary systems and business processes. The MyDrive® tools support the entire life cycle of the drive, from system design to service. Some of the tools are available free of charge, and some require a subscription.

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

2.1.8.1 MyDrive® Select

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

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

2.1.8.2 MyDrive® Harmonics

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

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

2.1.8.3 MyDrive® ecoSmart™

MyDrive® ecoSmart™ determines the energy efficiency of the drive being used and the system efficiency class according to IEC 61800-9.

MyDrive® ecoSmart™ uses information about the selected motor, load points, and AC drive to calculate the efficiency class and part load efficiency for a Danfoss AC drive, either for a free-standing drive (CDM) or a drive with a motor (PDS).

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

2.1.8.4 MyDrive® Insight

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

Backup, restore, and data logging within MyDrive® Insight support the usage of a microSD card as storage device.

2.1.9 Security Features

N O T I C E

The drive should not be connected directly to the internet, as end-to-end connectivity is not secured via Danfoss software tools. It is recommended drives are installed by authorized and educated personnel, who are aware of the security risks in networks and can mitigate threats in the network. Typically the drive can be accessed and configured by any user with physical access.

The drive provides the following cybersecurity features:

- Secure bootchain
- Signed and encrypted fimware and application software
- Secure software updates
- License verification
- Secure connectivity for all communication interfaces

2.1.10 Motion Features

The following Motion features are provided:

- Relative, Absolute, and Touch probe positioning
- Gear mode for relative or absolute synchronizing of 2 or more shafts
- Homing
- Superimposed positioning on top of underlying movement

2.2 Motor Control Features for FVC+ and VVC+ Control

Following is the compatibility of motor types and motor control related features with motor control principles.

Table 1: Motor Control Features and Motor Types

Motor type/Feature		Induction motors		Synchronous motors	
		FVC+	VVC+	FVC+	VVC+
Motor type	Induction motor (IM)	X	X	-	-
	Surface permanent magnet motor (SPM)	-	-	X	X
	Interior permanent magnet motor (IPM)	-	-	X	X
Speed feedback	Open loop	X	X	X	X
	Closed loop (with Encoder, Resolver)	X	X	X	-
Reference handling	Speed control	X	X	X	X
	Torque control	X	-	X	-

Motor type/Feature		Induction motors		Synchronous motors	
		FVC+	VVC+	FVC+	VVC+
	Position control	X	X	X	X
	Linear ramp	X	X	X	X
	S-ramp	X	X	X	X
	Load drooping	X	X	X	X
	Windowing in torque control	X	-	X	-
Limit handling	Speed limit	X	X	X	X
	Torque limit	X	X	X	X
	Position limit	X	X	X	X
	Current limit	X	X	X	X
	Power limit	X	X	X	X
	Overvoltage control	X	X	X	X
	Undervoltage control	X	X	X	X
Aux. functions	Flying start	X	X	X	X
	Automatic energy optimization (AEO)	X	X	X	X
	Power loss action	X	X	X	X
	AC-brake (Flux brake)	X	X	-	-
	Start magnetization	X	X	-	-
	DC-brake	X	X	X	X
	DC-injection in stop	X	X	X	X
	Stop state magnetization	X	X	-	-
	Initial position detection	-	-	X	X
	Rotor parking	-	-	X	X
Commissioning functions	AMA standstill	X	X	X	X
	Inertia measurement	X	-	X	-
	Speed control auto-tuning	X	-	X	-
Power options	Sine filter	X	X	-	X
	Advanced harmonic filter	X	X	X	X
Process functionality and protections	Missing motor phase	X	X	X	X
	Motor thermal protection	X	X	X	X
	Electronic thermal relay (ETR)	X	X	X	X

2.2.1 High Frequency Voltage Injection

For salient pole synchronous motors under FVC+, High Frequency Voltage Injection (HFVI) is an encoder/resolver alternative for rotor position detection at low speeds. If the motor has sufficient saliency (typically larger than 1.1) HFVI allows applications to run open loop with performance like closed loop.

In a salient pole motor, the magnetic material of the rotor is not rotationally symmetric, as opposed to a non-salient pole motor where it is. That means that the magnetic path through different diameters of the rotor varies. This results in different values of Lq and Ld inductances, which can be used to determine the orientation of the rotor. The saliency ratio is the ratio between Lq and Ld.

Commissioning HFVI

A typical HFVI commissioning workflow could be:

- 1: Set *4.3.1.1 Motor Control Principle* to FVC+
- 2: Enter the product label data to *4.2.4 Permanent Magnet Motor* and set *4.2.1.1 Motor Type*
- 3: Run full AMA: Set *4.2.1.4 Ama Mode* to Motor Data and start the drive
- 4: Enable HVFI by setting *4.3.3.4 Low Speed Mode*

While HVFI is enabled, the saliency ratio is validated.

Saliency ratio (Lq/Ld)	Drive response
SR ≤ 1.1	Motor start prevented.
1.1 < SR < 1.5	Warning issued in the event log. Tracking capabilities are possibly reduced.

HFVI parameters

The setup parameters are all located under *4.3.3 FVC+ Settings* in the *4.3 Motor Control* menu. HFVI is enabled by setting *4.3.3.4 Low Speed Mode* (1) to HF Injection.

1	4.3.3.4	Low Speed Mode	Normal Motor Control	Normal Motor Control	0	3	
	4.3.3.5	I/f Control Current %	100	100	0	500	%
	4.3.3.6	I/f Control Threshold Speed	10	300	1	50	rpm
	4.3.3.7	Low Speed Minimum Current	50	50	0	100	%
	4.3.3.8	Minimum Current Threshold Speed	10	10	1	50	Hz
	4.3.3.9	Motor Feedback Mode	Open Loop	Open Loop	0	1	
2	4.3.3.10	HF Inject Voltage Gain %	100	100	5	2000	%
3	4.3.3.11	HF Inject Bandwidth %	100	100	1	1000	%
4	4.3.3.12	HF Inject Angle Comp Gain	0	0	-35	35	°
5	4.3.3.13	HF Inject Angle Comp Offset	0	0	-25	25	°
6	4.3.3.14	HF Inject Frequency	0	0	0	3.4028234663852886e+38	Hz
7	4.3.3.15	Idlq Reference Ratio Pct	0	0	-100	100	%

e30bk407.10

Basic settings are done with the following 3 parameters:

- *4.3.3.10 HF Inject Voltage Gain %* (2): Sets the magnitude of the injected voltage as a percentage of the recommended injected voltage.
- *4.3.3.11 HF Inject Bandwidth %* (3): Sets the bandwidth of the position estimation as a percentage of the recommended bandwidth.
- *4.3.3.14 HF Inject Frequency* (6): Option to force the injection frequency to a specific value. If set to 0, the recommended injection frequency is used.

The recommended injected voltage and frequency are calculated based on motor data.

To ensure sufficient saliency levels under all load conditions, more advanced settings can be set with these 3 parameters:

- *4.3.3.12 HF Inject Angle Comp Gain* (4): Load-dependent offset to the estimated rotor angle.
- *4.3.3.13 HF Inject Angle Comp Offset* (5): Offset to the estimated rotor angle.
- *4.3.3.15 Idlq Reference Ratio Pct* (7): Disables the existing magnetization current controlling scheme, like MTPA, and introduces a magnetization current as a percentage of the torque current. This parameter can be used to force the motor to run with elevated magnetization current levels, if it is required to ensure sufficient saliency levels.

These 3 parameters require detailed information about the motor flux at various operating conditions.

2.3 Position Control and Motion Features

2.3.1 Position Control

This chapter describes the control configurations, position controller, position scaling, and limit handling, which is the basis for various motion control modes such as Positioning and Gear mode.

2.3.1.1 Control Configurations

iC7-Automation supports multiple configurations for motor, speed, and position control, with and without feedback enabling adaptation, to most applications. The following illustrations show the possible configurations for position control:

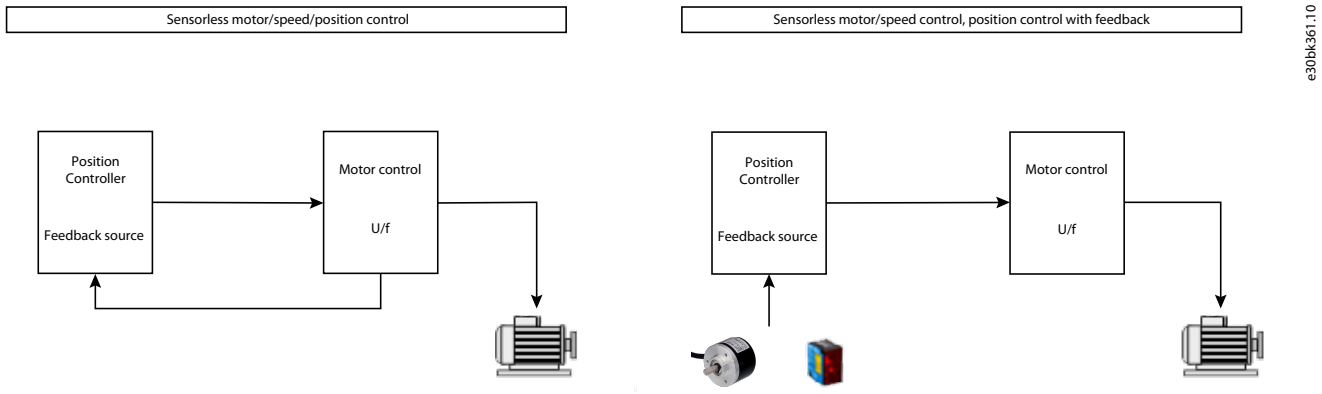


Illustration 1: Control Configuration in U/f Motor Control

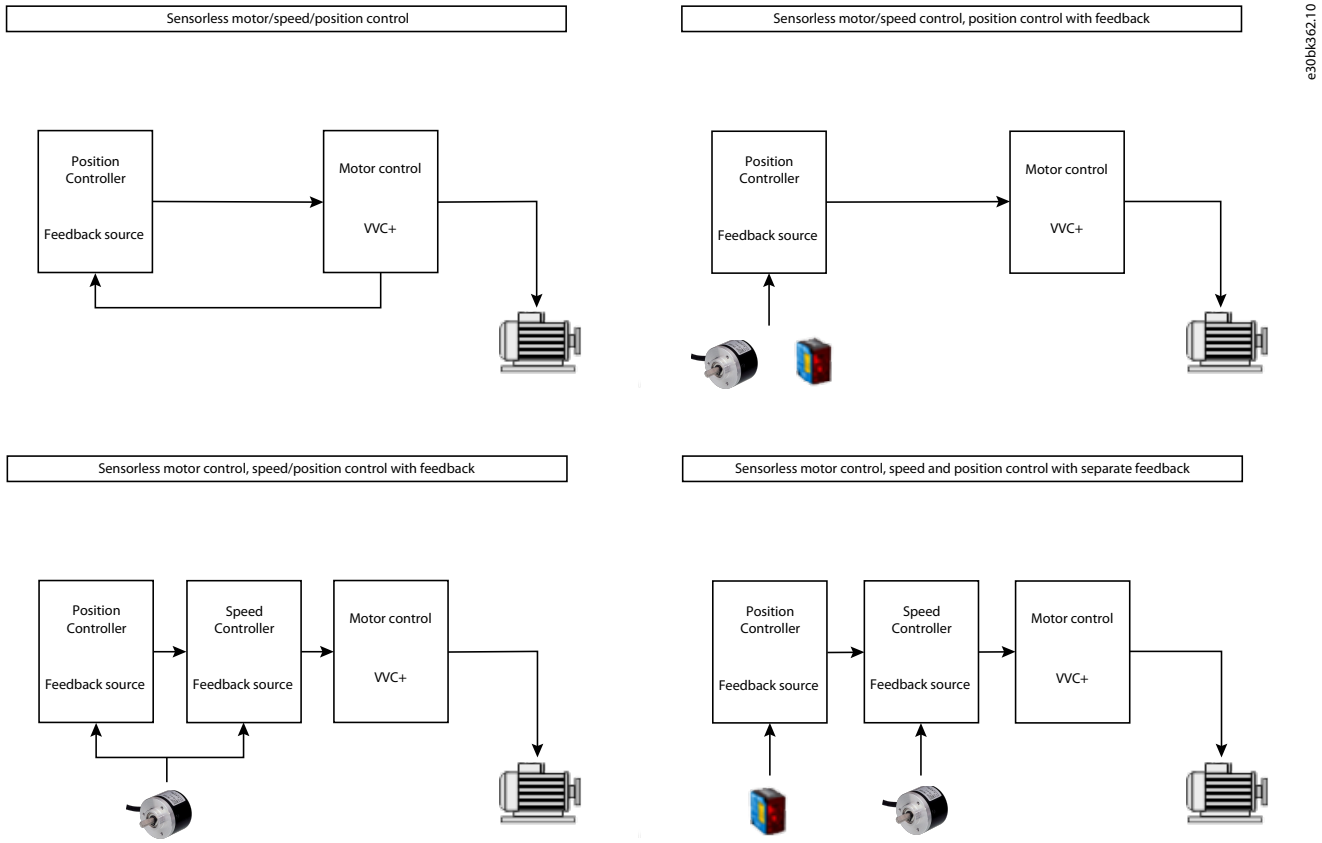


Illustration 2: Control Configuration in VVC+ Motor Control

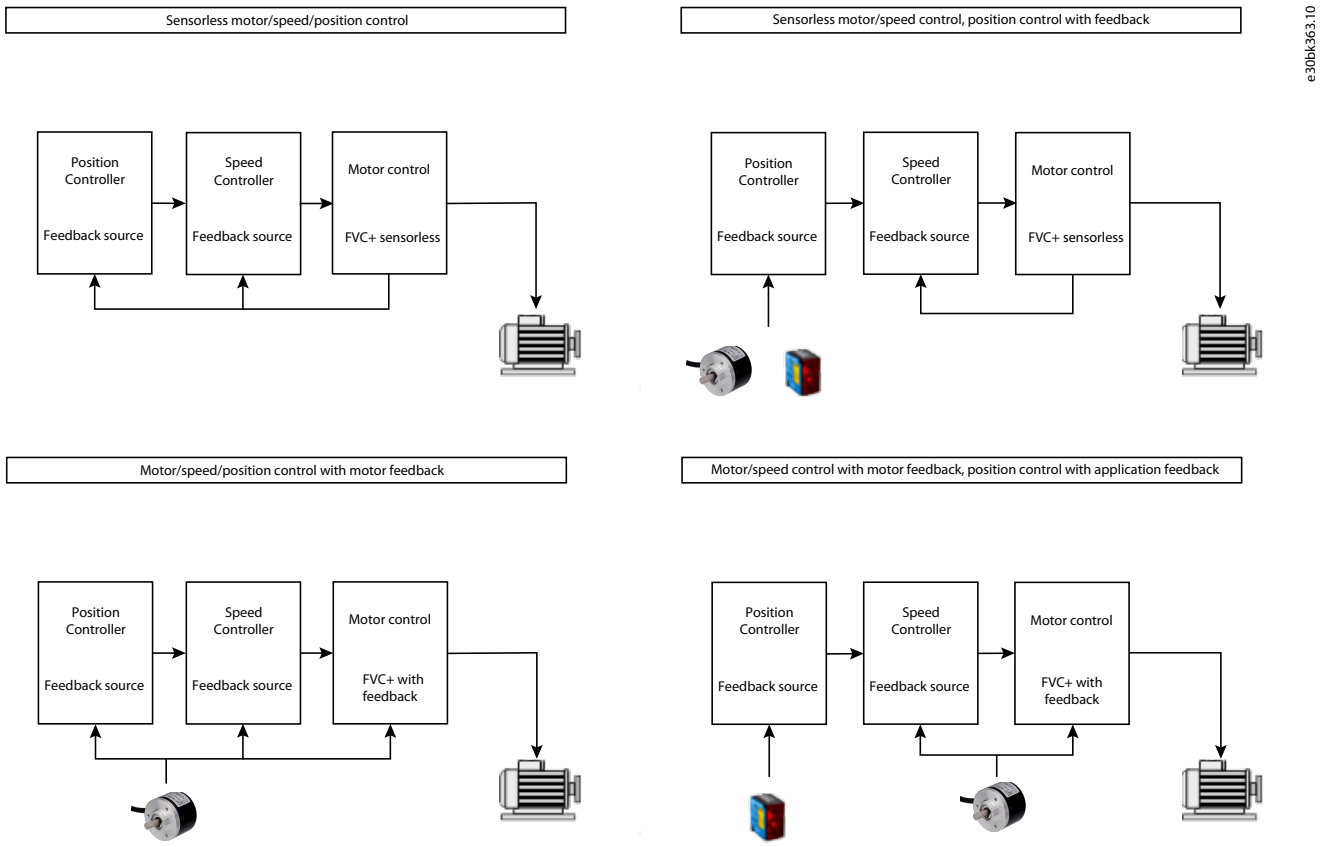


Illustration 3: Control Configuration in FVC+ Motor Control

2.3.1.2 Control Loop

Position control is always closed-loop control. It can be either sensorless, or with physical feedback using an encoder or resolver. In sensorless mode, the motor rotor angle, estimated by the motor controller, is used as feedback for the position controller. The Encoder-Resolver board (OC7M0) can be used to connect various encoder/resolver types as physical position feedback.

The position controller, in combination with speed feedforward, provides a speed reference for controlling the motor. Handling of the speed reference depends on how the speed and motor control is configured. The following illustrations show examples of the control structure and related parameters:

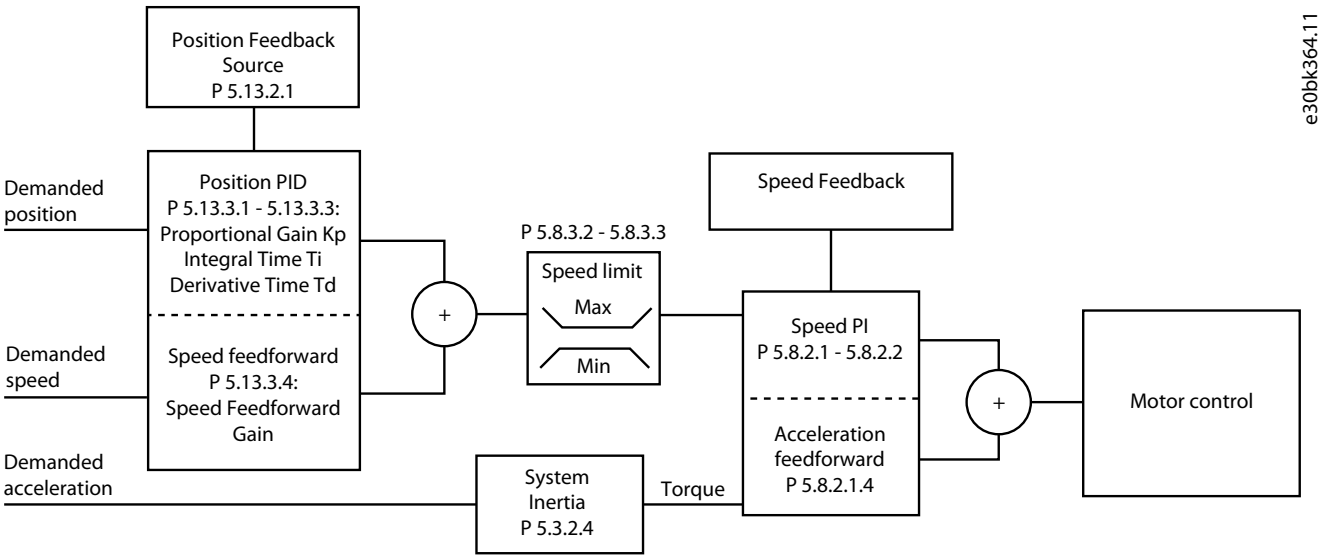


Illustration 4: Control Loop in FVC+ Mode with Speed PI Controller

2.3.1.3 Position Feedback and the Actual Position

The position feedback source is selected with parameter *5.13.2.1 Position Feedback Source*, and it can be the same as the speed or motor feedback source, or a separate source.

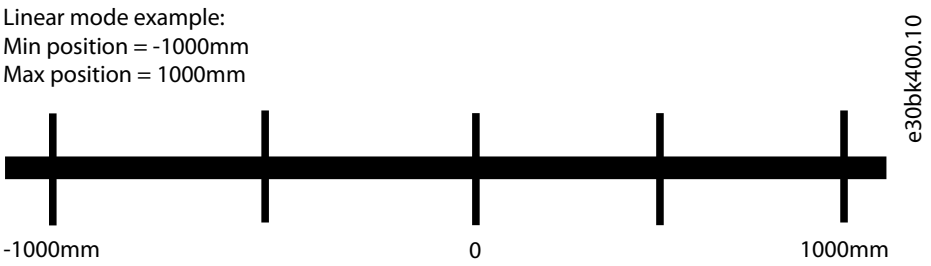
The position feedback can be relative or absolute. Relative means that only position changes are tracked, and absolute means that absolute position values are continuously received as feedback.

Position feedback is always relative in sensorless mode or when using an incremental encoder or resolver, and absolute when using an absolute encoder.

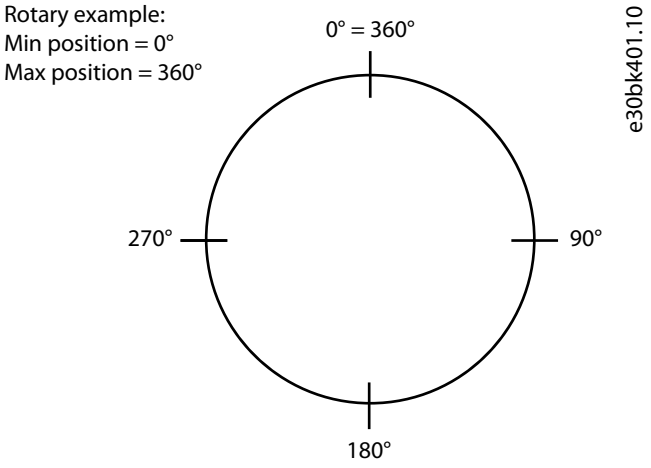
2.3.1.4 Linear Versus Rotary Axis

The axis mode defines how the actual position is handled. The mode can be linear or rotary. The mode is selected with parameter *5.13.4.1 Axis Mode*.

- In linear mode, the maximum position range is -2147483648 to +2147483647. Within this range, software position limits can be defined with configurable behavior. For more information, see "Software Position Limits".



- In rotary mode, the position range is defined with parameters *5.13.5.4 Min. Position Limit* and *5.13.5.5 Max. Position Limit*. When reaching 1 of the limits, the value automatically wraps around to the other limit.



2.3.1.5 Unit Scaling

Position values for settings and readouts can be scaled to any physical value relevant for the application. The scaling is done relative to 1 motor rotation and the default is 360° per motor rotation. To avoid rounding errors, the scaling factor is set as a fraction with 2 parameters, *5.13.4.4 Position Unit Numerator* and *5.13.4.5 Position Unit Denominator*.

The scaling factors are found by calculating or measuring how far the machine part is moving per motor rotation in the required unit. Measuring is typically not 100% accurate. It is often an advantage for readout resolution to scale the position units with a higher resolution than what is required for positioning accuracy. For example, scaling to 10th of a millimeter when an accuracy of 1 mm is required.

The following examples show how to calculate the scaling factors:

Example 1

A linear belt drive with pulley wheel directly connected to the motor. The pulley wheel has 32 teeth, and the timing belt pitch is 10 mm.

Linear movement per motor revolution is 32 x 10 = 320 mm.

For position values in millimeters, set parameter *5.13.4.4 Position Unit Numerator* to 320 and parameter *5.13.4.5 Position Unit Denominator* to 1.

Example 2

A linear belt drive using a VLT® OneGearDrive (OGD) with a gear ratio of 14.13 to drive the pulley wheel. The pulley wheel has 32 teeth and the timing belt pitch is 10 mm. 14.13 is a rounded value, the actual gear ratio of this 2-stage gear is 43/7 for stage 1 and 46/20 for stage 2. Without making rounding errors, the resulting ratio is (43*46) : (7*20) = 1978 : 140 = 989 : 70.

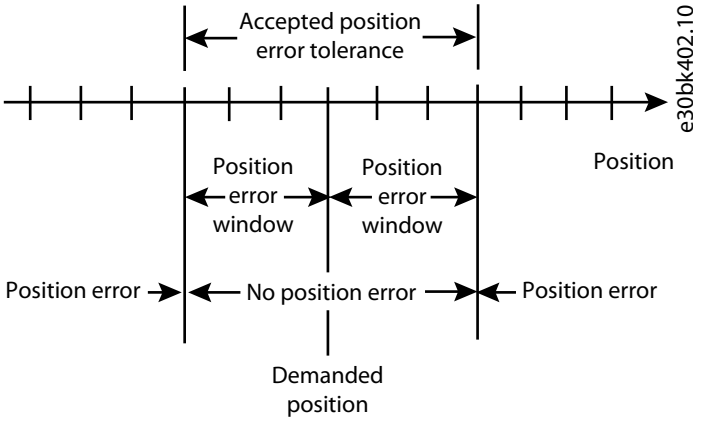
The linear movement is 70*32*10 = 22400 mm per 989 motor rotations.

For position values in millimeters, set parameter *5.13.4.4 Position Unit Numerator* to 22400 and parameter *5.13.4.5 Position Unit Denominator* to 989.

2.3.1.6 Position Monitoring

The actual position error is the difference between the commanded position and the actual position. It is continuously monitored while position control is active. The action to be taken when the maximum tolerated position error, defined by parameter *5.13.5.1 Position Error Window* and *5.13.5.2 Position Error Delay*, is exceeded can be selected with parameter *5.13.5.3 Position Error Action*. The available actions are:

Action	Description
Disabled	The position error window is ignored.
Warning	A warning is issued.
Fault	The motor is coasted and a fault is issued. The fault must be reset before operation can be resumed.



The value of the actual position error can be read out in parameter *5.13.1.6 Actual Position Error*. Exceeding the maximum tolerated position error can be signaled by a physical output or a fieldbus status word bit, defined by parameter *5.13.1.8 Max. Position Error Exceeded Output*.

2.3.1.7 Software Position Limits

In linear axis mode (set by parameter *5.13.4.1 Axis Mode*), parameters *5.13.5.4 Min. Position Limit* and *5.13.5.5 Max. Position Limit* define the allowed range of movement. In rotary axis mode, parameters *5.13.5.4 Min. Position Limit* and *5.13.5.5 Max. Position Limit* define the rotary position range.

Handling of the Software Position End Limits depends on the application control mode selected with parameter *5.4.2.16 Operation Mode*, as described in the following sections:

Position control mode

Positioning commands with a target outside the allowed position range are rejected and a warning is issued. If the actual position is already outside the allowed range, positioning commands are accepted if the target is closer to or inside the allowed range. If the target is further away from the allowed range the command will be rejected.

While executing a homing procedure, the monitoring of the Software Position Limits is disabled.

Other control modes

In control modes such as speed, torque, and gear control, where the final target is unknown, there is no action until reaching the configured limits. The action when a software position limit is reached is defined by parameter *5.13.5.6 Position Limit Action*. The available actions are:

Action	Description
Disabled	The software position limits are ignored.
Warning	A warning is issued.
Fault	The motor is coasted and a fault is issued. The fault must be reset before operation can be resumed.

2.3.1.8 Hardware End Limits

It is possible to connect hardware end limit switches to the drive and configure the reaction of the drive when a hardware end limit switch is activated. Hardware end limits are active in all control modes and when a limit switch is activated, movement is only possible in the direction away from the limit switch.

N O T I C E
When the reaction triggers a fault, movement is only possible after resetting the fault.

Digital inputs for connecting hardware end limit switches are selected with parameters *5.13.5.7 Negative Limit Switch Input* and *5.13.5.8 Positive Limit Switch Input*. The drive reaction when 1 of the hardware limit switches activates is selected with parameter *5.13.5.9 Limit Switch Action*. The following actions are available:

- No action
- Ramp to stop with warning (position control remains active with zero speed after ramp down)
- Ramp to stop and coast with warning (coast after ramp down)
- Ramp to stop with fault (fault after ramp down)
- Quick stop with warning (position control remains active with zero speed after quick stop)
- Quick stop and coast with warning (coast after quick stop)
- Quick stop with fault (fault after quick stop)
- Coast with warning
- Fault (coast)

2.3.2 Positioning Mode

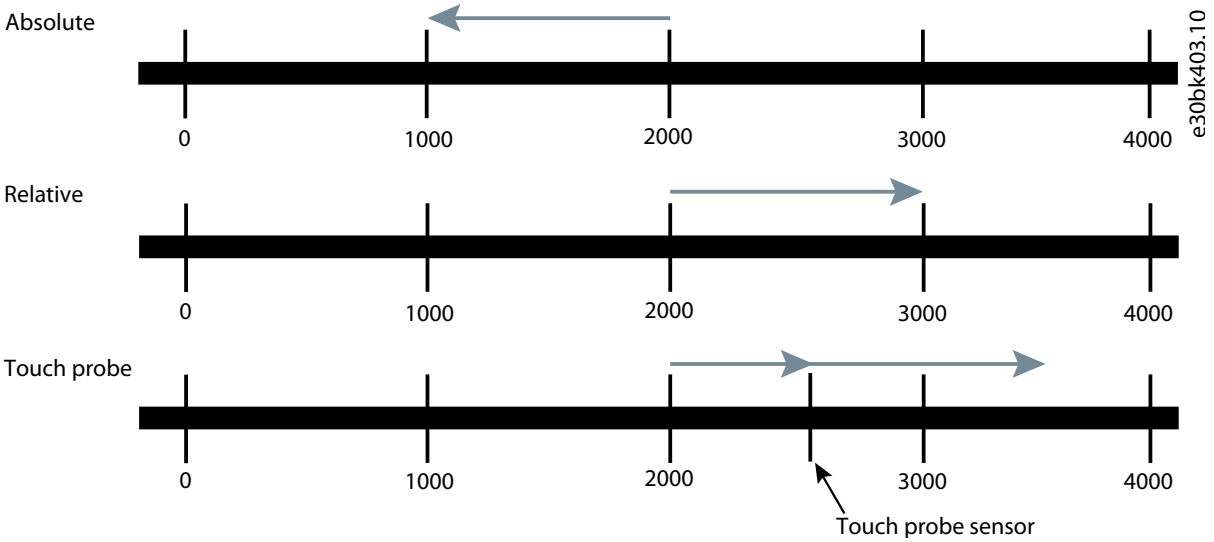
This chapter describes the different positioning modes, the profile generator, reference handling, and control and status signals. Positioning Mode is selected with parameter *5.4.2.16 Operation Mode*.

2.3.2.1 Positioning Types

The drive offers 3 basic positioning types: Absolute, Relative, and Touch Probe. The difference between them is which reference point is used for the positioning target.

Positioning type	Description
Absolute positioning	Target position is relative to the defined zero point of the machine.
Relative positioning	Target position is relative to the actual position of the machine.
Touch Probe positioning	Target position is relative to the position of a signal on a digital input.

The following example shows the resulting target for each positioning type with a start position of 2000 and a position reference or target of 1000:



The default positioning type is Absolute; Relative and Touch Probe positioning can be activated by parameter or external control signal.

N O T I C E

A prerequisite for any positioning movement is that the drive is enabled and has received a start command.

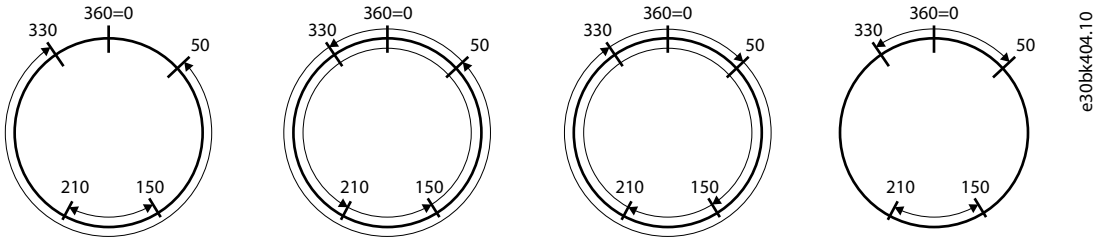
Absolute positioning

Absolute movement is started by activating a new target with the *Enable Reference* signal. For absolute positioning *Enable Reference* is level-triggered, meaning that when permanently set, any new position reference is used as the target right away, even if the new reference is selected before reaching the previous target. Any changes to speed reference and ramps are active right away while *Enable Reference* is set, also during ongoing movement. When *Enable Reference* is not set, any changes to position reference, speed reference, or ramps are inactive until *Enable Reference* is set.

With linear axis, direction of movement depends on whether the target is behind or in front of the actual position. With rotary axis, direction of movement is configurable with the following selections in parameter *5.14.2.20 Absolute Positioning Direction*:

Selection	Description
Disable Direction Selection	Like linear axis, no crossing of minimum and maximum positions.
Positive Direction	Movement always in the positive direction, even if it means crossing the minimum or maximum position.
Shortest Way	Always takes the shortest way, even if it means crossing the minimum or maximum position.
Negative Direction	Movement always in the negative direction, even if it means crossing the minimum or maximum position.

The arrows of the following illustration show the movement path with absolute movement from 50 to 330, 330 to 50, 150 to 210, and 210 to 150 for the different selections in a rotary system going from 0 to 360:



Disable Direction Selection | Negative Direction | Positive Direction | Shortest Way

Relative positioning

Relative movement is started by activating a new target with the Enable Reference signal. For relative positioning the Enable Reference signal is edge-triggered, meaning that a pulse executes a positioning command and completes it with the references active at the point of execution. Any change to the references are ignored unless activated with a new pulse.

With relative positioning, the target position is calculated from the set distance (position reference) and a starting point, which can be selected with parameter *5.14.2.18 Relative Position Mode* offering the following selections:

Selection	Description
Relative to current target	The relative distance is added to the current target even if the target has not been reached. The relative distance is added at every triggering of Enable Reference. As an example: Current position = 100, Position reference = 10, Enable Reference is toggled 5 times, the resulting target = 150.
Relative to demanded position	The relative distance is added to the demanded position (reference for the position controller) when Enable Reference is activated.
Relative to actual position	The relative distance is added to the actual position when Enable Reference is activated.
Relative to Touch Probe 1	The relative distance is added to the position of the latest Touch Probe 1. This selection requires that the Touch Probe 1 sensor has been detected at least once.
Relative to Touch Probe 2	The relative distance is added to the position of the latest Touch Probe 2. This selection requires that the Touch Probe 2 sensor has been detected at least once.

The sign of the position reference determines direction of movement with both linear and rotary axis. Distance of movement (position reference) can be greater than 1 rotation in rotary mode.

Touch Probe positioning

Touch probe positioning is started by activating the Touch probe positioning signal. The drive starts running in Speed mode with the set speed reference until the touch probe sensor is detected. Then the drive switches to positioning mode, with the target calculated from the position at the touch probe sensor and the selected position reference.

2.3.2.2 Profile Generator and Reference Handling

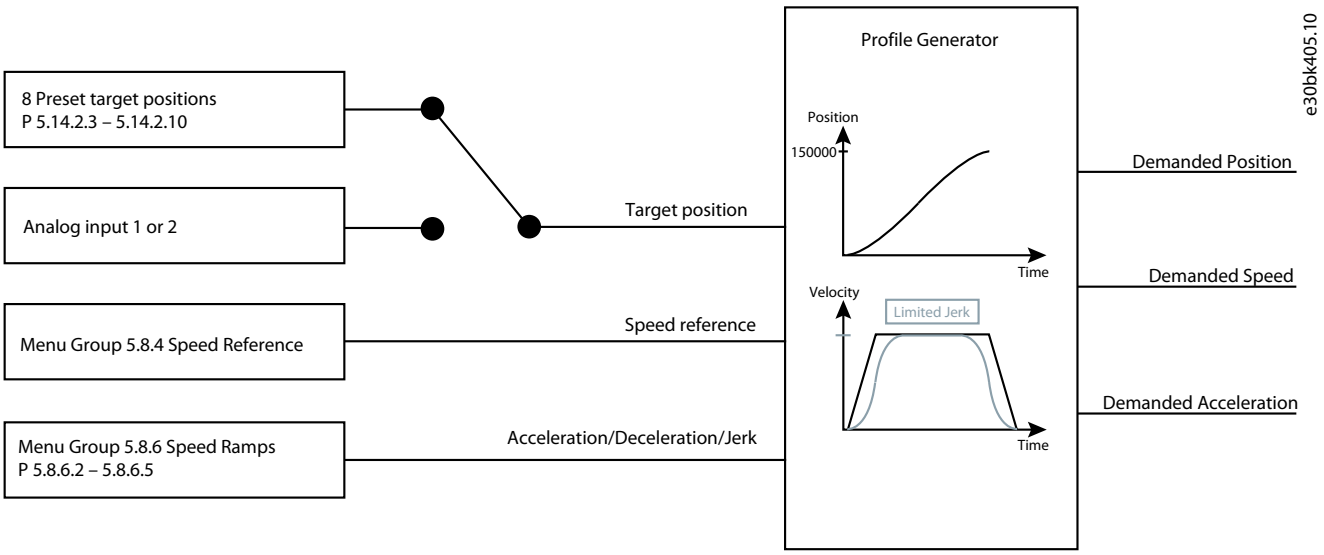
For each positioning, the drive calculates a speed profile for moving from the current position to the target, based on the selected references for position, speed, acceleration, and deceleration.

The source for the target or reference position is selected with parameter *5.14.2.1 Position Reference Source*, which offers the following options: Preset position reference, Analog input 1, and Analog input 2.

References for speed, acceleration, deceleration, and jerk are configured under Speed Control in the menu groups *5.8.4 Speed Reference* and *5.8.6 Speed Ramps*.

The profile generator calculates the demanded values for position, speed, and acceleration, which are used as references for the position of the speed controllers.

The following illustration shows an overview of the references:



The starting point for the calculated speed profile is based on the actual values for position, speed, and acceleration, to ensure bumpless transition when executing a position command while the drive is moving. For example, when switching from Speed or Gear mode to Position mode while running.

2.3.2.3 Control and Status Signals

Executing and controlling the positioning is done by the following control signals:

Control Signal (Input)	Function
Enable reference	Executes a positioning command and controls when new references are used depending on the positioning type: **Absolute positioning** A pulse executes a positioning command and completes it with the references active at the point of execution. Any change to the references is ignored unless activated with a new pulse. A permanent high signal executes a positioning command, and any changes to the references are taken into account while running or after reaching the target. **Relative positioning** A pulse executes a positioning command and completes it with the references active at the point of execution. Any change to the references is ignored unless activated with a new pulse. A permanent high signal executes a positioning command once triggered by the rising edge, and any changes to the speed and acceleration references are taken into account while running. Any change to the position reference is ignored unless activated with a new pulse.
Preset selector 1, 2, and 3	Used as binary code to select between the 8 preset position references.
Relative positioning	• Low signal = Absolute positioning • High signal = Relative positioning
Touch probe positioning	At edge-triggered start of touch probe positioning, the drive runs in Speed mode until the touch sensor is detected and then switches to Positioning mode. Changes to speed reference are accepted until the touch sensor has been detected. Relative positioning is executed using the actual speed and position reference.

N O T I C E

A prerequisite for any positioning movement is that the drive is enabled and has received a start command.

Status signal (output)	Function
Positioning Active	Signals that a positioning command is active. The signal is reset when the target is reached.
Positioning Target Reached	Signals that a positioning command is completed, and the target is reached with the actual position within the On Target Window. Stays active while the actual position is inside the On Target Window, or until a new target is activated.

2.3.3 Gear Mode

This chapter describes Gear mode, including the different synchronizing types, master handling, and control/status signals. Gear mode is selected with the parameter *5.4.2.16 Operation Mode*.

In Gear mode, the drive is position-controlled. The target position is given by a master signal taking the gear ratio into account, thus synchronizing the movement of the follower to the master and forming an electronic shaft.

Starting and stopping synchronization is controlled by the signal *Start Synchronizing*, which can be assigned to a digital input or a fieldbus bit.

2.3.3.1 Synchronization types

There are 3 synchronization types. The difference between them is in how and when the follower position is locked to the master position. The type of synchronization is selected with parameter *5.15.3.1 Start Behavior*. The parameter has the following selections:

- Relative Sync At Start
- Relative Sync
- Absolute Sync

Relative Sync At Start

With *Relative Sync at Start* the follower position is locked to the master position when the following 3 conditions are true:

- Operation mode is Gear Control
- The drive in enabled and started
- Start Synchronizing is True

The offset between master and follower is thus locked when setting *Start* or *Start Synchronizing*, depending on the order in which they are set as shown in the following diagram:

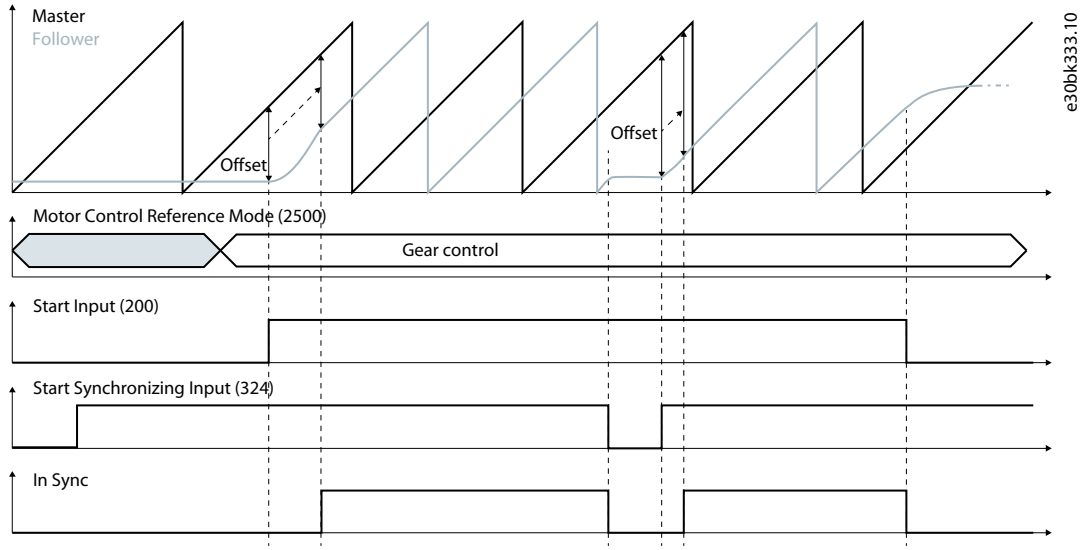


Illustration 5: Relative Sync at Start

Relative Sync

In *Relative Sync*, the follower position is locked to the master position when *Start Synchronizing* is set independent of Operation mode and drive status, and the offset will remain the same while *Start Synchronizing* is true. However, movement of the follower and actual synchronization will only commence when Operation mode is set to Gear Control and the drive is started.

The offset between master and follower will thus remain the same while *Start Synchronizing* is set, independent of drive status. This enables re-synchronizing after stopping and restarting the follower drive, for example, as shown in the following diagram:

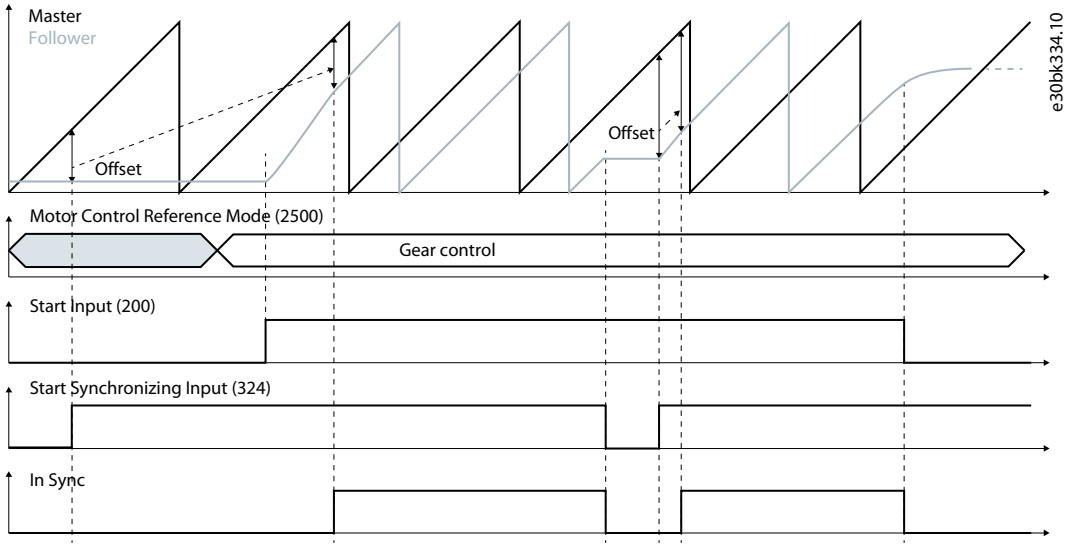


Illustration 6: Relative Sync

Absolute Sync

In *Absolute Sync*, the follower position is locked to the same master position when *Start Synchronizing* is set. However, movement of the follower and actual synchronization will only commence when Operation mode is set to Gear Control and drive is started, as shown in the following diagram:

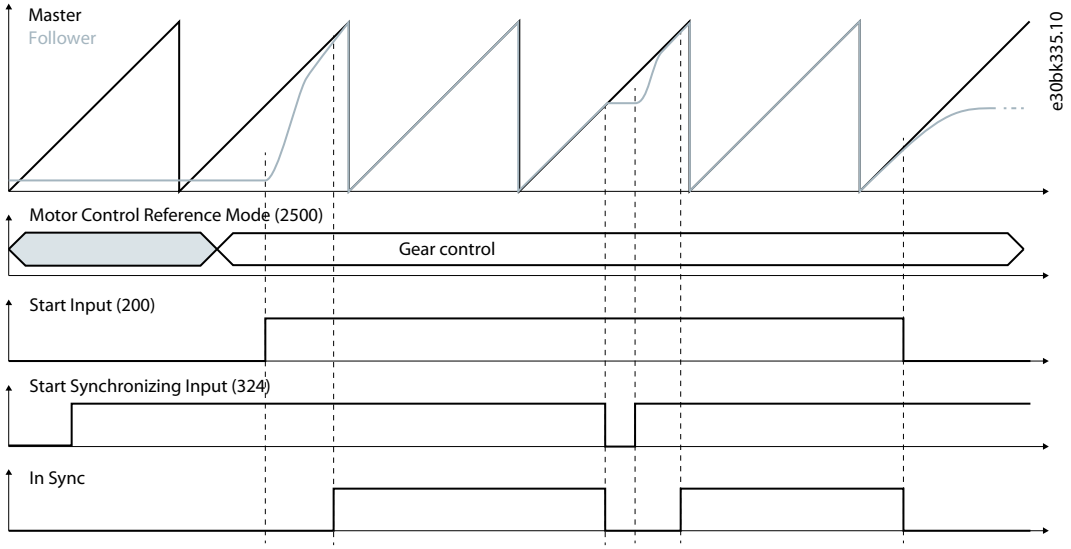


Illustration 7: Absolute Sync

2.3.3.2 Control and Status

The *Start Synchronizing* signal is level-triggered, and synchronization is active while the signal is true. When *Start Synchronizing* is set to false while the drive is running, the drive will ramp to standstill and maintain the position.

When starting synchronization, the follower sometimes needs to compensate for initial position differences between the master and follower, especially if the master is already running. In this case, the correction is done using the active ramps and the speed set in parameter *5.15.3.4 Superimposed Speed Difference*, which is added to the actual master speed. This means the maximum speed for correcting a position deviation is given by the equation:

Actual master speed x Gear ratio + Superimposed Speed Difference

The offset between master and follower can be corrected while synchronizing by using the Superimposed Movement function. For more information, see 2.3.6 Superimposed Movement.

The *In Sync* signal is true when the position deviation between master and follower is within the tolerance specified with parameter *5.15.2.2 Synchronization Window* for more than the time specified with parameter *5.15.2.3 Synchronization Window Delay*.

The actual synchronizing status is shown in parameter *5.15.1.1 Synchronizing Status*. The possible synchronizing states are:

- Idle
- Active
- Error
- Aborted
- In Sync

2.3.3.3 Master

Source of the master reference signal is selected with parameter *5.16.2.1 Master Source Selection*. The master source can be an encoder or resolver connected as device 1 or 2 to the Encoder/Resolver option (OC7M0). The master position can be set to a predefined position defined with parameter *5.16.2.3 Master Home Position* and activated by the *Master Home* signal. The *Master Home* signal can be assigned to a digital input or fieldbus bit with parameter *5.16.2.2 Master Home Input*.

2.3.4 Homing

The Homing function is used to define the zero point of the machine, thus creating a relation between the physical position of the machine and position values registered by the drive. Homing is needed in different situations depending on operating mode and type of feedback.

- With sensorless operation, homing is needed after power-up and when the motor is moved while not controlled by the drive; after a fault, for example.
- With incremental feedback, homing is needed after power-up.
- With absolute feedback, homing can be used during commissioning to define an offset for the absolute positions received from the encoder, as an alternative to physically aligning the encoder with the machine position.
- The Homing on the fly function refreshes the home position while the drive is running, without affecting the ongoing movement. It can be used to avoid position drifting especially for asynchronous motors in sensorless operation.

2.3.4.1 One Time Homing Methods

The drive supports several different homing methods, selectable with parameter *5.17.2.3 Home Mode*:

- Home Direct
- Home on Sensor
- Home on Block

These homing functions are executed by the *Home Enable* signal, which must remain high until the selected homing function is completed. If the *Home Enable* signal is removed before home is found, the ongoing homing movement is interrupted. The source for the *Home Enable* signal is selected with parameter *5.17.2.1 Home Enable Input*.

N O T I C E

A prerequisite for any homing movement is that the drive is in positioning mode, is enabled, and has received a start command.

It is possible to set time and distance limits for finding the home position with parameters *5.17.2.10 Home Time Limit* and *5.17.2.11 Home Distance Limit*. A fault occurs if home is not found within the set time or distance.

Home Direct

Home Direct sets *Actual Position* and *Demanded Position* to the value of parameter *5.17.2.5 Home Position* and the *Home Done* signal is set, meaning there is no movement of the motor.

Home on Sensor

Home on Sensor performs a search for the home sensor connected to the input selected with parameter *5.17.2.2 Home Sensor Input*, and sets *Actual Position* to the value of parameter *5.17.2.5 Home Position* at the edge of the home sensor signal. The home sensor can be a separate sensor, or 1 of the Hardware End limits can be used as home sensor.

Speed, ramps, and the direction for home sensor search are configured by parameters *5.17.2.6 Home Speed*, *5.17.2.8 Home Ramp Selection*, and *5.17.2.4 Home Search Direction*.

A second home speed can be defined. It enables the drive to find the home sensor at a high speed set with parameter *5.17.2.6 Home Speed*, while doing the actual home sensor detection at a lower speed, for higher accuracy, set with parameter *5.17.2.7 Home Speed Low*. When parameter *5.17.2.7 Home Speed Low* is set to zero (which is the default), the speed set with parameter *5.17.2.6 Home Speed* is used for the entire homing procedure.

The following illustrations show different scenarios with different positions defined as home:

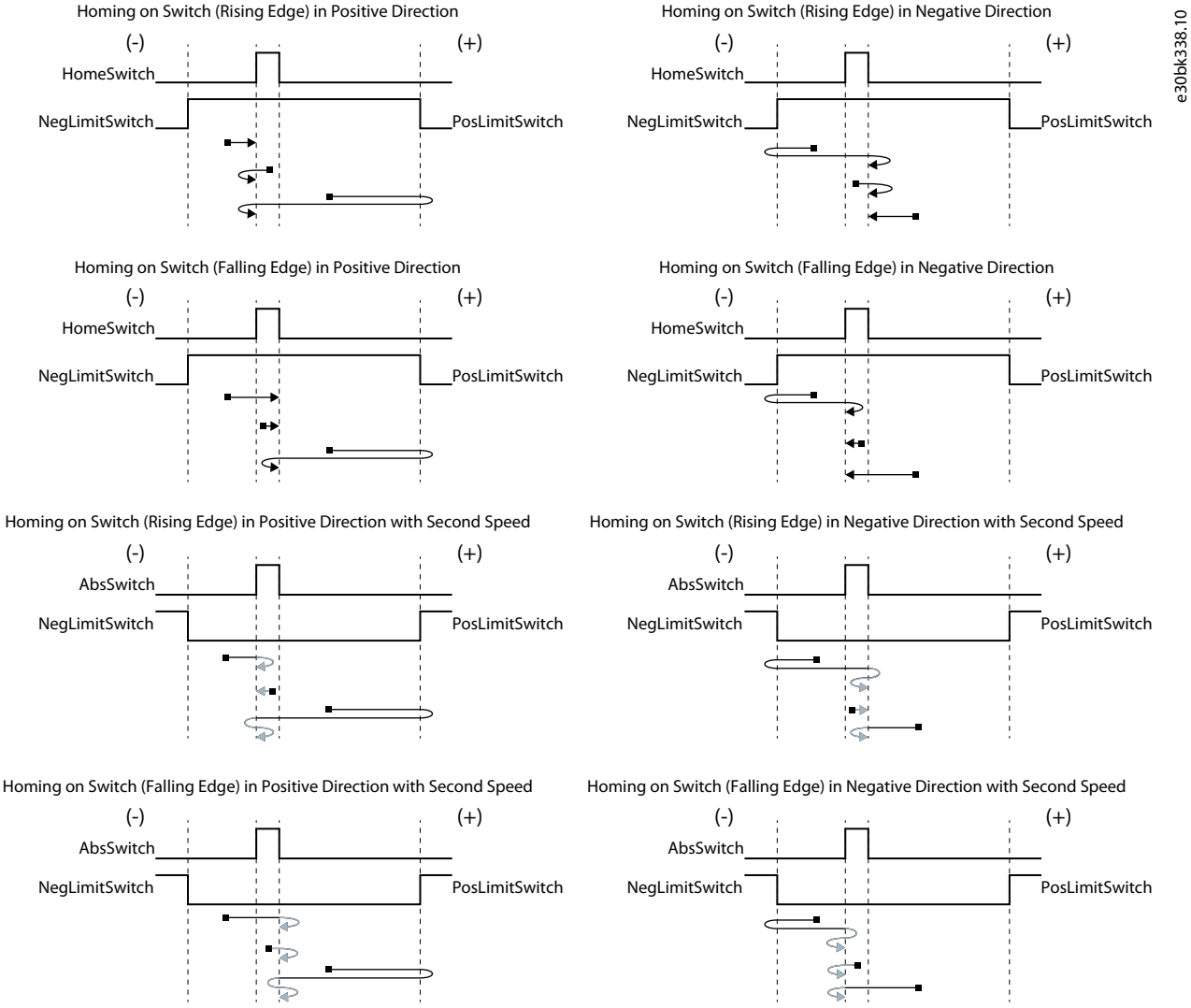


Illustration 8: Home on Sensor Scenarios

The illustrations show the position which is defined as Home Position, with the *Home Done* signal set. The function to be executed after finding the home position is configurable via parameter *5.17.2.12 Function after Home Found*, with the following selections:

Selection	Description
Speed Stop	Ramp down to zero speed. The stop position depends on speed reference and ramps.
Position Stop	Positioning to the target of parameter *5.17.2.13 Home Offset*, relative to the Home Position.

Home on Block

Home on Block enables homing without a sensor for machines that can run against an end mechanically blocking the movement. Searching for the block is done with speed, ramps, and direction configured with parameters *5.17.2.6 Home Speed*, *5.17.2.8 Home Ramp Selection*, and *5.17.2.4 Home Search Direction*. The block can be detected using the torque limit of the application while the motor is at standstill. Adapt the torque limit accordingly so it will not damage the machine. *Actual Position* is set to the value of parameter *5.17.2.5 Home Position* and the *Home done* signal is set when a block is detected.

2.3.4.2 Homing on the Fly

Homing on the fly adjusts *Actual Position* and *Demanded Position* when passing the home sensor, thus refreshing the home position while running, without affecting the ongoing movement.

Homing on the fly can be used in all operating modes as a one-time homing maneuver after power-up, instead of having to execute a separate one-time homing function before starting. Alternatively it can be used as a continuous function to avoid position drift-

ing. Homing on the fly is activated as a background task by selecting the required function with parameter *5.17.2.15 Homing On The Fly*. The following selections are available:

- 1st time after power-up
- 1st time after power-up (running in the positive direction)
- 1st time after power-up (running in the negative direction)
- 1st time after start
- 1st time after start (running in the positive direction)
- 1st time after start (running in the negative direction)
- 1st time after coast
- 1st time after coast (running in the positive direction)
- 1st time after coast (running in the negative direction)
- Every time
- Every time (running in the positive direction)
- Every time (running in the negative direction)
- Disabled (default)

The *Home Done* signal is set at the first occurrence of the home sensor.

2.3.4.3 Control and Status Signals

Executing and controlling homing is done by the following control signals:

Control signal (input)	Function
Home Enable	Executes the selected home function and starts searching for the home position, provided that the drive is enabled and has received a start command. Homing is interrupted if Home Enable is removed before finding the home position.
Home Sensor	The signal used for Home on sensor and Homing on the fly

The following status signals are available for monitoring homing status:

Status signal (output)	Function
Home Active	Signals that a homing procedure is active. The signal is reset when homing is done and the Home Enable signal is inactive.
Home Done	Signals that home is found. The signal is reset when starting a new homing procedure.

2.3.5 Touch Probe

The Touch probe function captures the actual position at the edge of a signal on a digital input, independent of the operating mode.

2 simultaneous touch probes are supported, called Touch Probe 1 (menu group 5.18.1) and Touch Probe 2 (menu group 5.18.2). The following describes Touch probe 1 but is applicable to both as the two touch probes and their parameters are identical, the only difference being level 3 of the parameter index number.

The source of the touch probe signal is selected with parameter *5.18.1.2.1 Touch Probe 1 Input* and it is possible to enable and disable monitoring of the touch probe by a digital input or a fieldbus control word bit, selected with parameter *5.18.1.2.2 Touch Probe 1 Enable Input*.

There are 2 modes for capturing the touch probe position selected via parameter *5.18.1.2.5 Touch Probe 1 Mode*:

Selection	Description
Single Shot	After the touch probe is enabled, only the first occurrence of the touch probe is captured. The actual position at the occurrence of the touch probe is shown in parameter *5.18.1.1.5 Touch Probe 1 Recorded Position*.
Continuous	All occurrences of the touch probe are captured while the touch probe is enabled. The actual position at the latest occurrence of the touch probe is shown in parameter *5.18.1.1.5 Touch Probe 1 Recorded Position*. The number of oc-

Selection	Description
	currences is counted and shown in parameter *5.18.1.1.7 Touch Probe 1 Counter*. The counter is automatically reset when the touch probe is enabled, but it can also be reset at any time by parameter *5.18.1.2.4 Touch Probe 1 Reset Counter*.

The captured touch probe positions can be read out and used by an external controller, while they can be used inside the drive for Touch probe positioning and distance measurement in Gear mode.

It is possible to define a position window for accepting the touch probe by defining first and last positions for the acceptable position area with parameters *5.18.1.2.7 Touch Probe 1 First position* and *5.18.1.2.7 Touch Probe 1 First position*. The following illustrations show different scenarios for linear and rotary axis:

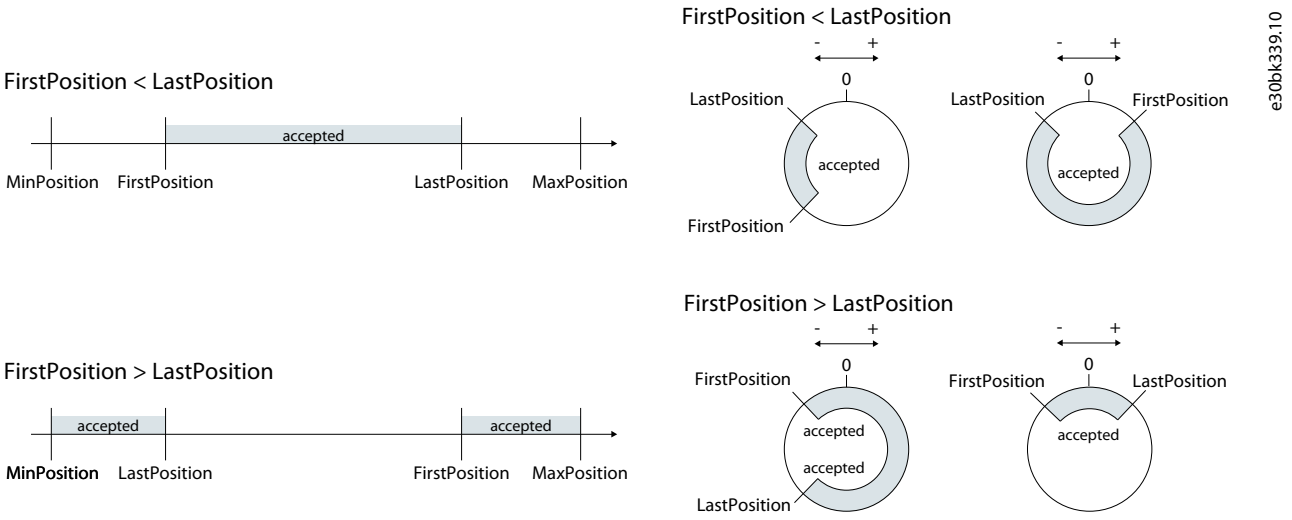


Illustration 9: Touch Probe Scenarios for Linear and Rotary Axis

2.3.5.1 Control and Status Signals

Controlling touch probes is done by the following control signals:

Control signal (input)	Function
Touch Probe 1 Enable	Activates monitoring and capturing of Touch Probe 1 while signal is high (level-triggered)
Touch Probe 2 Enable	Activates monitoring and capturing of Touch Probe 2 while signal is high (level-triggered)
Touch Probe 1	The signal for capturing Actual Position of Touch Probe 1, edge-triggered.
Touch Probe 2	The signal for capturing Actual Position of Touch Probe 2, edge-triggered.

The following status signals are available for monitoring Touch Probe status:

Status signal (output)	Function
Touch Probe 1 Detected	Signals that Touch Probe 1 has been detected. The signal is reset when the Touch Probe is disabled.
Touch Probe 2 Detected	Signals that Touch Probe 2 has been detected. The signal is reset when the Touch Probe is disabled.
Touch Probe 1 Active	Signals that Touch Probe 1 is enabled.
Touch Probe 2 Active	Signals that Touch Probe 2 is enabled.

2.3.5.2 Distance Measurement

The drive can measure the distance between 2 Touch Probe events in position units. It can be the distance between 2 separate Touch Probes or the distance between 2 instances of the same Touch Probe. The measured distance is shown in parameter *5.18.3.1.1 Distance*, and the number of measurements is shown in parameter *5.18.3.1.3 Result Counter*. The counter is reset when the source selection is changed.

Measurement is done between 2 sources, A and B, selected with parameters *5.18.3.2.1 Selection Source A* and *5.18.3.2.2 Selection Source B* with the following selections:

- None
- Touch Probe 1
- Touch Probe 2

The distance is measured between source B and the latest occurrence of source A and is calculated at every occurrence of source B: Distance = [Position of source B] – [Position of source A].

The following illustrations show how the distance is measured in different scenarios:

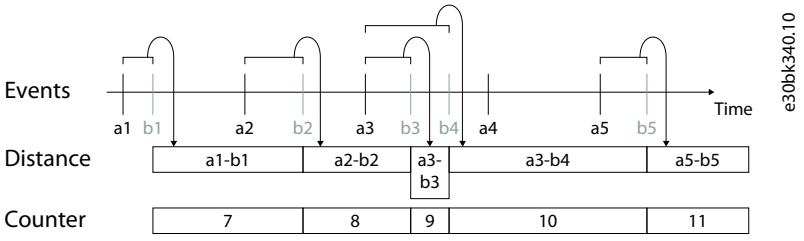


Illustration 10: Two Separate Touch Probes as Sources A and B

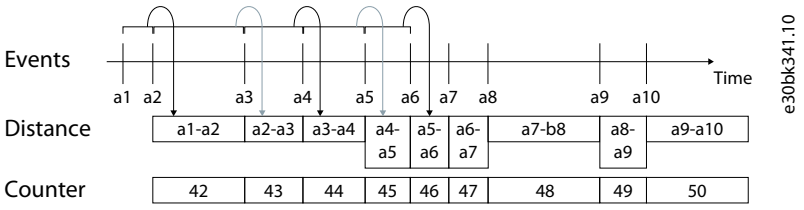


Illustration 11: The Same Touch Probe as Sources A and B

2.3.6 Superimposed Movement

Superimposed movement is positioning on top of an underlying motion in Speed mode or Gear mode, used for offsetting the position while running. Superimposed movement is controlled by a separate profile generator, which calculates a speed profile on top of the underlying movement based on distance, speed, and ramps, defined with the following parameters:

Parameter	Description
5.19.2.4 Superimposed Speed Difference	Sets the speed reference for the superimposed motion, which is added to the actual speed of the underlying motion.
5.19.2.5 Superimposed Distance	Sets the distance for superimposition in position units.
5.19.2.6 Superimposed Ramp Selection	Selects the set of ramp type and ramp times for the superimposed movement.

Superimposed movement is triggered by the signal Superimposed Start. The source for this signal is selected with parameter *5.19.2.1 Superimposed Start Input*. The superimposed distance can be relative to the previous target, the actual position, or an absolute value. This is configurable via parameter *5.19.2.2 Superimposed Mode*, with the following selections:

Selection	Description
Additive to Previous Target	Distance is added to the previous superimposed target even if the target is not yet reached.
Additive to Covered Distance	Distance is added to the actual position meaning that the target of an ongoing superimposed movement is replaced by the new target.
Absolute	Distance is used as the absolute target, relative to the starting point of the first superimposed movement since the underlying movement was started.

The following figures illustrate the results of different superimposed movements:

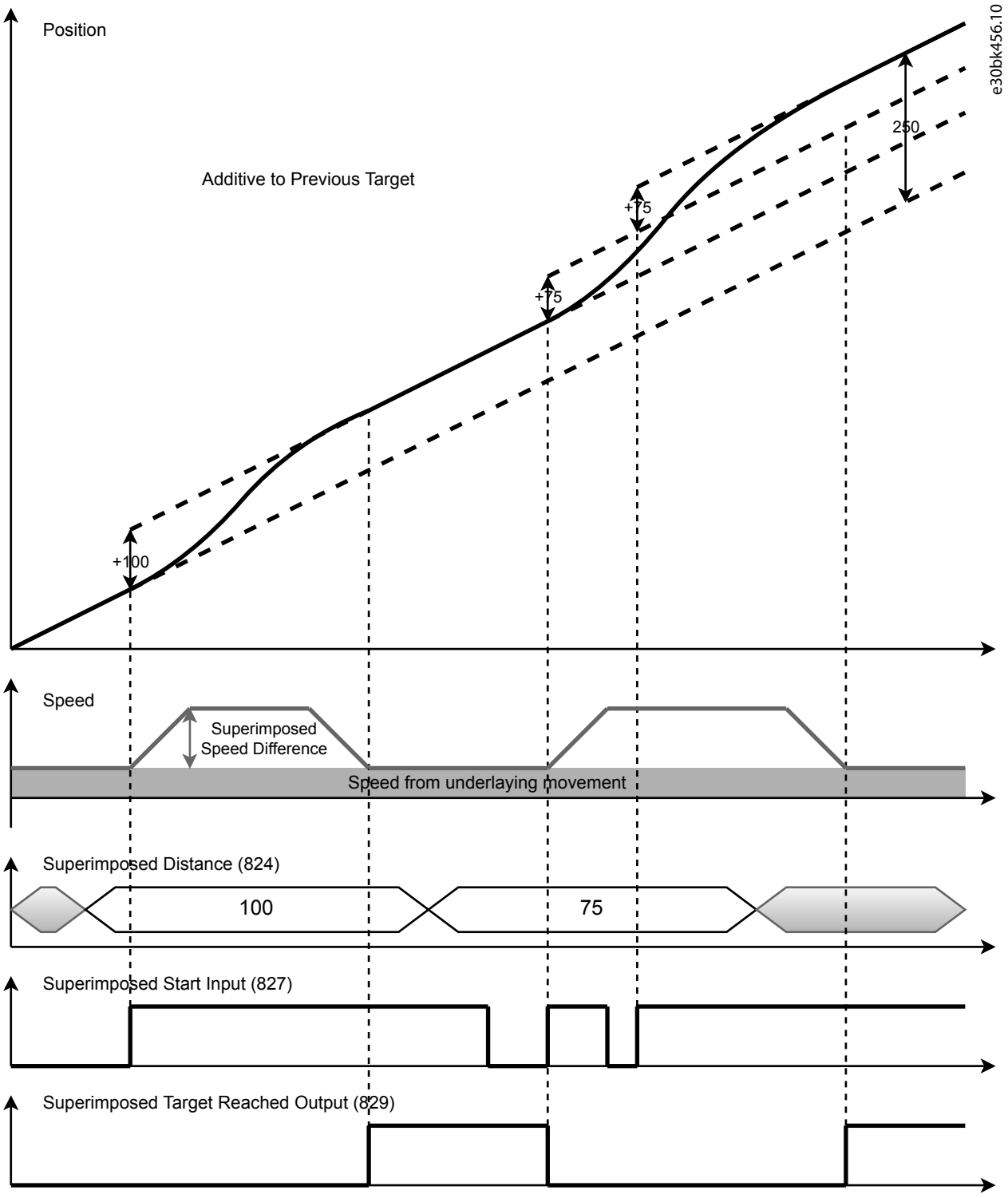


Illustration 12: Speed Control Superimposed Mode - Additive to Previous Target

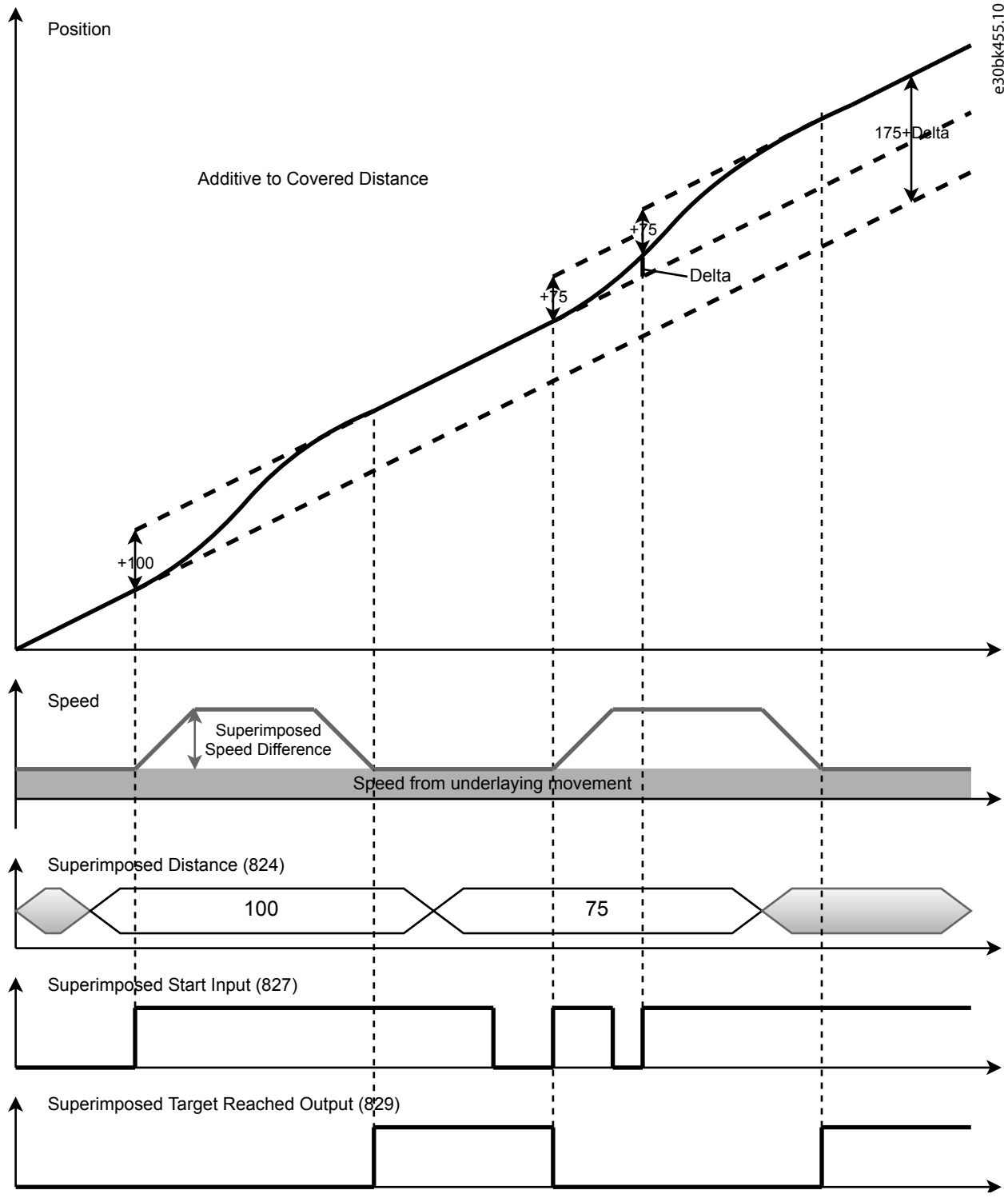


Illustration 13: Speed Control Superimposed Mode - Additive to Covered Distance

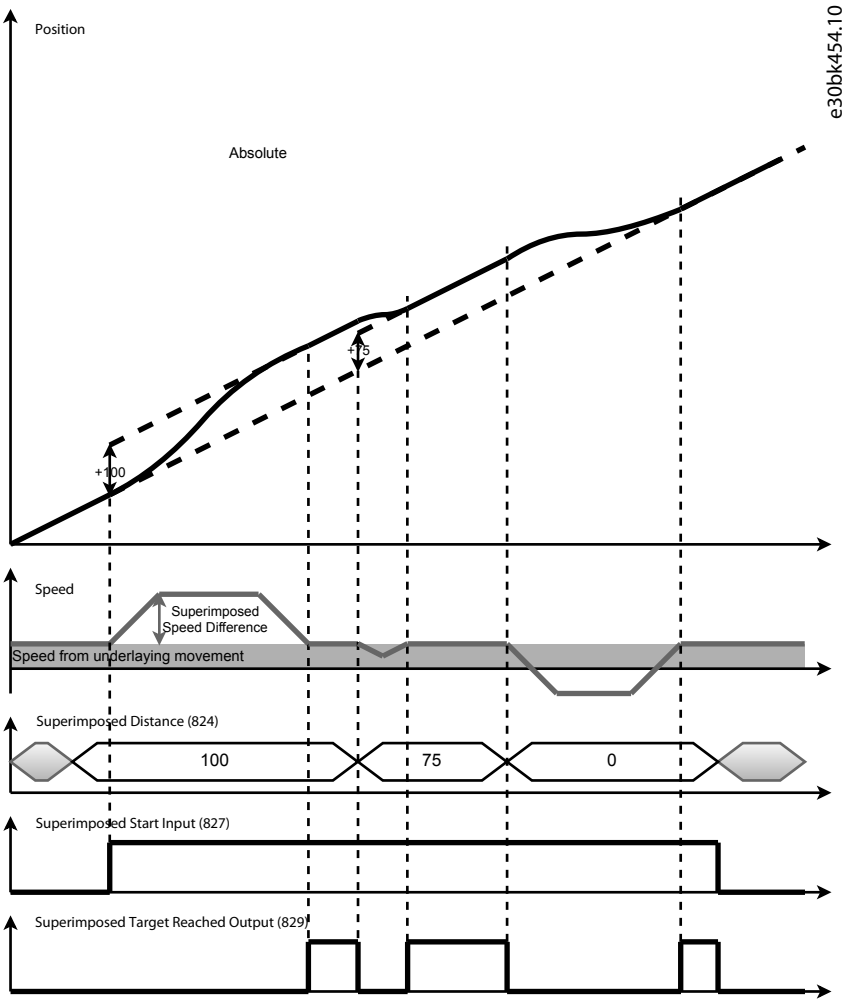


Illustration 14: Speed Control Superimposed Mode - Absolute

Control and Status Signals

Controlling superimposed movement is done by the following control signal:

Control signal (input)	Function
Superimposed Start	Activates the configured superimposed movement, edge-triggered.

The following status signals are available for monitoring superimposed movement status:

Status signal (output)	Function
Superimposed Active	Signals that superimposed movement is ongoing.
Superimposed Target Reached	Signals that the superimposed target has been reached. The condition is that Superimposed Demanded Position = Superimposed Target Position.

2.4 PROFIdrive – Standard Telegram 1

Standard telegram 1 is implemented according to PROFIdrive Application Class 1 profile as defined in the PROFIdrive standard and state machine diagram.

2.4.1 Control Word (CTW) in PROFIdrive Standard Telegram 1

Table 2: Control Word Bits in PROFIdrive Standard Telegram 1

Bit number	Name	Description
0	On-Off	1 = On. 0 = Off.
1	Coast stop	1 = No coast stop. 0 = Coast stop.
2	Quick stop	1 = No quick stop. 0 = Quick stop.
3	Operation	1 = Enable operation. 0 = Disable operation.
4	Ramp generator	1 = Enable Ramp generator (RFG). 0 = Reset Ramp generator. Output of the RFG is set to 0. The drive decelerates along the current limit or along the voltage limit of the DC link.
5	Freeze	1 = Unfreeze ramp generator. 0 = Freeze ramp generator. Freezes the present output frequency (in Hz).
6	Enable setpoint	1 = Enable setpoint. 0 = Disable setpoint.
7	Fault acknowledge	0 → 1 = Acknowledge faults. Acknowledge is edge-triggered when changing from logic 0 to logic 1. 0 = No function.
8	Jog 1	1 = Jog 1 on. 0 = Jog 1 off. Operation is enabled, drive is in standstill and STW1 bit 4, 5, 6 = 0. The drive runs up along the ramp to jogging setpoint 1.
9	Jog 2	1 = Jog 2 on. 0 = Jog 2 off. Operation is enabled, drive is in standstill and STW1 bit 4, 5, 6 = 0. The drive runs up along the ramp to jogging setpoint 1.
10	Control by PLC	1 = Uses the process data (control by PLC). 0 = Ignores the current process data. This is linked to the submodule where the CTW is present. If signals are to be covered, the CTW/STW profile (for example, the iC Speed Profile) must be part of the signals list.
11	Reserved	Reserved for future use.
12	User defined	These bits enable mapping application functionality of the drive to the control word. Mapping is done through parameters. For more information, refer to the *Parameter Descriptions* chapter in the application guide.
13	User defined	
14	User defined	
15	User defined	

2.4.2 Status Word (STW) in PROFIdrive Standard Telegram 1

Table 3: Status Word Bits in PROFIdrive Standard Telegram 1

Bit Number	Name	Description
0	Ready to switch on	1 = Ready to switch on. 0 = Not ready to switch on.
1	Ready to operate	1 = Ready to operate. 0 = Not ready to operate.
2	Operation enabled	1 = Operation enabled. 0 = Operation disabled.
3	Operation fault	1 = Fault present. 0 = No fault.
4	Coast stop	1 = Coast stop not activated (No OFF2). 0 = Coast stop activated (OFF2).
5	Quick stop	1 = Quick stop not activated (No OFF3). 0 = Quick stop activated (OFF3).
6	Switching on inhibited	1 = Switching on inhibited. 0 = Switching on not inhibited.
7	Warning	1 = A warning has occurred. 0 = There are no warnings.
8	Speed=reference/ Speed<>reference	1 = The present motor speed matches the present speed reference within a given tolerance. The tolerance is product-specific. 0 = The motor runs, but the present speed is different from the present speed reference. It could, for example, be the case while the speed ramps up/down during start/stop.
9	Bus control/Local operation	1 = The device is controlled and reacting to I/O and Process data. 0 = The device does not react to commands from fieldbus, because of 1 of the following reasons: • CTW bit 10 = 0. • HMI is in local mode. • MyDrive® Insight has taken control. • Control places do not include fieldbus.
10	Frequency limit ok/Out of frequency limit	1 = The output frequency is within the defined motor limits. 0 = The output frequency has exceeded the defined motor limits given by parameters. The speed limits are set by parameters: • *P 5.8.3.4 High Speed Warning* • *P 5.8.3.9 Low Speed Monitor Limit*
11	User defined	These bits enable mapping application functionality of the drive to the status word. Mapping is done through parameters. For more information, refer to the *Parameter Descriptions* chapter in the application guide.
12	User defined	

Bit Number	Name	Description
13	User defined	
14	User defined	
15	User defined	

2.4.3 PROFIdrive State Machine

In the PROFIdrive control profile, the control bits perform different functions:

- 0–3 perform the basic start-up and power-down functions.
- 4–10 perform application-oriented control.
- 12–15 can be configured for different purposes.

See Illustration 15 for the basic state transition diagram, where control bits 0–3 control the transitions and the corresponding status bit indicates the actual state. The black dots indicate the priority of the control signals. Fewer dots indicate lower priority, and more dots indicate higher priority.

The general state diagram is defined in the PROFIdrive standard.

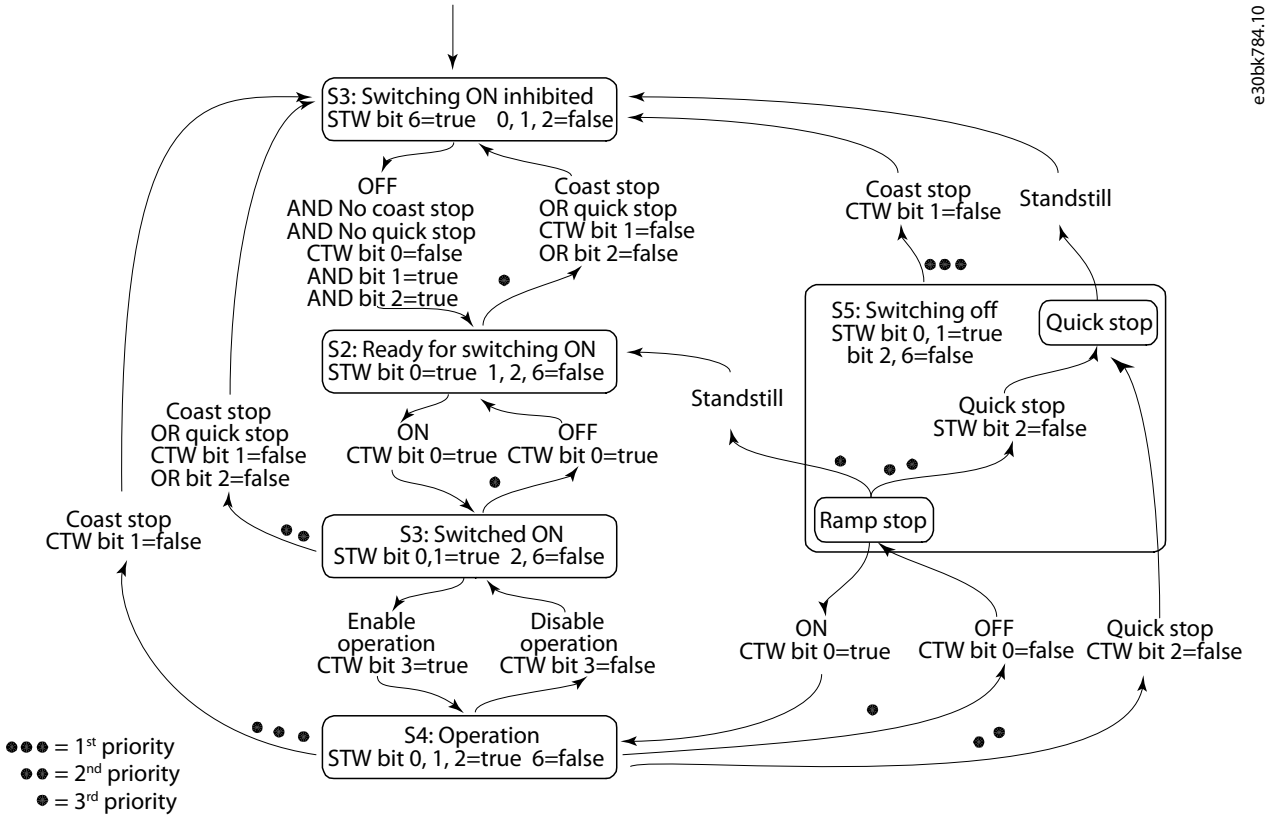


Illustration 15: General State Diagram

2.5 iC Speed Profile

The iC Speed profile is used with the iC7 series. iC Speed profile differs from the PROFIdrive profile, because it does not have a State Machine. It is only controlled by the actual state 1/0 of the control bits, not the sequence in which they are manipulated.

2.5.1 Control Word (CTW) in iC Speed Profile

Table 4: iC Speed Profile Control Word Bits

Bit number	Name	Description
0+1	Preset reference selector	00 = Preset reference 1 01 = Preset reference 2 10 = Preset reference 3 11 = Preset reference 4
2	Reserved	Reserved for future use. Any control words sent to the device should keep this bit at 0 to ensure compatibility with future extensions of the control word.
3	No coast/Coast	1 = No function. 0 = Causes the frequency converter immediately to coast the motor.
4	No quick stop/ Quick stop	1 = No function. 0 = Quick stops the frequency converter and ramps down the motor speed to stop as defined in the quick-stop ramp parameter.
5	No hold/Hold – output frequency	1 = No function. 0 = Holds the present output frequency (in Hz).
6	Start/No start	1 = If the other starting conditions are fulfilled, the selection allows the frequency converter to start the motor. 0 = Stops the frequency converter and ramps down the motor speed as defined in the ramp-down parameter.
7	Fault acknowledge	0→1 = Acknowledge faults. Acknowledge is edge-triggered, when logic is changed from 0 to 1. Faults can only be acknowledged if the trigger condition has been removed and any required acknowledgment has been done. 0 = No function.
8	Jog/No jog	1 = Sets the output frequency to the jog speed defined in the jog speed parameter. 0 = No function.
9	Ramp select	1 = Ramp 2 is active. 0 = Ramp 1 is active.
10	Data valid	1 = Uses the process data (control by PLC). 0 = Ignores the current process data. This is linked to the submodule where the CTW is present. If signals are to be covered, the CTW/STW profile (for example, the iC Speed Profile) must be part of the signals list. Uses the previously processed data when the data valid bit was true (no control by PLC).
11	Reserved	Reserved for future use.
12	User defined	These bits are reserved for application-specific advanced control. For more information, refer to the *Parameter Descriptions* chapter in the application guide.
13	User defined	
14	User defined	
15	User defined	

2.5.2 Status Word (STW) in iC Speed Profile

Table 5: iC Speed Profile Status Word Bits

Bit number	Name	Description
0	Control ready/Control not ready	1 = The device controls are ready and react to process data. 0 = The device controls are not ready and do not react to process data.
1	Frequency converter ready/Frequency converter not ready	1 = The frequency converter is ready for operation. 0 = The frequency converter is not ready for operation. This does not involve faults and warnings as they are indicated in their respective bits elsewhere.
2	Coasting/No coast	1 = There are no active coast signals, and the motor can start when a start signal is given. 0 = The frequency converter has an active coast signal and has released the motor.
3	Fault/No fault	1 = A fault has occurred, and an acknowledge signal is required to re-establish operation. 0 = There are no faults.
4	Reserved	Reserved
5	Reserved	Reserved
6	Reserved	Reserved
7	Warning/No warning	1 = A warning has occurred. 0 = There are no warnings.
8	Speed=reference/ Speed<>reference	1 = The present motor speed matches the present speed reference within a given tolerance. The tolerance is product-specific. 0 = The motor runs, but the present speed is different from the present speed reference, for example while the speed ramps up or down during start or stop.
9	Bus control/Local operation	1 = The device is controlled and reacting to I/O and process data. 0 = The device does not react on commands from fieldbus, for 1 of the following reasons: • CTW Bit 10 = 0. • HMI is in local mode. • MyDrive® Insight has taken control. • Control places do not include fieldbus.
10	Frequency limit ok/Out of frequency limit	1 = The output frequency is within the defined motor limits. 0 = The output frequency has exceeded the motor limits defined in parameters. The speed limits are set by parameters: • *P 5.8.3.1 Positive Speed Limit* • *P 5.8.3.2 Negative Speed Limit* • *P 5.8.3.3 Minimum Speed Limit*
11	In operation/No operation	1 = The process is running, and the motor could be running or starting at any time. 0 = There are no active start requests, and the process does not run. The motor is in a coasted state and is not started.
12	Reserved	Reserved

Bit number	Name	Description
13	Reserved	Reserved
14	User defined	These bits are reserved for application-specific advanced control. For more information, refer to the *Parameter Descriptions* chapter in the application guidethe *Parameter Descriptions* chapter in the application guide.
15	User defined	

3 User Interfaces and How to Configure

3.1 Overview of User Interfaces

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

Using MyDrive® Insight provides the ability to access the drive from a remote place, if infrastructure is in place and 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 Control Panel Options

The iC7 Series offers the following 2 different control panel options:

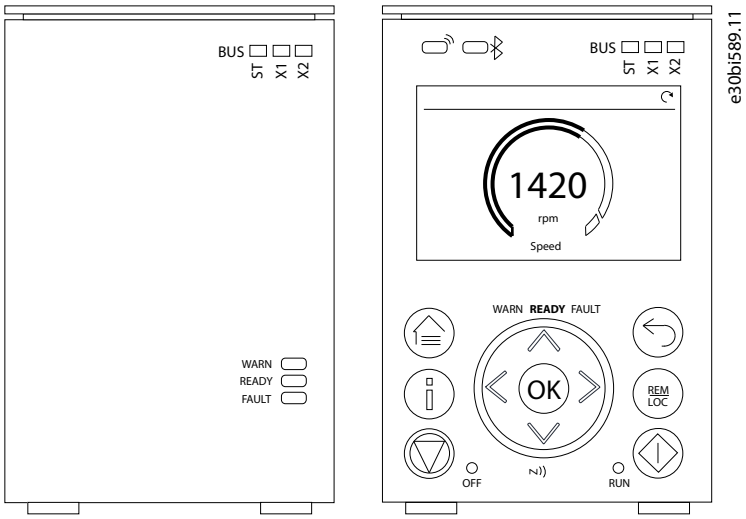


Illustration 16: Control Panel Options

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

A more detailed overview of the Control Panel 2.8 0PX20 is as follows:

- 2.8" monochromatic user interface with a display resolution of 240 x 160 pixels.
- Visual LEDs to identify drive status, fieldbus communication.
- Halo indicator with 3 colors to illustrate drive status at a glance.
- Convenient readout of status values in the display, which can be customized to show the required or essential information.
- Local operation to control the drive including toggle mechanism to easily switch between local and remote operation.
- 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 AC drive easily. The section describes the elements for all control panel options.

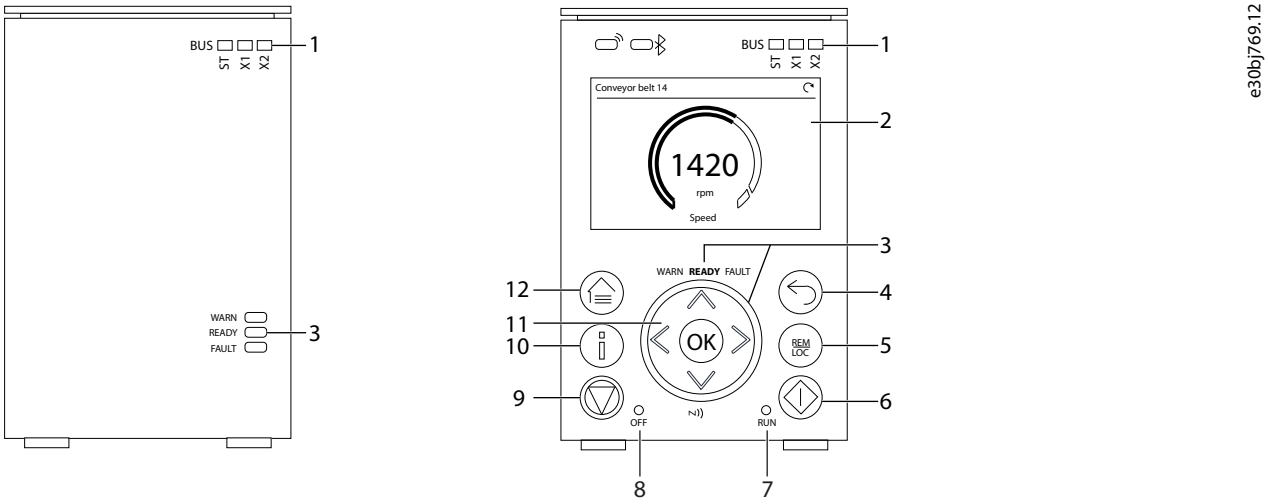


Illustration 17: Control Panel Elements

Table 6: Control Panel Elements Description

Legend	Name of Element	Description
1	Fieldbus Indicators	The related LEDs indicate the status of the communication interface X1 and X2. • **[ST]** - Green LED blink indicates normal operating state of the communication interfaces. - Red LED blink indicates that an error has occurred and communication is not possible. • **[X1]** - Green LED blink indicates data exchange on communication interface X1. - Red LED blink indicates an error during data exchange on communication interface on X1. • **[X2]** - Green LED blink indicates data exchange on communication interface X2. - Red LED blink indicates an error during data exchange on communication interface on X2.
2	Display	Enables to access content and settings. The display provides detailed information about the status of the drive.
3	Drive Status Indicators	The related LEDs indicate the status of the drive. In Control Panel 2.8, the status of the drive is also shown by the Halo indicator, which has the same color as the drive status LEDs. • **[WARN]** - Yellow color on the LED and Halo indicates that a warning has occurred in the drive. • **[READY]** - White color on the LED and Halo indicates that the drive is ready for operation. • **[FAULT]** - Red color on the LED and Halo indicates a fault.
4	Back button	Navigates to previously viewed screen or a menu level above current menu.
5	REM/LOC	Toggles the drive between remote and local operation.
6	Run button	Starts the operation of the drive.

Legend	Name of Element	Description
7	RUN LED	Indicator has the following states: • **On:** Start command is applied and the drive is modulating. • **Off:** Drive has stopped and start command is not applied.
8	OFF LED	Indicator has the following states: • Steady on: The indicator is in this state, because of the following 2 reasons: - The drive is not modulating and the drive is coasted. - The stop signal is applied, output is active, and the drive 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 start is blocked. • Off: The drive is in operation, a start signal is applied and the output is active. This also includes ramping, running on reference, and AMA). • **Note:** When a fault has occurred on the drive, the LED is on though the start command is available. If there is a fault, and the start command is disabled and reinitiated again, the Off LED blinks.
9	Stop button	Stops the operation of the drive, depending on the setting of parameter *5.5.3.1.4 CP Stop Button Action*.
10	Info button	Provides more detailed information about an event that has occurred in the drive. If there is an active event and the button is pressed on the home screen, information on the active event is shown on screen. If parameter information is shown on the screen, pressing Info also shows a help text for the parameter.
11	Arrow buttons	• **Arrow buttons:** 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	Used to toggle between Home screen and current parameter menu in order to allow quick access to key status information during parameter setup.

3.2.3 Control Panel Basic Configurations

Basic configurations of the control panel include:

- Readout status of the motor and the drive, including warnings and faults.
- Navigate to the menus in order to view or change parameter settings for the drive.

3.2.3.1 Starting the Drive and Control Panel Display

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

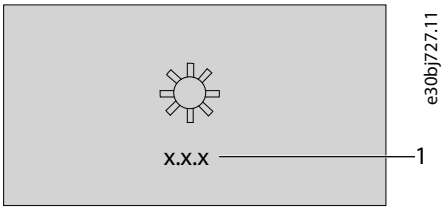


Illustration 18: Control Panel Display on Startup

Table 7: Legend Table

Legend	Description
1	Shows the software version of the control panel.

N O T I C E

When the drive is started, it takes 25–30 seconds for the drive 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 drive is in ready state, the control panel display shows the *Home* screen. By default, as a factory setting, the *Home* screen is shown as follows.

The *Home* screen can be customized.

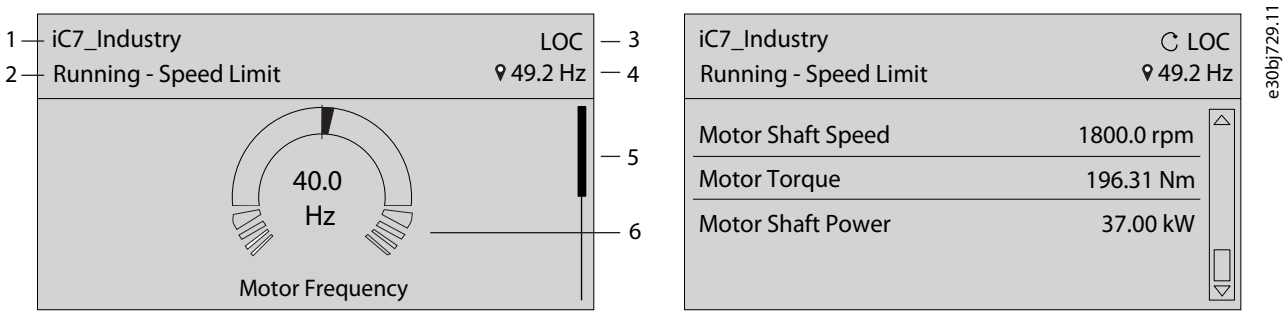


Illustration 19: Home Screen (Donut View vs. Line View)

The following are the legends and description of the *Home* screen.

Table 8: Legend Table

Legend	Description
1	Shows the name of the application software.
2	Shows the status of the drive (see the following table).
3	Shows the current control of the drive. REM indicates remote control and LOC indicates local control. The arrow shows the direction of the motor.
4	Shows the setpoint of the chosen operation mode. The local setpoint can only be changed when the drive is in local control.
5	Shows 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.
6	Shows the readout value as a donut infographic view. By default, the Motor Speed readout is shown. It is possible to show only a single readout in a donut view. When more than one 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.

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

Drive status in the panel	Description
Drive Ready	Drive is powered and ready to start.
Running at Reference	Drive is running at speed reference.
Running at Standstill	Drive is running with 0 reference.
Stopping	Drive is running towards stop.
Stopped	Drive is stopped due to an active stop command.
Coasted	Drive is coasting due to an active coast command.

Drive status in the panel	Description
Quick Stop	Drive is stopped due to an active quick stop command.
Start Interlock	Drive is stopped with an active start command. To restart, the start command must be deactivated and given again.
Start Inhibited	Drive is in a state that is preventing start. All start commands are ignored.
Safe Torque Off (STO)	Drive is coasting due to an active STO command.
Inching	Drive is inching or jogging.
Running/Stopping/Inching, with: • Power Limit • Undervoltage Limit • Overvoltage Limit • Torque Limit • Current Limit • Speed Limit	Drive is running, stopping, or inching, and has exceeded the limit that is shown. For example, *Running - Power Limit*. Some possible limits are listed in the cell on the left. See also the preceding image.
AMA Ready	Advanced Motor Adaptation is activated and is awaiting the start command.
AMA in Progress	Advanced Motor Adaptation is running, measuring motor data.
AMA Finished	Advanced Motor Adaptation has finished. To restart the drive, remove the start command and give it again.

Press the down arrow on the control panel when in the *Readout Screen 1*. The control panel screen navigates to the *Readout Screen 2*. As a factory default setting, the control panel shows 3 readout values, as shown.

3.2.3.3 Setting the Intensity of Display Backlight and Contrast

When in *Readout Screen 1* or *Readout Screen 2*, it is possible to adjust the intensity of the display backlight and the contrast can be adjusted according to individual requirement.

In order to adjust the display backlight and contrast settings, press the *Info* button and any of the arrow buttons of the control panel. The screen changes to the following:

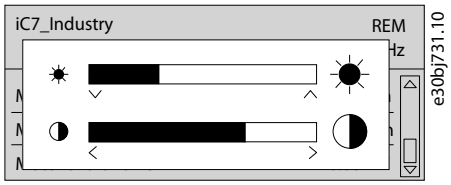


Illustration 20: Intensity Change in Backlight and Contrast

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

3.2.3.4 Changing the Content of Different Readout Screens

In this section, an example to change or customize the content of *Readout Screen 1* is explained. The same procedure is applicable to *Readout Screen 2*.

1. To change the content, press *OK* for a minimum of five seconds while in any *Readout Screen 1* or *Readout Screen 2*. The screen changes as shown.

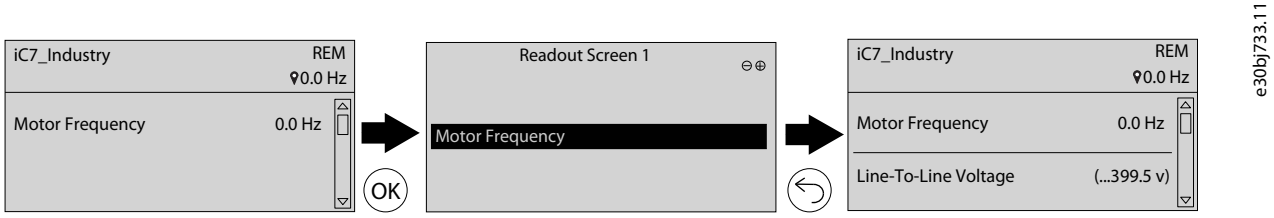


Illustration 21: Typical Readout Screen

2. Press the up arrow of the control panel and move to the remove readout button to remove an existing readout. Using the left and the right arrow of the control panel, a readout can be added or removed using the add readout or remove readout buttons.
When at the add or remove readout buttons, the buttons are highlighted in black as shown.

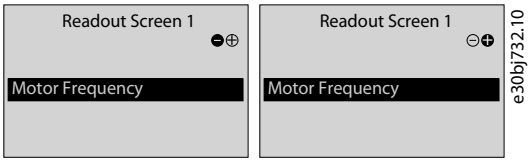


Illustration 22: Add and Remove Readout buttons

3. After selecting the available selections to add or remove from the list, press *OK*.

N O T I C E
On removing a readout, the last readout from the list is removed.

On selecting the add readout button, select the readout you want to add.
In this example, the readout Line-to-Line Voltage (RMS) is selected, as shown.

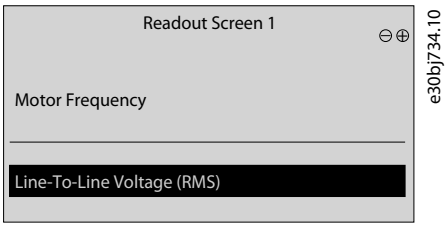


Illustration 23: Readout Screen Update (Example)

4. To add more readouts, continue pressing the add readout button and select required readouts.
5. Press *Home* button or *Back* button to return to the required Readout Screen, after adding required readouts.

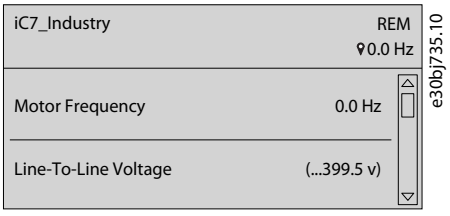


Illustration 24: Readout Screen Update

N O T I C E
The *Readout Screen 1* and *Readout Screen 2* can also be adjusted using the *parameter group 8 Customization* → Control Panel. For more information, see 6.9 Customization (Menu Index 8).

3.2.3.5 Parameter Group Screens and Overall Navigation

Using the *Home/Menu* button allows to toggle between readout screens and 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 below.

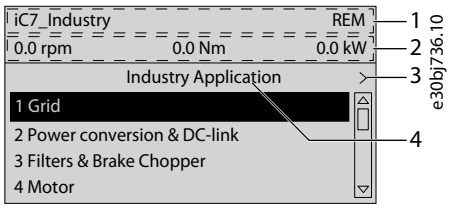


Illustration 25: Parameter Group Screen

Table 9: Legend Table

Legend	Description
1	Name and control state of the drive.
2	The menu readout header shows the first three signals chosen in *Readout Screen 2*. Editing this line also affects *Readout Screen 2*.
3	Press the left and right icon to navigate one level above or below respectively, in the parameter group structure. When the Previous or Next arrows are not shown, this indicates that the view is currently at the top of the menu structure (as in the illustration above) or at the bottom of the menu structure. See illustration for Previous button.
4	Name of the application software that is currently active in the drive.

Basic Navigation Handling Techniques
To navigate through and within the different parameter groups, use the navigation keys of the control panel.

- Use the up or down arrows of the control panel to navigate to different parameter groups.
- Use the left or right arrows of the control panel to navigate to parameter subgroups or parameters within a parameter group.
- Use the *Back* button to navigate to a higher level, and the *OK* button to navigate to a lower level in the parameter/parameter group screens.

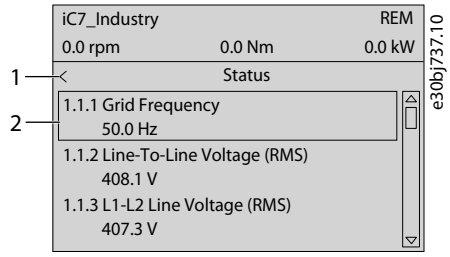


Illustration 26: Parameter Navigation

Table 10: Legend Table

Legend	Description
1	Previous button when in the parameter group.
2	When parameters are defined as readout only, the current readout is shown below the parameter name. A black outline around the parameter indicates that the value of the parameter cannot be changed.

3.2.3.6 Changing Selections in a Parameter

In this example, the *parameter 5.8.6.2.1 Ramp 1 Type* is considered. When a parameter has selections, a black highlight is active on the parameter index and name, as shown.

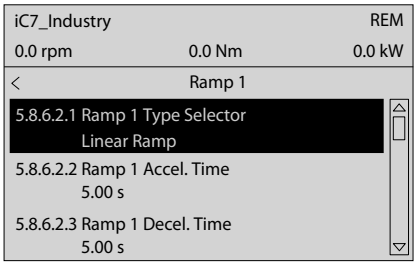


Illustration 27: Changing Selections in a Parameter

1. To view the selections of the parameter, press the right arrow of the control panel or *OK*. The selections available for the parameter are shown.

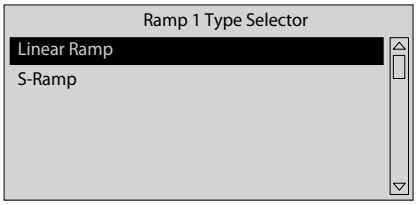


Illustration 28: Selections in a Parameter (Example)

2. Use the up or down arrow to browse through the selections.
3. Press *OK* at the required selection.

3.2.3.7 Changing Parameter Value

In the example, the *parameter 5.8.6.2.2 Ramp 1 Accel. Time* is considered and the illustrations show the change of value from 5 s to 10 s.

1. Go to the *parameter 5.8.6.2.2 Ramp 1 Accel. Time* and press *OK*.

The screen changes as shown in the following illustration. The range of the parameter (minimum to maximum values) is shown at the bottom of the control panel display.

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. Use the up and down arrow buttons of the control panel to increase or decrease the value.
4. Press *OK* to confirm the changes.

The following illustration shows all the screens relevant to change the value of a parameter.

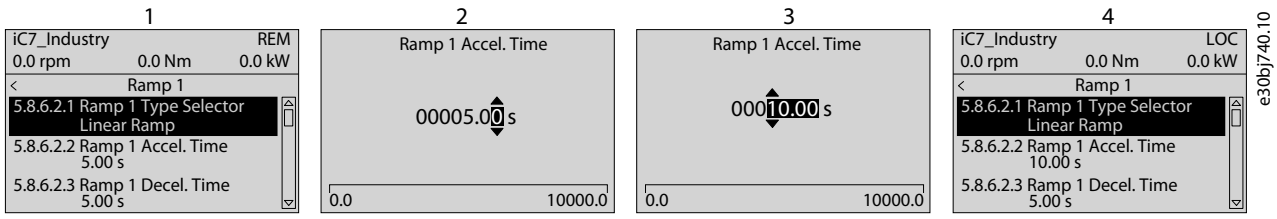


Illustration 29: Changing Value in a Parameter

3.2.3.8 Locking the Control Panel Display

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

1. To lock the control panel, press the *Back* button for 3 seconds. After 3 seconds, the following screen is shown.

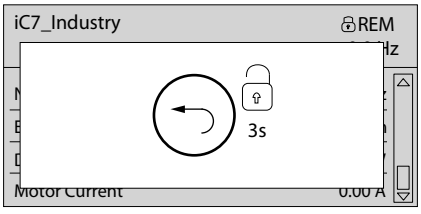


Illustration 30: Control Panel Lock Screen

When the control panel is locked, no interaction is possible even though buttons on the control panel are pressed.
To unlock the control panel, press the *Back* button for 3 seconds.

3.2.4 Control Panel Shortcuts

Following is a list of shortcuts in navigating the control panel.

Table 11: Legend Table

Action	Pre-condition	Buttons	Activate Time
Fast scroll	When in a menu or choice lists	Up and down arrows	1 s. to activate
Factory reset	N/A	*Home* + *Back* + down arrow	3 s. to activate
Keypad lock		*Back*	3 s. to activate or deactivate
Reference set point edit	• *Home* screen is active. • LOC mode is active • Control allowed	*[OK]*	Single press
Edit *Home* screen readouts	*Home* screen active	*[OK]*	5 s. to activate
Edit Menu Readout header	Any menu is active	*[OK]*	5 s. to activate
Show active events	*Home* screen is active	*Info*	A single press
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 iC7 series. Some of the key features include:

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

N O T I C E

This chapter applies to MyDrive® Insight version 2.8.0 or above. Please make sure to uninstall lower versions of MyDrive® Insight from your device to utilize the latest MyDrive® Insight functions.

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 drive using MyDrive® Insight. For further information on the different MyDrive screens, integrated help within MyDrive® Insight will be available in future releases.

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 drive and the device, use the communication interface X0 and the RJ45 Ethernet port on the device by using a standard Ethernet cable.

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

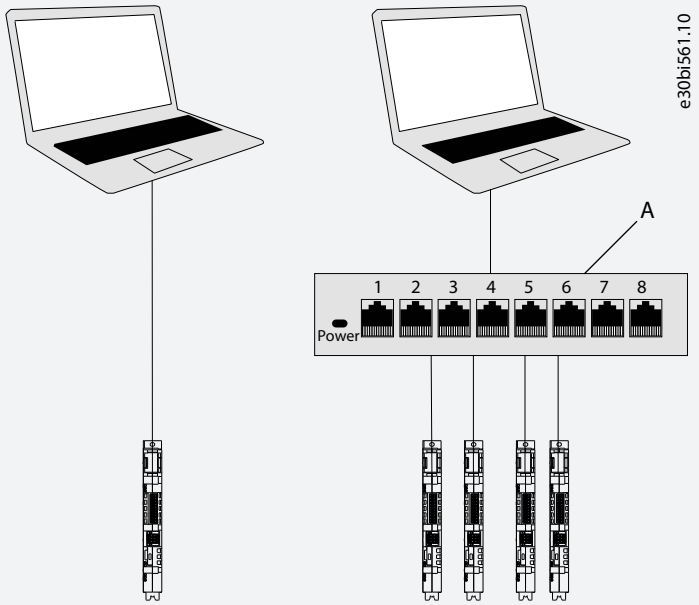
   

   Illustration 31: Connection to the PC

A	Ethernet switch

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

   Illustration 32: Confirm Connection

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

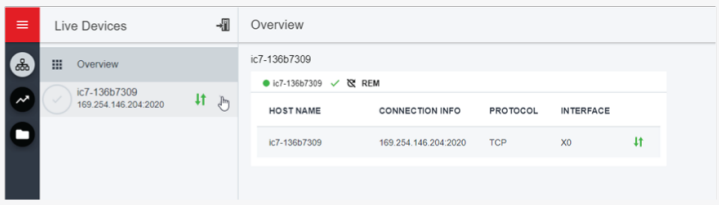
   

   Illustration 33: Establish Connection

4. Select the required interaction for the drive. In this example, the *Device Info* screen is shown.

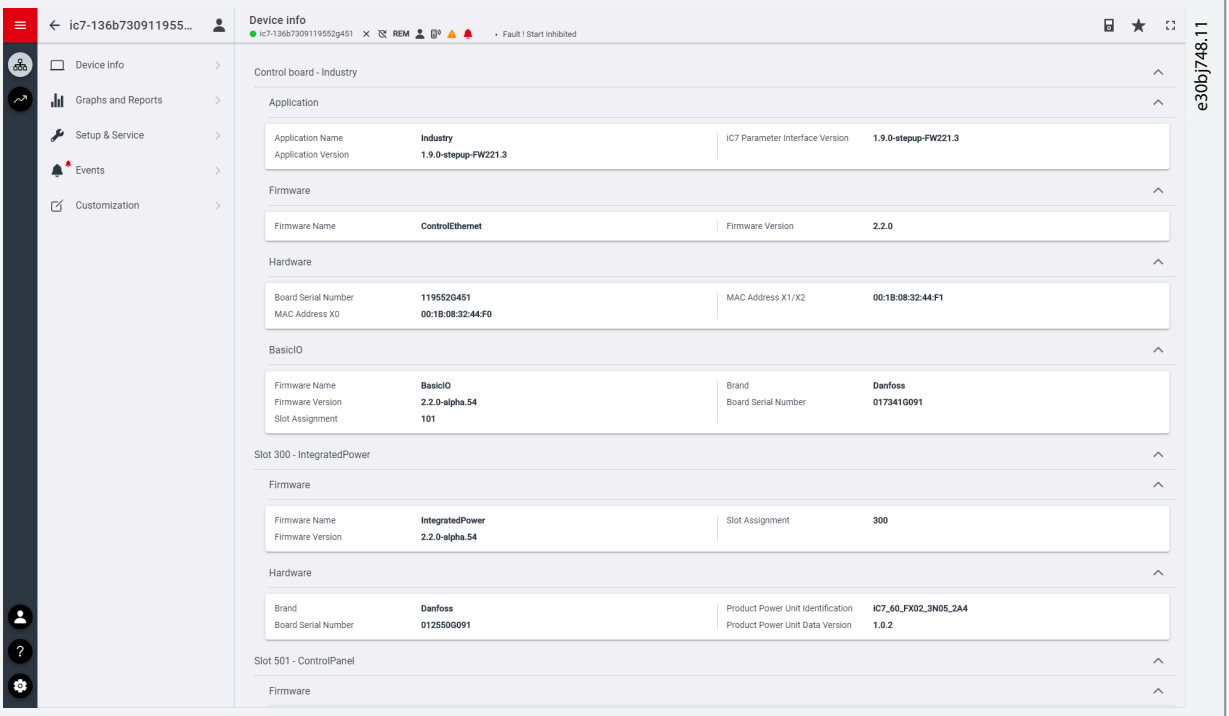


Illustration 34: Device Info

NOTICE

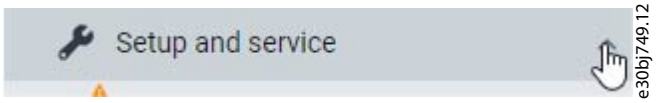
The application guide covers basic information such as accessing parameters and using the PC control in MyDrive® Insight.

3.3.2 Accessing Parameters and Understanding Parameter Screens in MyDrive Insight

Viewing and Changing Parameters

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

1



2

Illustration 35: Setup and Service

Parameter Screen Overview

The following is an overview of the *Parameters (Live)* screen in MyDrive® Insight.

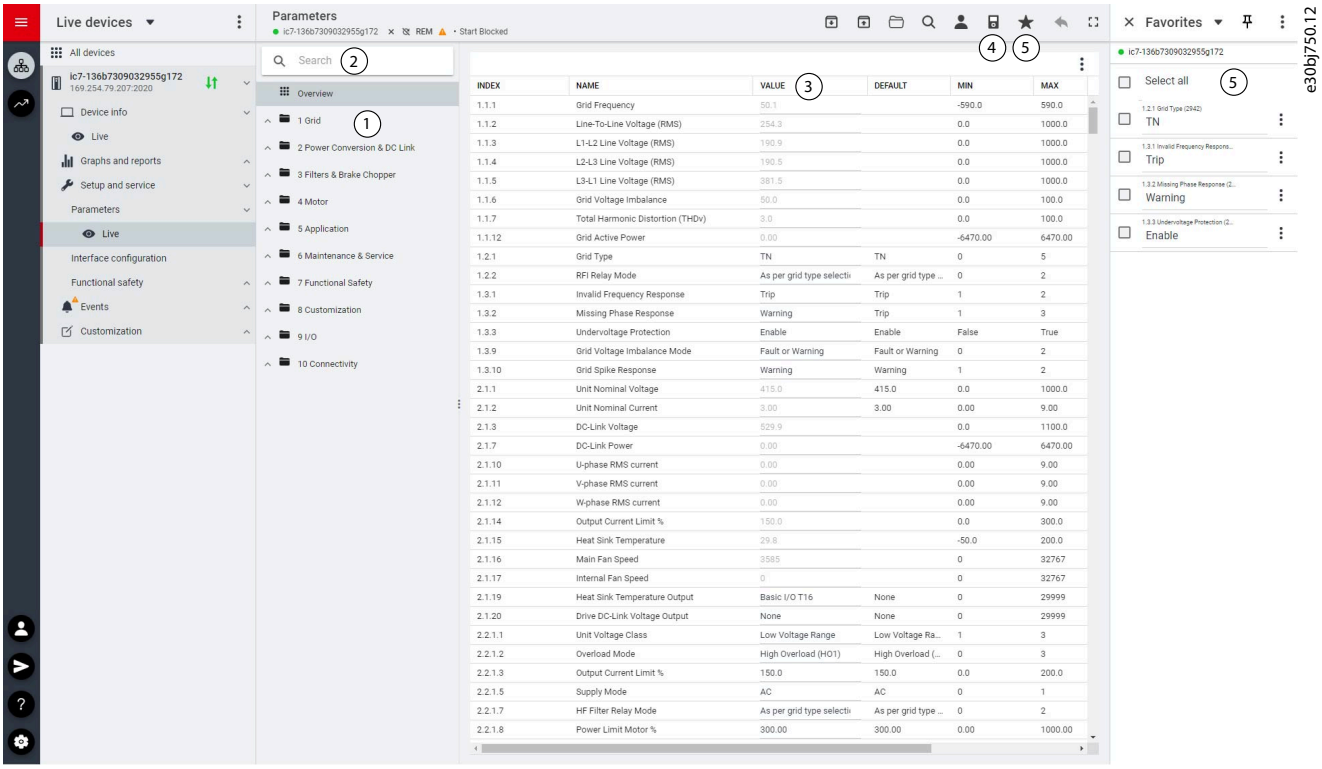


Illustration 36: Parameters (Live)

Table 12: Legend Table

Legend	Name	Description
1	Parameter group	Navigate through the different parameter groups in the drive.
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 drive are shown on the Live screen.
4	*PC Control* button	Switch to PC control to start or stop the drive using MyDrive Insight.
5	Favorites	Select a parameter as a favorite by clicking the star in its row. Open the favorites panel on the right side of the screen by clicking the star at the top of the page.

Navigate through different parameter groups

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

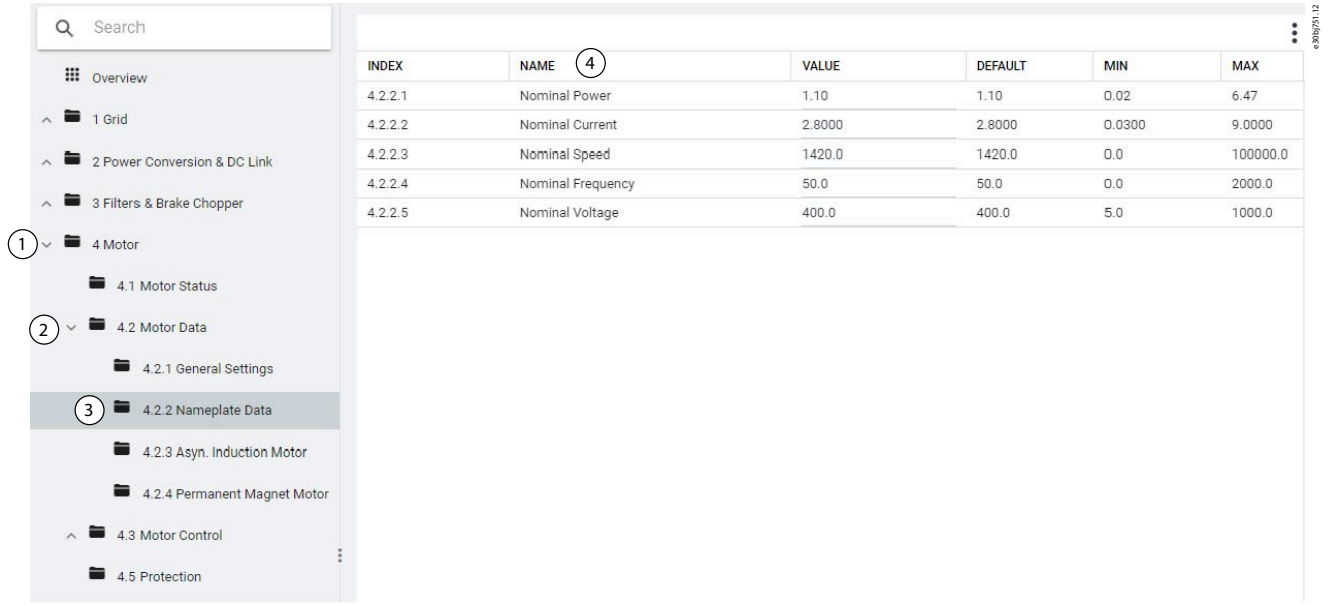


Illustration 37: Parameter Group

1. Click the parameter group (1) from the *Live* pane.
2. Click the parameter subgroup (2).
3. Repeat step 2, until the right level of parameter subgroup (3) is reached to find the specific parameters (4).

N O T I C E

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.

In the following example, all parameters with *DC-Link* in the name are listed in the search results.

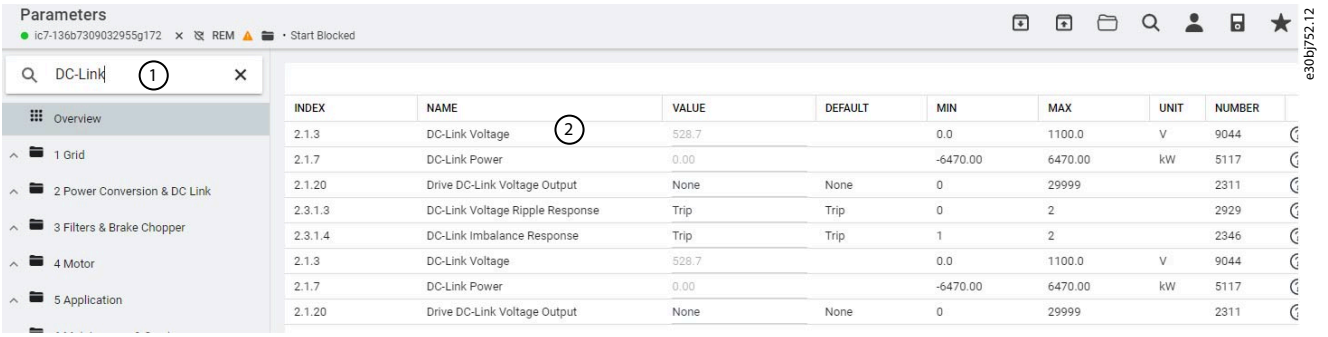


Illustration 38: Search button

1	Search term
2	Search results

3.3.3 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.

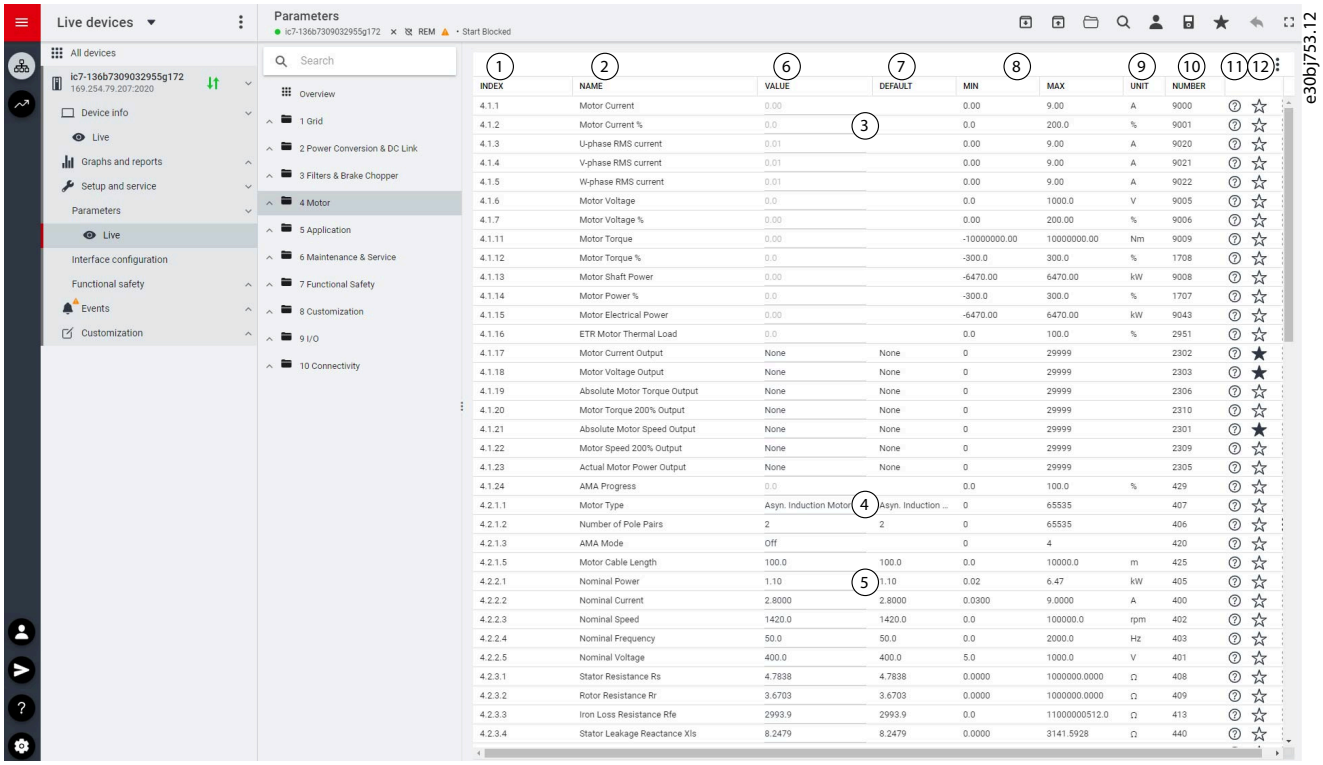


Illustration 39: Parameter Overview

Table 13: Legend Table

Number	Field 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	Status parameter	Provides the current status or value of a parameter. The parameter value is shown in a light gray color and cannot be changed.
4	Selection parameters	To see all selections available for the parameter, click the value in the *Value* field.
5	Range parameters	The parameter value can be modified based on the ranges defined (maximum and minimum values).
6	*Value*	The current value of the parameter.
7	*Default*	The factory setting (default value) of the parameter.
8	*Min* and *Max*	When applicable, the minimum and maximum values of the parameter are shown in the *Min* and *Max* fields.
9	*Unit*	When applicable, the unit of the parameter is shown in the *Unit* field.
10	*Number*	The unique identifier for each parameter. The identifier is independent and decoupled from the parameter index values.
11	*Help*	Click the *?* button to see a description about the parameter. For more detailed descriptions, see 6 Parameter Descriptions.
12	*Favorites (star)*	Clicking the Favorites icon will add the parameter to Favorites.

3.3.4 PC Control to Operate the Drive Using MyDrive® Insight

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

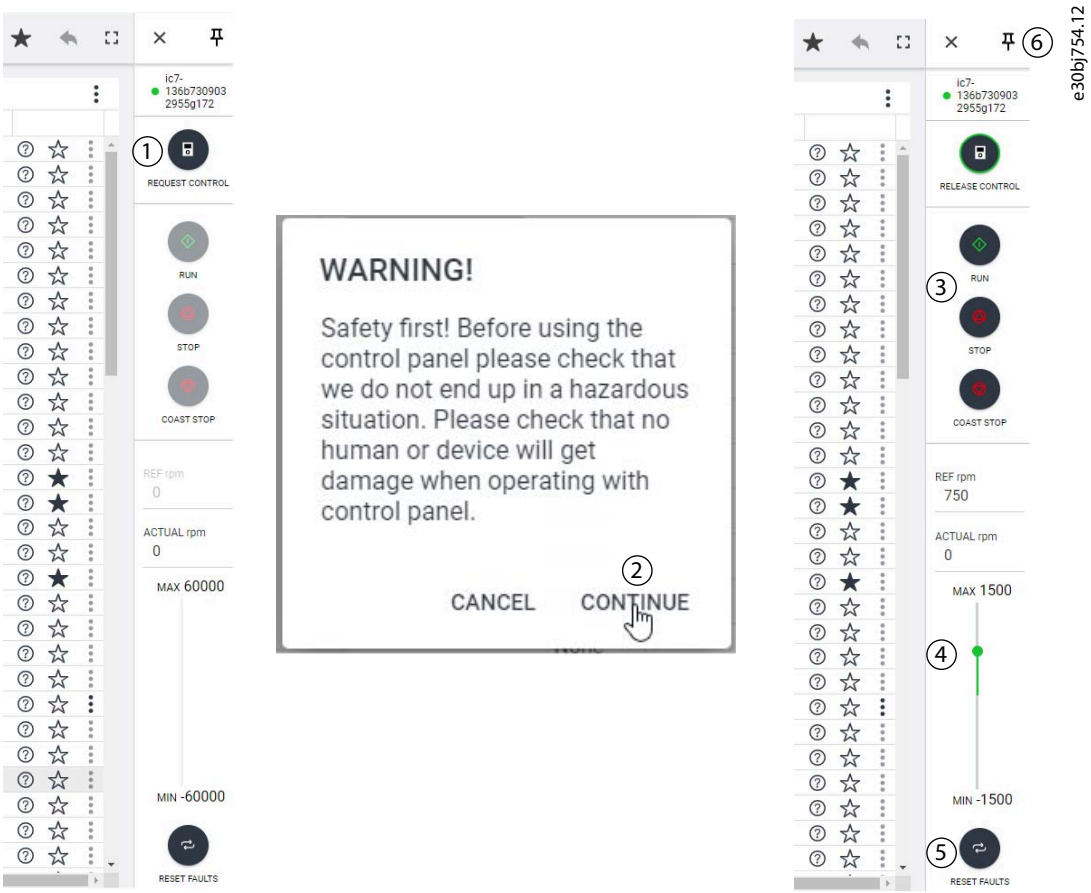


Illustration 40: Operate Drive using MyDrive® Insight

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

1. Click the *REQUEST CONTROL* button (1).
2. Click *Continue* (2) to confirm secure operational conditions while controlling the drive using MyDrive® Insight.
3. Use the *START*, *STOP*, *STOP COAST* buttons (3) to perform a drive operation. Use the sliders (4) to increase or decrease the reference speed.
4. To reset a drive in case of a fault, click *RESET FAULTS* (5).
5. For ease of access, click the Pin button (6) to make the control panel constantly visible on the screen.

3.3.5 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 drive (1), then go to *Graphs and Reports* (2) → *Datalogger* (3).

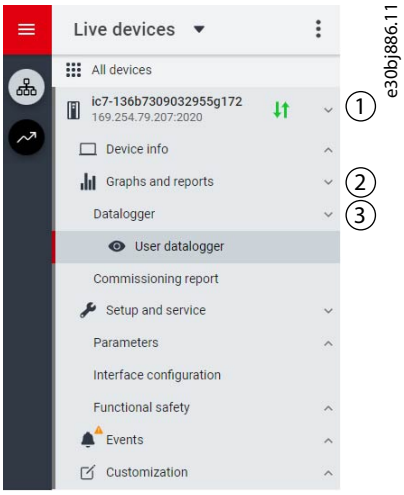


Illustration 41: Navigating to *Datalogger*

The following image shows the *Datalogger* main controls.

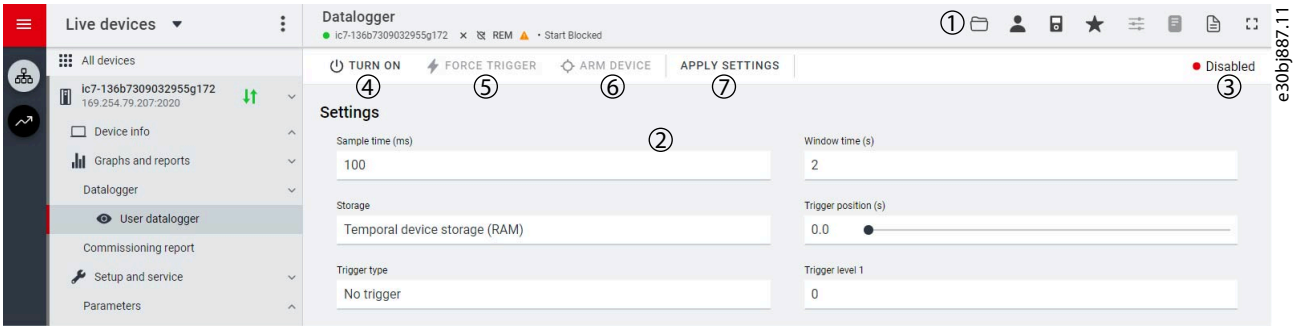


Illustration 42: Datalogger Screen

Table 14: Main Controls

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.

3.3.5.1 Configuring Datalogger

To configure the datalogger, follow these 2 main steps:

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

Procedure:

1. Open Datalogger.

   The settings view opens.

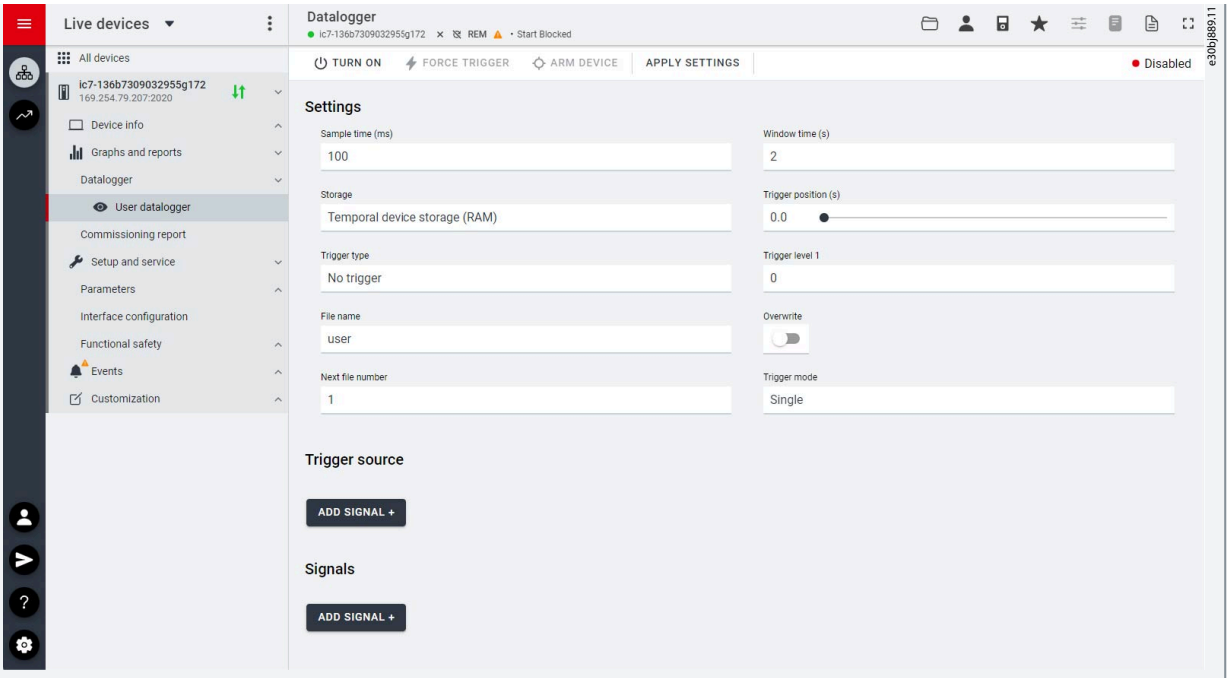
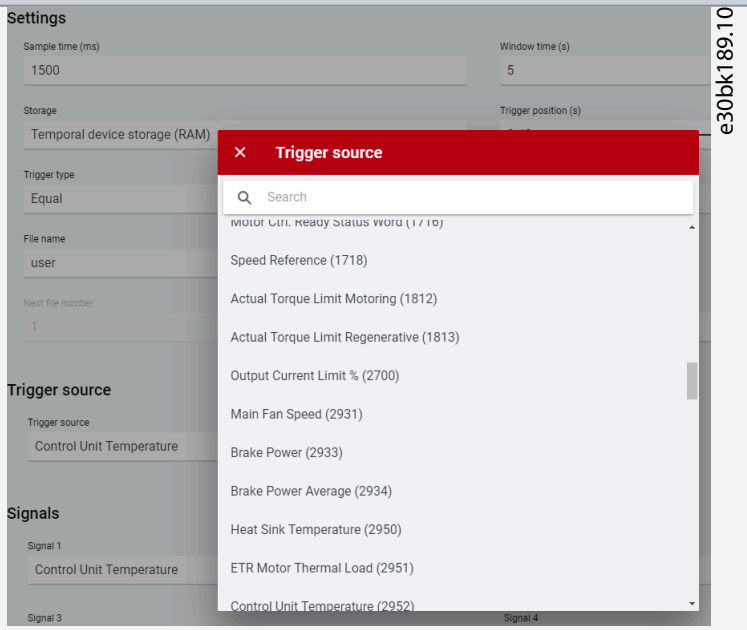
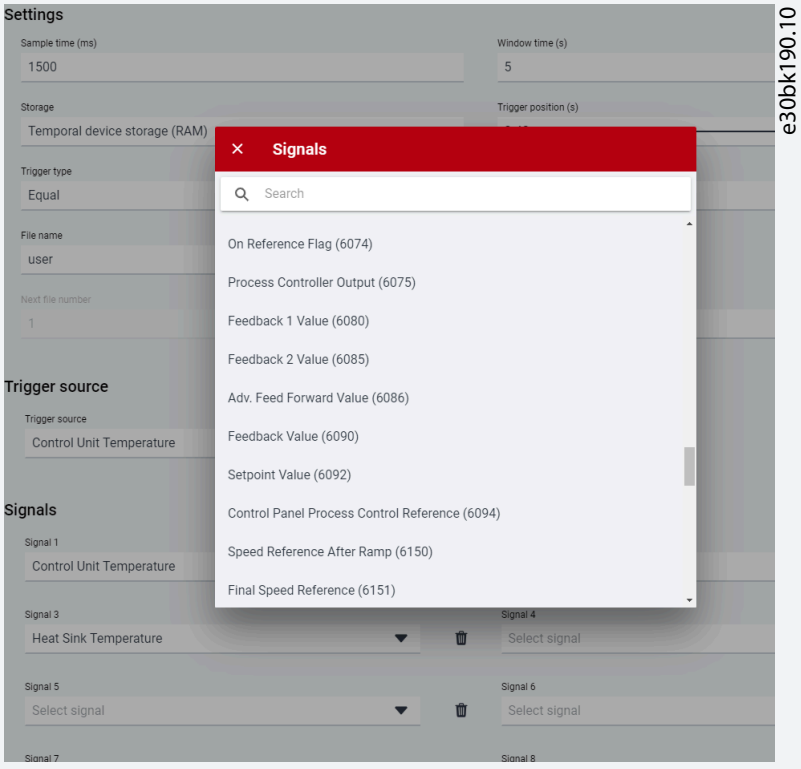


Illustration 43: Datalogger Settings

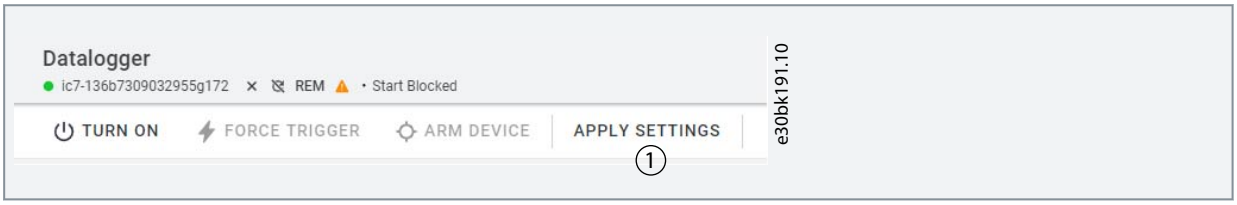
The description of the user interface elements in the screen is as follows:

Field name	Field description
Sample time (ms)	Enter a sample time in ms. The actual sample time is dependent 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: - **RAM:** Settings are stored on the RAM of the drive. - **Flash:** Settings are stored on the flash of the drive. - **SD card:** Data is stored on the (optional) microSD card. The supported microSD cards 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 that 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.
Trigger type	The trigger types are the following: - **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.

Field name	Field description
	- **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	Click the toggle button to turn the overwrite function on or off. - **On:** Overwrite is enabled. A file number is not appended to the datalog 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 datalogs are previously available in the drive. The number is auto-incremented with each datalog recording when the entry in *Next file number* is enabled.
Trigger mode	Select 1 of the following trigger modes. - **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:

Field name	Field description
	
Signals	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:  Add more signals as necessary by clicking the *Add signal* button again.

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 the icon shown in the following figure.

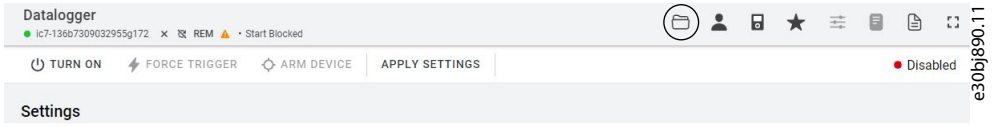


Illustration 44: Datalogger View Icon

3.3.6 Backup and Restore

Backup

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

To utilize 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 image below.

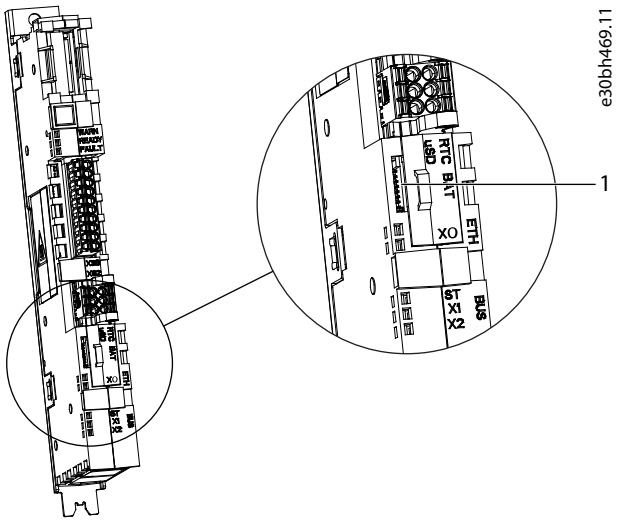


Illustration 45: MicroSD Card Slot

1	The microSD card

The 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)

N O T I C E

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

3.3.6.1 Backing up the Drive

Procedure

1. To back up the drive, select a drive, go to *Setup & Services* → *Parameters*.

   The *Parameters Live* screen is shown.

2. Click the icon as shown in the figure.

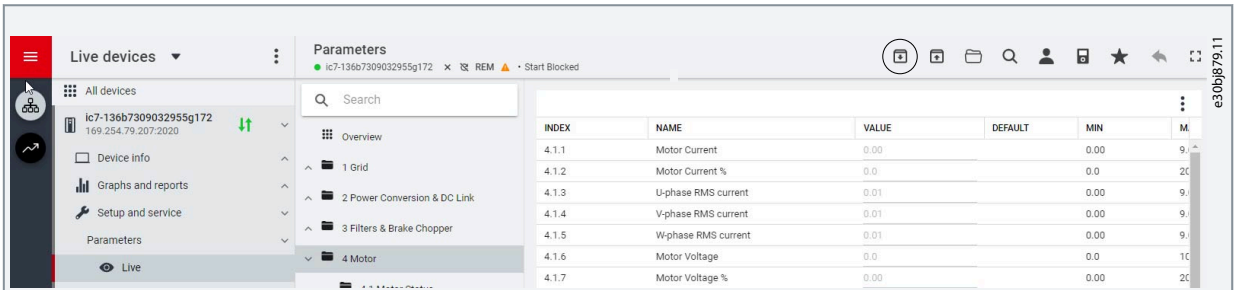


Illustration 46: Backup Destination Icon

   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* backup was created, the backup is shown in the device menu under *Parameters*.

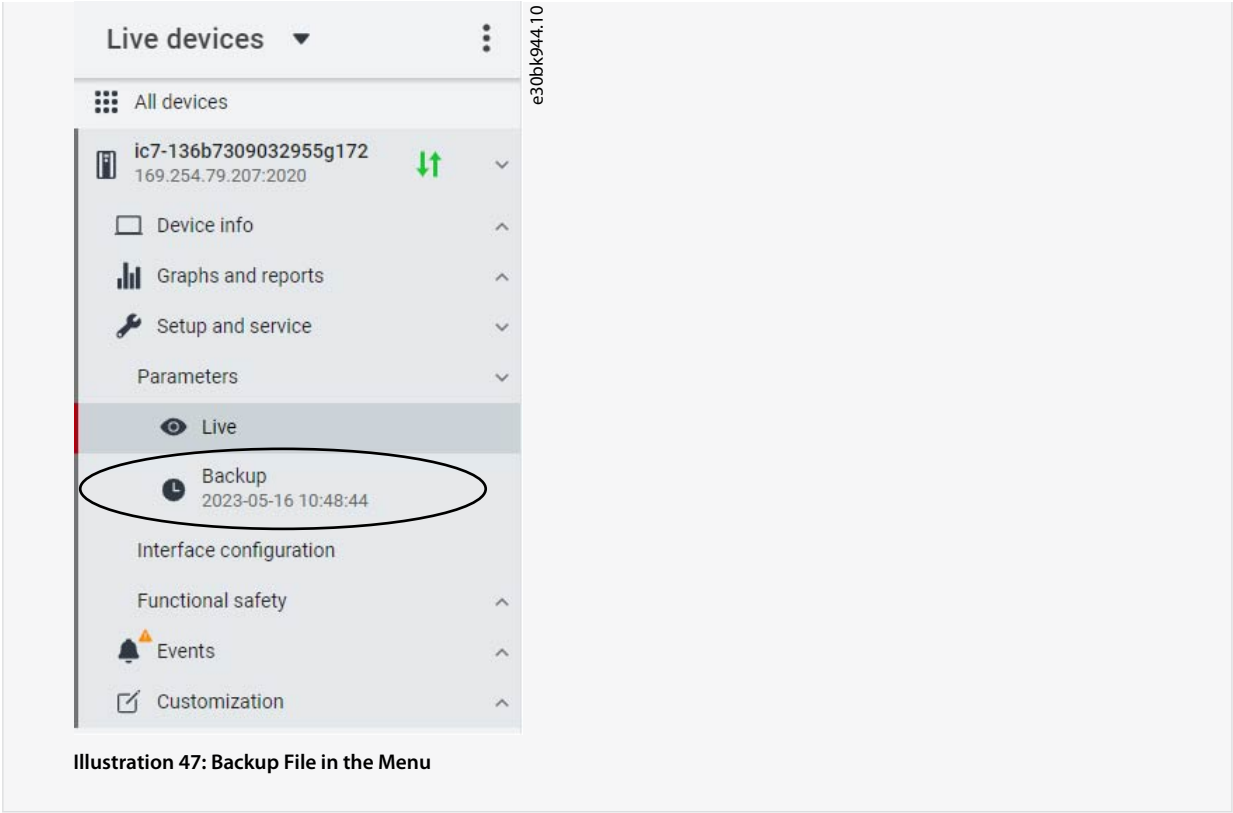


Illustration 47: Backup File in the Menu

3.3.6.2 Restoring the Data to the Drive

Procedure

1. To restore data to the drive, select a drive, go to *Setup & Service* → *Parameters*.
2. Click the icon as shown in the image below.

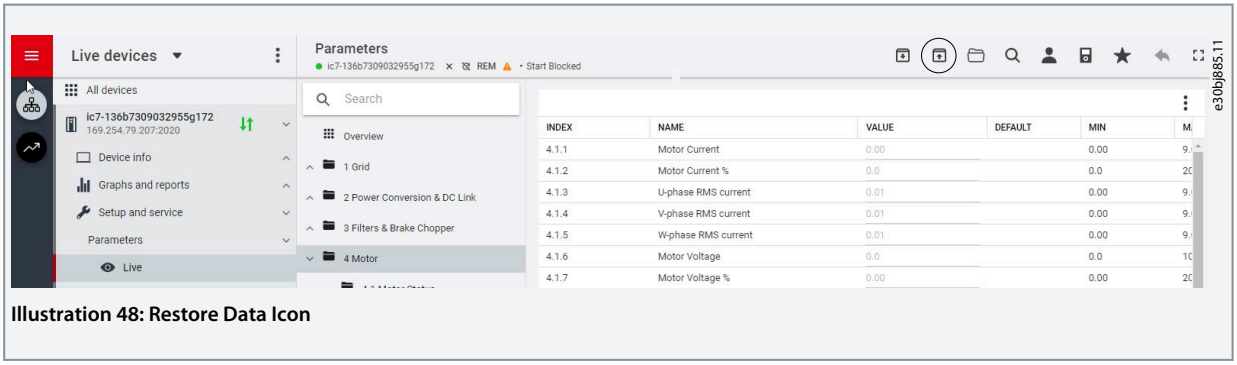


Illustration 48: Restore Data Icon

3. Select the source of the data which has to be restored to the drive.

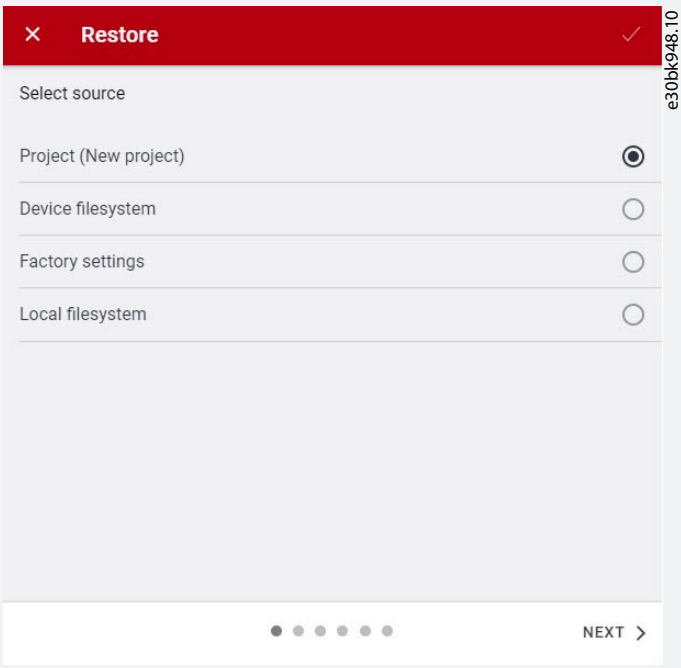


Illustration 49: Source of Data for Restore

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*.

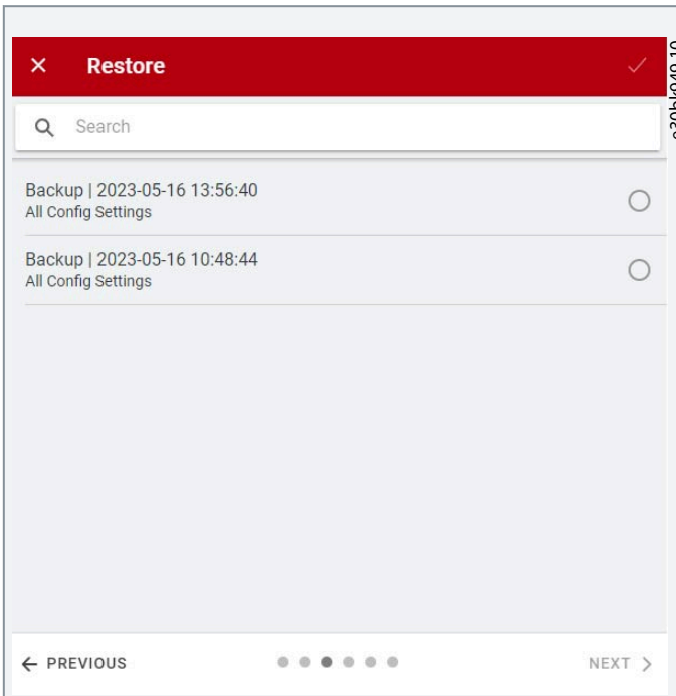


Illustration 50: Select the Backup

6. Select the files for restoring data into the drive, as shown in the figure below, and click *Next*.

NOTICE

It is possible to exclude ethernet port settings when restoring the data.

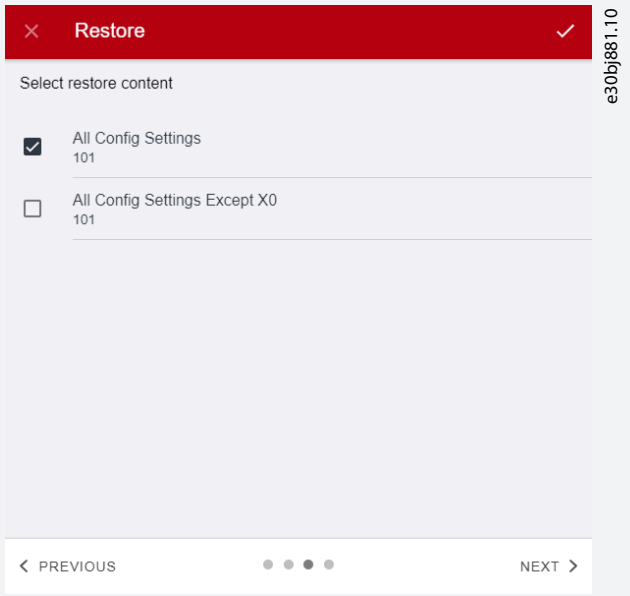


Illustration 51: Restore Data

7. The system asks you to confirm the restore action. Click *Restore*.

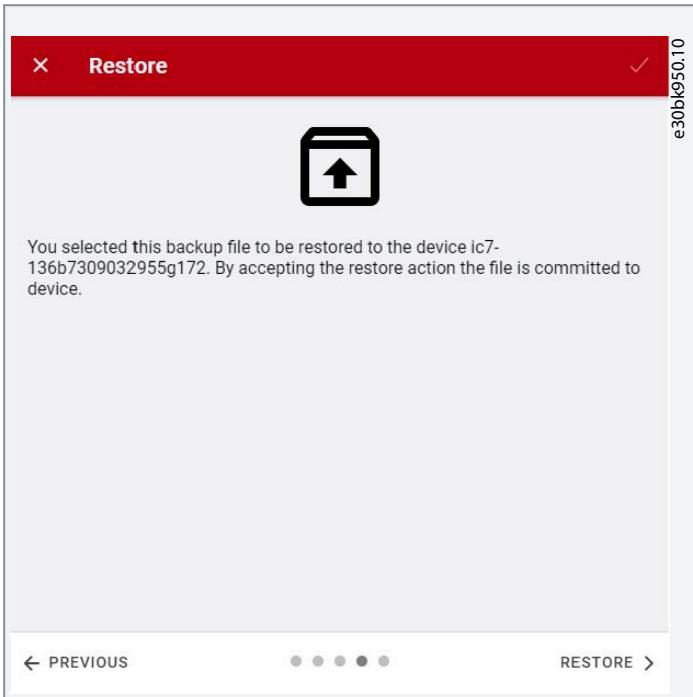


Illustration 52: Confirm Restore

On successful restore of data, a message is displayed.

4 Application Software Structure and Overview

4.1 Understanding Application Software Structure Principles

The basic design principle of the application software structure and the related hierarchy refers to the setup of a typical iC7 drive, as shown.

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

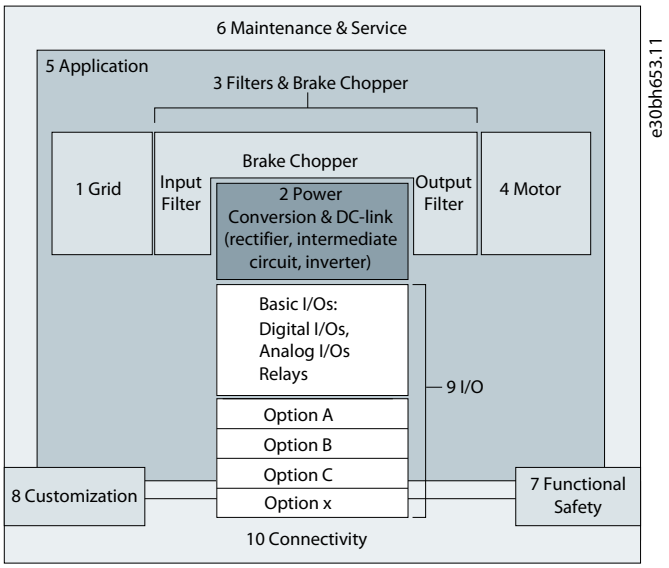


Illustration 53: Application Software Structure Overview

4.2 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 drive within a logical structure. One example is that the *Status* parameter group is embedded into each main group (if applicable) to provide quick and easy access to view real time status information of relevant data of parameters within this group.

- All generic settings such as Grid, Power Conversion and DC-link, Filters & Brake Chopper, and Motor are accessed via parameter group 1–4.
- Most of the application-specific parameters are accessed via parameter group 5 Application.
- Features and functions such as Maintenance & Service, Functional Safety, and Customization are in parameter group 6,7, and 8.
- The basic setup for external control signals and communication interfaces is done in parameter group 9 and 10.
- Features and related parameters are grouped in individual parameter groups. Each feature has a parameter group of its own.
- Status information for each parameter group is available separately for easy access.

The following table provides information about the parameter groups.

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

Index	Parameter group name	Description
3	Filters & Brake Chopper	Contains parameters to configure, monitor, and control the input filters, output filters, brake chopper, and brake resistors.
4	Motor	Contains parameters to configure motor, motor control, and motor protection.
5	Application	Contains parameters for application-specific features such as position control, speed control, torque control, mechanical brake control and many more.
6	Maintenance & Service	Contains parameters exclusively related to status, events, and service features such as condition-based monitoring.
7	Functional Safety	Contains non-safety-related parameters for configuring Safe Torque Off, as well as other safety features.
8	Customization	Contains parameters to customize and adapt the behavior of the drive and user interface design.
9	I/O	Contains hardware-related parameters to configure digital or analog I/O's.
10	Connectivity	Parameters to configure the built-in and optional communication of the drive system.

5 Configuration Setup Examples

5.1 Introduction and Prerequisites

The section covers the basic configuration steps of a drive. The application may require more steps such as protection settings. Use the following topics as reference during the drive 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 Descriptions.

Prerequisite:

N O T I C E
Ensure that the drive is mounted safely as described in the iC7-Automation Frequency Converters Installation Guide.

See also the following schematic for the correct wiring:

1 Fx09–Fx12

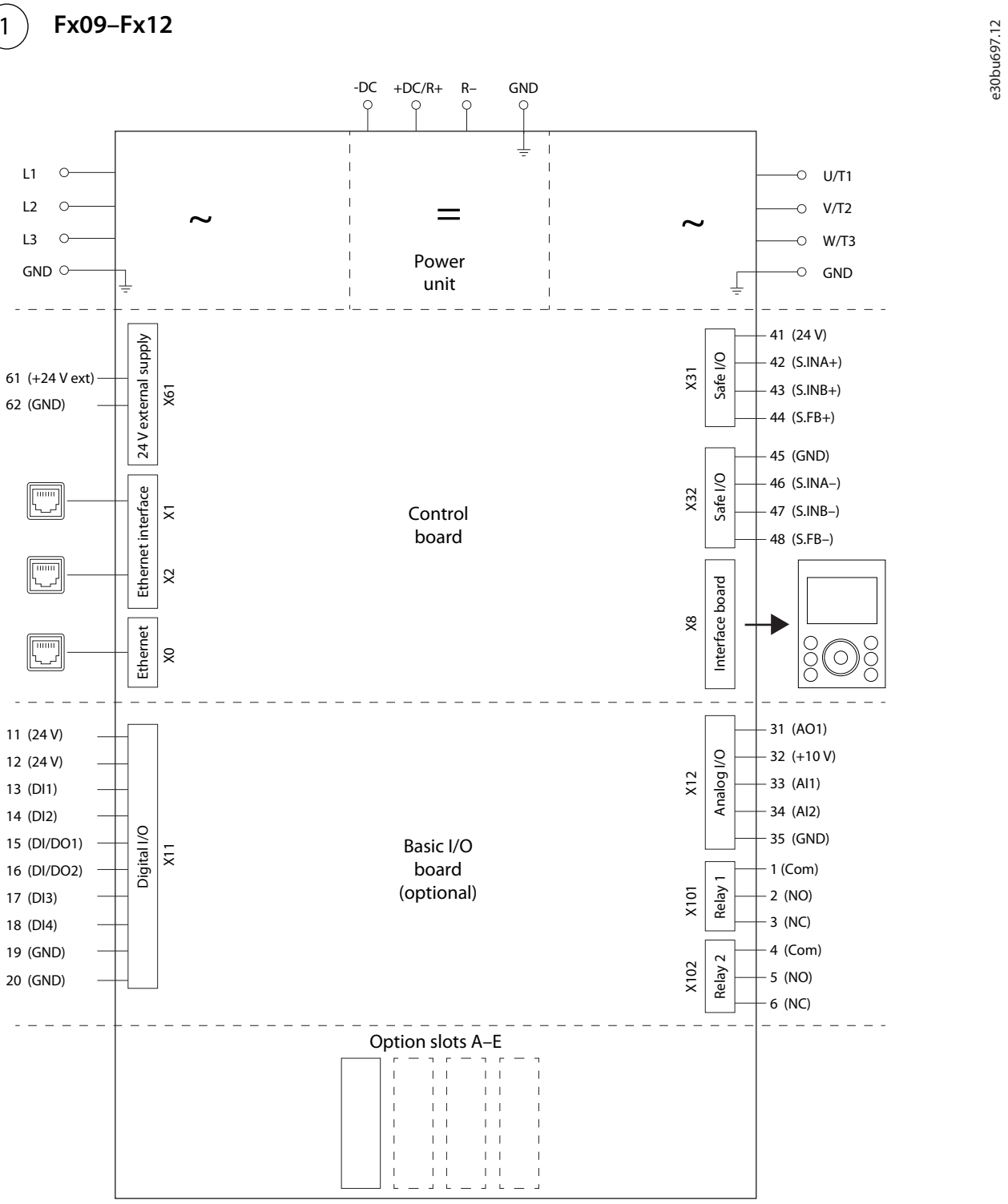


Illustration 54: Wiring Diagram

N O T I C E

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 a Drive

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

The steps described in detail are as follows.

1. Configure the grid settings using the following parameter.

Index	Parameter name	Example setting	Parameter number
1.2.1	Grid Type	TN	2942

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

Index	Parameter name	Example setting	Parameter number
2.2.1.1	Unit Voltage Class	Low Voltage Range (380 - 440 V)	2832
2.2.1.2	Overload Mode	High Overload (HO1)	2833

3. Configure the operation mode using the following parameters.

Index	Parameter name	Example setting	Parameter number
5.4.2.16	Operation Mode	Speed Control	2500
5.4.2.19	Motor Feedback Mode	Open Loop	2502

4. Configure the control place settings using the following parameters.

Index	Parameter name	Example setting	Parameter number
5.5.2.1	Control Place Selection	Advanced Control	114
5.5.3.1.2	Local Control Mode	Allow Local Control	107
5.5.6.1.1	Advanced Start Input	Basic I/O T13, PF Start	4722
5.5.6.1.2	Advanced Start Logic	Source 1	1933
5.5.6.1.7	Advanced Coast Inverse Input	Basic I/O T16, FB Coast Stop	4724
5.5.6.1.8	Advanced Coast Inverse Logic	Source 1	1936

5. Configure the fieldbus communication (if applicable). See relevant fieldbus guide.
6. Configure the readouts in the control panel. See 3.2.3.2 Understanding Readout Screens.

5.3 Configuring Motor, Motor Control, and Motor Thermal Protection

The required configuration steps depend on the motor type selected in parameter *4.2.1.1 Motor Type*.

NOTICE

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

Following are the steps in detail.

1. Configure basic motor data. Go to *Parameter group 4* and specify the following:

Index	Parameter name	Parameter setting	Parameter number
4.2.1.1	Motor Type	Async. Induction Motor or Permanent Magnet Motor	407
4.2.2.1	Nominal Power	As on motor nameplate.	405
4.2.2.2	Nominal Current	As on motor nameplate.	400
4.2.2.3	Nominal Speed	As on motor nameplate.	402
4.2.2.4	Nominal Frequency	As on motor nameplate.	403
4.2.2.5	Nominal Voltage	As on motor nameplate.	401
4.2.4.1	Back EMF	Only for Permanent Magnet Motors. As on motor data sheet, as specified at 1000 rpm.	415

NOTICE

Changing the name plate data causes a reset of the advanced motor data to defaults and a loss of AMA results.

2. Perform AMA. To conduct the data measurement (in standstill), use the following parameter.

The advanced motor data, which are needed for optimal motor control performance, and which are described in step 3, can be entered manually or measured and calculated based on AMA.

Index	Parameter name	Recommended setting	Parameter number
4.2.1.3	AMA Mode	Motor Data	420

NOTICE

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

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

Asynchronous Induction Motors

Index	Parameter name	Setting	Parameter number
4.2.3.1	Stator Resistance Rs	Result of AMA or as on motor data sheet.	408
4.2.3.2	Rotor Resistance Rr	Result of AMA or as on motor data sheet.	409
4.2.3.3	Iron Loss Resistance Rfe	Result of AMA or as on motor data sheet.	413

Index	Parameter name	Setting	Parameter number
4.2.3.4	Stator Leakage Reactance Xls	Result of AMA or as on motor data sheet.	440
4.2.3.5	Rotor Leakage Resistance Xlr	Result of AMA or as on motor data sheet.	441
4.2.3.6	Magnetizing Reactance Xm	Result of AMA or as on motor data sheet.	442

Permanent Magnet Motors

Index	Parameter name	Setting	Parameter number
4.2.4.2	Stator Resistance Rs	Result of AMA or as on motor nameplate.	408
4.2.4.3	d-axis Inductance Ld	Result of AMA or as on motor nameplate.	417
4.2.4.4	d-axis Inductance LdSat	Result of AMA or as on motor nameplate.	418
4.2.4.5	Ld Saturation Point	Result of AMA or as on motor nameplate.	426
4.2.4.6	q-axis Inductance Lq	Result of AMA or as on motor nameplate.	427
4.2.4.7	q-axis Inductance LqSat	Result of AMA or as on motor nameplate.	422
4.2.4.8	Lq Saturation Point	Result of AMA or as on motor nameplate.	424

4. Configure motor control.

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

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

- Configure compensations for slip and different application conditions in *parameter group 4.3.4*.
- Enable and configure Automatic Energy Optimization (AEO) in parameter group *5.3.3 Torque & AEO*.
- For U/f, define the voltage and frequency points in parameter group *4.4.2 U/f Settings* as required for the application.

5. Configure motor thermal protection.

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

Index	Parameter name	Recommended setting	Parameter number
4.5.4	ETR Overtemperature Response	Fault, Ramp down to Stop	2825
4.1.16	Motor Thermal Load (ETR)	Varies (Readout)	2951

The fault *0x7120-4177 Motor Temperature* is issued when the motor thermal load has reached 100%.

5.4 Configuring Speed Control

The section describes the basic configuration for speed control in open loop. For advanced features such as enabling load drooping, see 6.6.8.9 Load Drooping (Menu Index 5.8.9).

The following procedure describes the additional steps to control the speed according to the following wiring schematic.

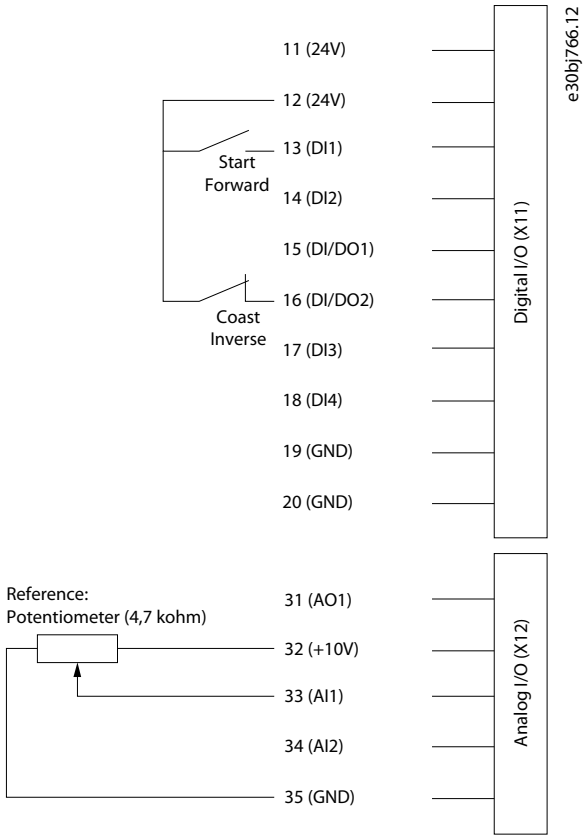


Illustration 55: Wiring Schematic Example - Speed Control with Basic I/O

Procedure

1. Perform the steps in 5.2 Basic setup of a Drive.
2. Perform the steps in 5.3 Configuring Motor, Motor Control, and Motor Thermal Protection.
3. Configure the operation mode for speed control using the following parameters.

Index	Parameter name	Example setting	Parameter number
5.4.2.16	Operation Mode	Speed Control	2500
5.4.2.19	Motor Feedback Mode	Open Loop	2502

4. Configure the type of speed reference used for the Advanced Control Place

Parameter index	Parameter name	Example setting	Parameter number
5.5.6.2.1	Adv. Speed Reference	Fieldbus Reference, Reference 1 Input	1915
5.5.6.2.2	Adv. Speed Reference Logic	Sum	1916

5. Configure speed limit settings using the following parameters.

Index	Parameter name	Example setting	Parameter number
5.8.3.1	Positive Speed Limit	1500 RPM	1729
5.8.3.2	Negative Speed Limit	-1500 RPM	1728
5.8.3.3	Minimum Speed	0 RPM	1722

6. Configure the ramp using the following parameters.

Index	Parameter name	Example setting	Parameter number
5.8.6.1.1	Ramp Selector	Ramp 1	1100
5.8.6.2.1	Ramp 1 Type	Linear Ramp	1125
5.8.6.2.2	Ramp 1 Accel. Time	5s	1101
5.8.6.2.3	Ramp 1 Decel. Time	5s	1105

7. Configure the reference and input settings according to the selected reference type, using the following parameters.

Reference Settings

Index	Parameter name	Example setting	Parameter number
5.8.4.1	Speed Reference 1 Input	Basic I/O T33	501
5.8.4.3	Speed Reference 1 Max.	50 Hz	1724
5.8.4.4	Speed Reference 1 Min.	0 Hz	1725

Basic I/O Settings

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

8. Configure the settings for the Auto Tuning of the speed controller

- For achieving optimal motor control performance, perform an Inertia Estimation or, if the inertia is known, enter the inertia manually with parameter *5.3.2.3 System Inertia*. Also perform an Auto Tuning of the speed controller settings. Besides the settings already described above, adjust the following:

Index	Parameter name	Example setting	Parameter number
5.8.11.1	Speed Controller Auto Tuning	Enabled	4546
5.3.2.1	Inertia Estimation Mode	Without Load Profile	668

N O T I C E

The recommended setting for parameter 5.3.2.1 Inertia Estimation Mode depends on the torque characterstic configured in parameter 5.3.2.1 Torque Characterstic. Select *Without Load Profile* in case of a constant torque load and *With Profile* for a variable torque load.

9. Apply a start signal to terminal 13 of the Basic I/O to start the tuning process.

5.5 Configuring Torque Control

While the drive is in torque control, the motor speed is not controlled. Therefore motor speed can reach speed limits, when the load application or upper system are not within the speed limits. For this reason, it is important to set the limits of the output frequency as described in 5.4 Configuring Speed Control. Since speed ramps can also be used as limiting factor, check the ramp settings in step 6 of 5.4 Configuring Speed Control. Torque control is only available with the motor control principle FVC+.

The procedure is described below according to the following wiring schematic. The same wiring schematic is used in 5.4 Configuring Speed Control.

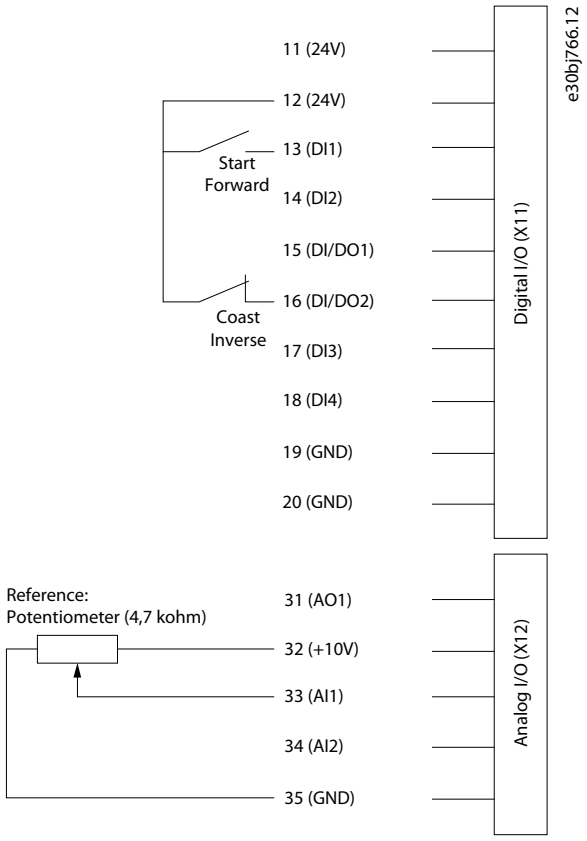


Illustration 56: Wiring Schematic Example - Torque Control with Basic I/O

To configure torque control, perform the following:

1. Perform the steps in 5.2 Basic setup of a Drive.
2. Perform the steps in 5.3 Configuring Motor, Motor Control, and Motor Thermal Protection.

3. Configure the operation mode for torque control using the following parameter.

Parameter index	Parameter name	Example setting	Parameter number
5.4.2.16	Operation Mode	Torque Control	2500

4. Configure the type of torque reference used for the Advanced Control Place.

Parameter index	Parameter name	Example setting	Parameter number
5.5.6.2.4	Adv. Torque Reference	Fieldbus Reference, Reference 1 Input	1929
5.5.6.2.5	Adv. Torque Reference Logic	Sum	1919

5. Configure the torque limit settings using the following parameters.

Index	Parameter Name	Example setting	Parameter number
5.9.2.1	Positive Torque Limit	150%	1810
5.9.2.2	Negative Torque Limit	-150%	1811
5.9.2.3	Motoring Torque Limit	100%	1321
5.9.2.4	Regenerative Torque Limit	100%	1323
5.9.2.5	Speed Limit Mode Torque Ctrl.	Pos./Neg. Frequency Limit	2332

See more information about flexible limit modes in 6.6.9.2 Limits (Menu Index 5.9.2).

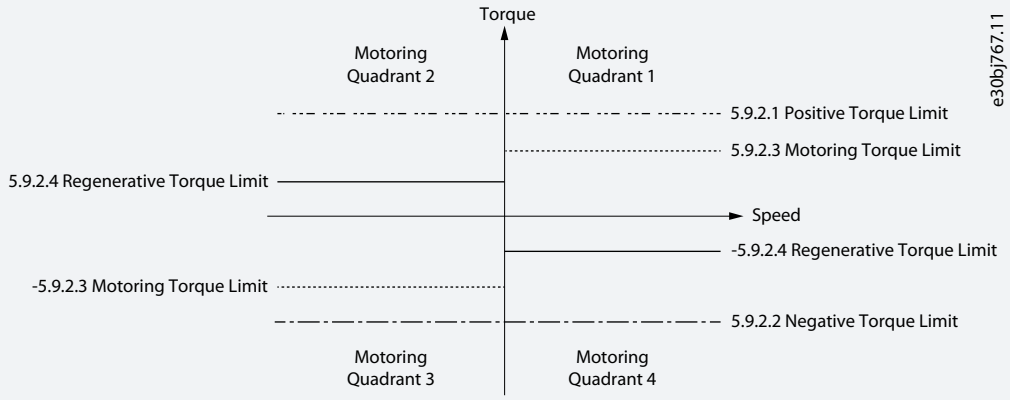


Illustration 57: Torque Control Limits

6. Configure reference settings and terminals used for the reference signal.

Reference Settings

Index	Parameter name	Example setting	Parameter number
5.9.3.1	Torque Reference 1 Input	Basic I/O T33	4534
5.9.3.3	Torque Reference 1 Max2.	100%	4530
5.9.3.4	Torque Reference 1 Min.	0%	4531
5.9.3.14	Torque Reference Ramp Time	10s	2330

Basic I/O Settings

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

6 Parameter Descriptions

6.1 Reading the Parameter Table

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

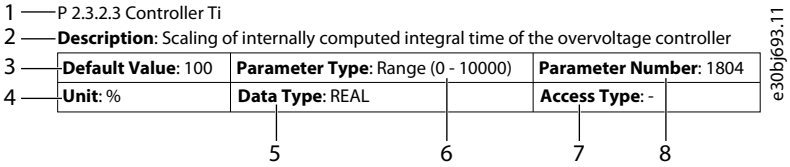


Illustration 58: Reading the Parameter Table

1	The parameter name and index. Parameter names start with a P.
2	The parameter help text, which is visible through the control panel and MyDrive® Insight.
3	The default setting from the factory.
4	The unit of the parameter.
5	The data type of the parameter. See 6.1.1 Understanding Data Types.
6	The type of parameter. Parameters have either defined ranges or selections. See 6.1.2 Understanding Parameter Types.
7	The access type of the parameter. See 6.1.3 Understanding Access Types.
8	The unique parameter number, which is relevant for PLC programming.

6.1.1 Understanding Data Types

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

Table 15: Overview of Data Type

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
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 -1.175494351 E-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

6.1.2 Understanding Parameter Types

The following are the different type of parameter information.

Table 16: Parameter Types and Description

Parameter Type	Description
Selection	The parameter provides a list of selections.
Range (0 - 255)	The value of the parameter is within the specified range. In this example, the parameter can have any value between 0 and 255.
Range (* - *)	The value of the parameter can be set within the full range of the data type REAL. See 6.1.1 Understanding Data Types.
Range (0 - *)	The value of the parameter can be set within the upper range of the data type REAL. See 6.1.1 Understanding Data Types.
Range (Unit dependent)	The range depends on the selected unit and is visible in MyDrive Insight and the Control Panel.

6.1.3 Understanding Access Types

The following are the access type of parameters and descriptions.

Table 17: Access Types and Descriptions

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

6.2 Grid (Menu Index 1)

6.2.1 Grid Status (Menu Index 1.1)

P 1.1.1 Grid Frequency

Description: Shows the actual grid frequency.

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

P 1.1.2 Line-To-Line Voltage (RMS)

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

Default Value: NA	**Parameter Type:** Range (0 — *)	**Parameter Number:** 9040
Unit: V	**Data Type:** REAL	**Access Type:** Read Only

P 1.1.3 L1-L2 Line Voltage (RMS)

Description: Shows the L1-L2 line voltage (RMS).

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

P 1.1.4 L2-L3 Line Voltage (RMS)

Description: Shows the L2-L3 line voltage (RMS).

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

P 1.1.5 L3-L1 Line Voltage (RMS)
Description: Shows the L3-L1 line voltage (RMS).

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

P 1.1.6 Grid Voltage Imbalance
Description: Shows the grid voltage imbalance in %. A value greater than 3% may indicate grid problems.

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

P 1.1.7 Total Harmonic Distortion (THDv)
Description: Shows the total harmonic distortion of the grid voltage (THDv) in %.

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

P 1.1.12 Grid Active Power
Description: Shows the active power at the point of grid connection.

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

6.2.2 Grid Settings (Menu Index 1.2)

P 1.2.1 Grid Type
Description: Select the grid type of the supply system. The selection affects the setting of "1.2.2 RFI filter" and "2.2.1.7 HF DC-link Filter Mode" if set to "As grid type".

Default Value: 0 [TN]	**Parameter Type:** Selection	**Parameter Number:** 2942
Unit: -	**Data Type:** UINT	**Access Type:** Read/Conditional Write

The following are the selections for the parameter.

Selection number	Selection name
0	TN
1	TT
2	IT
3	HRG
4	Grounded Delta

P 1.2.2 RFI Filter Mode
Description: Select the Radio Frequency Interference (RFI) filter mode.

Default Value: 2 [Filter matches grid type selection]	**Parameter Type:** Selection	**Parameter Number:** 2943
Unit: -	**Data Type:** UINT	**Access Type:** Read/Conditional Write

The following are the selections for the parameter.

Selection number	Selection name
0	Filter inactive
1	Filter active
2	Filter matches grid type selection

6.2.3 Grid Protection (Menu Index 1.3)

P 1.3.1 Invalid Frequency Response

Description: Select the response after detection of invalid grid frequency.

Default Value: 1 [Fault]	**Parameter Type:** Selection	**Parameter Number:** 2337
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
1	Fault
2	Automatically derate

P 1.3.2 Missing Grid Phase Response

Description: Select the response after detection of a missing grid phase.

Default Value: 1 [Fault]	**Parameter Type:** Selection	**Parameter Number:** 2338
Unit: -	**Data Type:** UDINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
1	Fault
2	Automatically derate
3	Warning

P 1.3.3 Undervoltage Protection

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

Default Value: 1 [Enabled]	**Parameter Type:** Selection	**Parameter Number:** 2344
Unit: -	**Data Type:** BOOL	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Disabled
1	Enabled

P 1.3.9 Grid Voltage Imbalance Response

Description: Select the mode of grid imbalance protection.

Default Value: 1 [Fault or Warning]	**Parameter Type:** Selection	**Parameter Number:** 9056
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Off
1	Fault or Warning
2	Automatically derate

P 1.3.10 Grid Spike Response
Description: Select the response to grid voltage spike monitoring. If large spikes occur, it will protect the drive.

Default Value: 3 [Warning]	**Parameter Type:** Selection	**Parameter Number:** 2342
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
3	Warning
9	Fault, ramp to coast

6.3 Power Conversion & DC Link (Menu Index 2)

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

P 2.1.1 Unit Nominal Voltage
Description: Shows the nominal voltage setting as a result of the setting of parameter "2.2.1.1 Unit Voltage Class".

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

P 2.1.2 Unit Nominal Current
Description: Shows the nominal current of the unit.

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

P 2.1.3 DC-link Voltage
Description: Shows the actual DC-link voltage.

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

P 2.1.7 DC-link Power
Description: Shows the actual DC-link power.

Default Value: NA	**Parameter Type:** Range (* — *)	**Parameter Number:** 5117
Unit: kW	**Data Type:** REAL	**Access Type:** Read Only

P 2.1.10 U-phase RMS Current
Description: Shows the U-phase RMS current.

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

P 2.1.11 V-phase RMS Current
Description: Shows the V-phase RMS current.

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

P 2.1.12 W-phase RMS Current
Description: Shows the W-phase RMS current.

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

P 2.1.14 Actual Relative Output Current Limit
Description: Shows the actual output current limit relative to the nominal motor current.

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

P 2.1.15 Heat Sink Temperature
Description: Shows the temperature of the power unit heat sink.

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

Depending on whether metric or imperial units are in use, you can give the value for the parameter in either Celsius (C) or Fahrenheit (F). The value range is different with the different units.

P 2.1.16 Main Fan Speed
Description: Shows the speed of the main cooling fan.

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

P 2.1.17 Internal Fan Speed
Description: Shows the speed of the internal cooling fan.

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

P 2.1.19 Heat Sink Temperature Output
Description: Select the output indicating if the heat sink temperature is within range.

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

P 2.1.20 Drive DC-link Voltage Output
Description: Select the output indicating if the DC-link voltage is within range.

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

6.3.2 Power Unit Settings (Menu Index 2.2)

6.3.2.1 General Settings (Menu Index 2.2.1)

P 2.2.1.1 Unit Voltage Class
Description: Select the unit voltage class to optimize the performance of the drive.

Default Value: 1 [Low-voltage range]	**Parameter Type:** Selection	**Parameter Number:** 2832
Unit: -	**Data Type:** UINT	**Access Type:** Read/Conditional Write

The following are the selections for the parameter.

Selection number	Selection name
1	Low-voltage range
2	Mid-voltage range
3	High-voltage range

P 2.2.1.2 Overload Mode
Description: Select the overload mode.

Default Value: 2 [High overload (HO1)]	**Parameter Type:** Selection	**Parameter Number:** 2833
Unit: -	**Data Type:** UINT	**Access Type:** Read/Conditional Write

The following are the selections for the parameter.

Selection number	Selection name
0	Automatic
1	Low overload (LO)
2	High overload (HO1)
3	High overload increased duty (HO2)

P 2.2.1.3 Relative Output Current Limit
Description: Set the output current limit relative to the motor nominal current from the nameplate.

Default Value: 150	**Parameter Type:** Range (0 — 200)	**Parameter Number:** 1325
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 2.2.1.5 Supply Mode
Description: Select the supply mode.

Default Value: 0 [AC]	**Parameter Type:** Selection	**Parameter Number:** 1328
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	AC
1	DC

P 2.2.1.7 HF DC-link Filter Mode
Description: Select the mode of the high-frequency filter in the DC link.

Default Value: 2 [Filter matches grid type selection]	**Parameter Type:** Selection	**Parameter Number:** 2944
Unit: -	**Data Type:** UINT	**Access Type:** Read/Conditional Write

The following are the selections for the parameter.

Selection number	Selection name
0	Filter inactive
1	Filter active
2	Filter matches grid type selection

P 2.2.1.8 Relative Power Limit Motor
Description: Set the power limit in motor mode in % of nominal motor power.

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

P 2.2.1.9 Relative Power Limit Generator
Description: Set the power limit in generator mode in % of nominal motor power.

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

P 2.2.1.12 Output Current Limit Scale Input
Description: Select the input for scaling the output current limit between 0% and 100% value as defined in the current limit. Off equals 100%.

Default Value: Off	**Parameter Type:** Selection	**Parameter Number:** 1322
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 2.2.1.13 Output Current Limit Response
Description: Select the desired response for running in current limit after the time delay set.

Default Value: 0 [No response]	**Parameter Type:** Selection	**Parameter Number:** 2359
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	No response
1	Info
10	Fault

P 2.2.1.14 Output Current Limit Delay
Description: Set the delay before the selected response is triggered after the drive has reached the current limit.

Default Value: 0.0 s	**Parameter Type:** Range (0 — 65000)	**Parameter Number:** 2360
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 2.2.1.15 Power Limit Motor Response
Description: Select the response for running within power limit after the time delay set.

Default Value: 0 [No response]	**Parameter Type:** Selection	**Parameter Number:** 2366
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	No response
1	Info
10	Fault

P 2.2.1.16 Power Limit Motor Delay
Description: Set the delay before the selected response is triggered after the drive has reached the power limit.

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

P 2.2.1.17 Power Limit Generator Response
Description: Select the response for running within power limit after the time delay set.

Default Value: 0 [No response]	**Parameter Type:** Selection	**Parameter Number:** 2367
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	No response
1	Info
10	Fault

P 2.2.1.18 Power Limit Generator Delay
Description: Set the delay before the selected response is triggered after the drive has reached the power limit.

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

6.3.2.2 Cooling Fan Control (Menu Index 2.2.2)

P 2.2.2.1 Main Fan Minimum Speed
Description: Set the minimum speed of the main cooling fan.

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

P 2.2.2.2 Internal Fan Minimum Speed
Description: Set the minimum speed of the internal cooling fan.

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

P 2.2.2.3 Main Fan Fail Response
Description: Select the drive response to a main fan fail.

Default Value: 3 [Warning]	**Parameter Type:** Selection	**Parameter Number:** 2939
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
3	Warning
10	Fault

P 2.2.2.4 Internal Fan Fail Response
Description: Select the drive response to an internal fan fail.

Default Value: 3 [Warning]	**Parameter Type:** Selection	**Parameter Number:** 2940
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
3	Warning
10	Fault

6.3.3 Protection (Menu Index 2.3)

6.3.3.1 Settings (Menu Index 2.3.1)

P 2.3.1.1 Retry after Fault
Description: Enables retry functionality (ride-through) after fault.

Default Value: 1 [Enabled]	**Parameter Type:** Selection	**Parameter Number:** 2927
Unit: -	**Data Type:** BOOL	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Disabled
1	Enabled

P 2.3.1.2 Smart Derate Mode
Description: Select the level of derating if the drive's nominal operational limits have been exceeded.

Default Value: 0 [Maximum derating]	**Parameter Type:** Selection	**Parameter Number:** 2345
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Maximum derating
1	Minimum derating

P 2.3.1.3 DC-link Voltage Ripple Response
Description: Select the mode of excessive DC-link voltage ripple protection.

Default Value: 1 [Fault]	**Parameter Type:** Selection	**Parameter Number:** 2929
Unit: -	**Data Type:** UDINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Disabled
1	Fault

P 2.3.1.4 DC-link Imbalance Response
Description: Select a response to an imbalance across the DC-link capacitors' voltage.

Default Value: 10 [Fault]	**Parameter Type:** Selection	**Parameter Number:** 2346
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
3	Warning
10	Fault

P 2.3.1.5 Rectifier Thermal Overload Response
Description: Select the mode of rectifier thermal overload protection.

Default Value: 1 [Fault]	**Parameter Type:** Selection	**Parameter Number:** 2340
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
1	Fault
2	Automatically derate

P 2.3.1.6 Inverter Thermal Overload Response
Description: Select the mode of inverter thermal overload protection.

Default Value: 1 [Fault]	**Parameter Type:** Selection	**Parameter Number:** 2341
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
1	Fault
2	Automatically derate

P 2.3.1.7 Ground Fault 0 Response
Description: Select a response if a high-impedance ground fault occurs.

Default Value: 9 [Fault, ramp to coast]	**Parameter Type:** Selection	**Parameter Number:** 2347
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	No response
9	Fault, ramp to coast

P 2.3.1.8 Constant Loss Controller
Description: Enables the constant-loss controller. The function maintains a constant temperature in the drive at low-load conditions.

Default Value: 0	**Parameter Type:** Range (0 — 1)	**Parameter Number:** 2355
Unit: -	**Data Type:** BOOL	**Access Type:** Read/Write

6.3.3.2 Overvoltage Protection (Menu Index 2.3.2)

P 2.3.2.1 Overvoltage Control
Description: Enables the DC-link overvoltage controller. It is recommended to disable the overvoltage controller if brake is enabled, or the unit is supplied with a regulated DC.

Default Value: 1 [Enabled]	**Parameter Type:** Selection	**Parameter Number:** 1802
Unit: -	**Data Type:** BOOL	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Disabled
1	Enabled

P 2.3.2.2 Overvoltage Control Kp
Description: Set the scaling of the overvoltage control proportional gain.

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

P 2.3.2.3 Overvoltage Control Ti
Description: Set the scaling of the overvoltage control integral time.

Default Value: 100	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 1804
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 2.3.2.4 Overvoltage Control Td
Description: Set the scaling of the overvoltage control derivation time.

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

P 2.3.2.5 Overvoltage Control Activation Level
Description: Set the level at which the overvoltage control is activated.

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

6.3.3.3 Power Loss (Menu Index 2.3.3)

P 2.3.3.3 Power Loss Response
Description: Select the response to an insufficient supply voltage.

Default Value: 1 [Undervoltage control]	**Parameter Type:** Selection	**Parameter Number:** 1818
Unit: -	**Data Type:** UINT	**Access Type:** Read/Conditional Write

The following are the selections for the parameter.

Selection number	Selection name
0	None
1	Undervoltage control
2	Controlled ramp down
3	Coast

P 2.3.3.4 Power Recovery Response
Description: Select the action to take when supply voltage returns after a power loss.

Default Value: 0 [Ramp to reference]	**Parameter Type:** Selection	**Parameter Number:** 1819
Unit: -	**Data Type:** UINT	**Access Type:** Read/Conditional Write

The following are the selections for the parameter.

Selection number	Selection name
0	Ramp to reference
1	Ramp fast to reference
2	Ramp to zero

P 2.3.3.5 Undervoltage Control Kp
Description: Set the scaling of the undervoltage control proportional gain.

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

P 2.3.3.6 Undervoltage Control Ti
Description: Set the scaling of the undervoltage control integral time.

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

P 2.3.3.7 Undervoltage Control Td
Description: Set the scaling of the undervoltage control derivation time.

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

P 2.3.3.8 Undervoltage Control Activation Level
Description: Set the level at which undervoltage control is activated.

Default Value: 425.5 V	**Parameter Type:** Range (* — *)	**Parameter Number:** 1817
Unit: V	**Data Type:** REAL	**Access Type:** Read/Write

P 2.3.3.12 Deceleration Time Power Loss
Description: Set the deceleration time from nominal speed to 0 when in power-loss mode.

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

6.3.4 Modulation (Menu Index 2.4)

P 2.4.1 Max. Switching Frequency
Description: Set the maximum switching frequency.

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

P 2.4.2 Min. Switching Frequency
Description: Set the minimum switching frequency.

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

P 2.4.3 Switching Frequency
Description: Set the switching frequency.

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

P 2.4.4 Control Frequency Request
Description: Set the requested control frequency. A constant control frequency is enabled by setting this value. If set to 0.0, constant control frequency is disabled.

Default Value: 4.00	**Parameter Type:** Range (0.00 — 16.00)	**Parameter Number:** 2921
Unit: kHz	**Data Type:** REAL	**Access Type:** Read/Conditional Write

P 2.4.6 Overmodulation
Description: Enables the modulation index to exceed 1.0.

Default Value: 1 [Enabled]	**Parameter Type:** Selection	**Parameter Number:** 5094
Unit: -	**Data Type:** BOOL	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Disabled
1	Enabled

6.4 Filters & Brake Chopper (Menu Index 3)

6.4.1 Filters & Brake Chopper Status (Menu Index 3.1)

P 3.1.1 Brake Power
Description: Shows the power dissipated in the brake resistor.

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

P 3.1.2 Average Brake Power
Description: Shows the average power dissipated in the brake resistor, calculated over 120 s.

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

P 3.1.3 AHF Capacitor Connected
Description: Shows if the advanced harmonic filter (AHF) capacitor is connected.

Default Value: NA	**Parameter Type:** Range (0 — 1)	**Parameter Number:** 5410
Unit: -	**Data Type:** BOOL	**Access Type:** Read Only

6.4.2 Brake Chopper (Menu Index 3.2)

P 3.2.1 Brake Chopper

Description: Select the brake chopper operation mode.

Default Value: 0 [Disabled]	**Parameter Type:** Selection	**Parameter Number:** 2935
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Disabled
1	Enabled in Run and Coast
2	Enabled in run only

P 3.2.2 Brake Chopper Voltage Reduce

Description: Set the activation level of the brake chopper. If set to 0, the brake chopper is active if the voltage exceeds the overvoltage control activation level. The value set is subtracted from the overvoltage control activation level, lowering the brake chopper activation level, respectively.

Default Value: 0	**Parameter Type:** Range (0 — 50)	**Parameter Number:** 2938
Unit: V	**Data Type:** REAL	**Access Type:** Read/Write

6.4.3 Brake Resistor (Menu Index 3.3)

P 3.3.1 Brake Resistor Test

Description: Enables the brake resistor test. The drive conducts a test of brake resistor presence while the drive is coasted. Starting of the drive is prohibited until the test is completed.

Default Value: NA	**Parameter Type:** Selection	**Parameter Number:** 430
Unit: -	**Data Type:** UINT	**Access Type:** Read/Conditional Write

The following are the selections for the parameter.

Selection number	Selection name
0	Off
1	Enable brake chopper test run

P 3.3.2 Brake Resistor Resistance

Description: Set the resistance value of the brake resistor.

Default Value: 5	**Parameter Type:** Range (* — *)	**Parameter Number:** 2936
Unit: Ω	**Data Type:** REAL	**Access Type:** Read/Conditional Write

P 3.3.3 Brake Resistor Power Limit

Description: Set the power limit for resistor braking.

Default Value: 1	**Parameter Type:** Range (0 — *)	**Parameter Number:** 2937
Unit: kW	**Data Type:** REAL	**Access Type:** Read/Write

6.4.4 Advanced Harmonic Filter (Menu Index 3.4)

P 3.4.1 Advanced Harmonic Filter

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

Default Value: 0 [Disabled]	**Parameter Type:** Selection	**Parameter Number:** 3410
Unit: -	**Data Type:** BOOL	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Disabled
1	Enabled

P 3.4.2 Capacitor Disconnect Output

Description: Select the output terminal for disconnecting the capacitor.

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

P 3.4.3 Thermal Switch Function

Description: Select which function to activate if the thermal input indicates a too high temperature.

Default Value: 1 [Fault, ramp down to stop]	**Parameter Type:** Selection	**Parameter Number:** 3413
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
1	Fault, ramp down to stop
2	Derate

P 3.4.4 Thermal Switch Input

Description: Select the digital input terminal for the thermal switch.

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

P 3.4.5 Power Stabilizer Gain

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

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

P 3.4.6 Power Stabilizer Bandwidth

Description: Set the controller bandwidth for power stabilization.

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

6.4.5 Output Filter (Menu Index 3.5)

P 3.5.1 Output Filter Type

Description: Select the output filter type.

Default Value: 0 [None]	**Parameter Type:** Selection	**Parameter Number:** 5501
Unit: -	**Data Type:** UINT	**Access Type:** Read/Conditional Write

The following are the selections for the parameter.

Selection number	Selection name
0	None
1	Sine-wave Filter

P 3.5.2 Filter Capacitance
Description: Set the capacitance of the output filter.

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

P 3.5.3 Filter Inductance
Description: Set the inductance of the output filter.

Default Value: 0.00	**Parameter Type:** Range (0.00 — 1000.00)	**Parameter Number:** 5503
Unit: mH	**Data Type:** REAL	**Access Type:** Read/Conditional Write

6.5 Motor (Menu Index 4)

6.5.1 Motor Status (Menu Index 4.1)

P 4.1.1 Motor Current
Description: Shows the actual motor current.

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

P 4.1.2 Relative Motor Current
Description: Shows the actual motor current in % of the nominal motor current.

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

P 4.1.3 U-phase RMS Current
Description: Shows the U-phase RMS current.

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

P 4.1.4 V-phase RMS Current
Description: Shows the V-phase RMS current.

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

P 4.1.5 W-phase RMS Current
Description: Shows the W-phase RMS current.

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

P 4.1.6 Motor Voltage
Description: Shows the actual motor voltage.

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

P 4.1.7 Relative Motor Voltage
Description: Shows the actual motor voltage in % of the nominal motor voltage.

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

P 4.1.11 Motor Torque
Description: Shows the actual motor torque.

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

Depending on whether metric or imperial units are in use, you can give the value for the parameter in either newton meters (Nm) or pound-feet (lb ft). The value range is different with the different units.

P 4.1.12 Relative Motor Torque
Description: Shows the motor torque in % of the nominal motor torque.

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

P 4.1.13 Motor Shaft Power
Description: Shows the actual power at the motor shaft.

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

Depending on whether metric or imperial units are in use, you can give the value for the parameter in either kilowatt (kW) or horsepower (HP). The value range is different with the different units.

P 4.1.14 Relative Motor Shaft Power
Description: Shows the actual motor shaft power in % of the nominal motor shaft power.

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

P 4.1.15 Motor Electrical Power
Description: Shows the actual motor power.

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

P 4.1.16 Motor Thermal Load (ETR)
Description: Shows the estimated thermal load of the motor calculated by the ETR function.

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

P 4.1.17 Motor Current Output
Description: Select an output for the motor current signal. The scale of the signal is 0–100% of the nominal current.

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

P 4.1.18 Motor Voltage Output
Description: Select an output for the motor voltage signal. The scale of the signal is 0–100% of the nominal voltage.

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

P 4.1.19 Absolute Motor Torque Output
Description: Select an output for the motor torque signal. The scale of the signal is 0–100% of the absolute value of the nominal torque.

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

P 4.1.20 Extended Motor Torque Output
Description: Select an output for the motor torque signal. The scale of the signal is -200...200% of the nominal torque.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 2310
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 4.1.21 Absolute Motor Speed Output
Description: Select an output for the motor speed signal. The scale of the signal is 0–100% of the absolute value of the nominal speed.

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

P 4.1.22 Extended Motor Speed Output
Description: Select an output for the motor speed signal. The scale of the signal is -200...200% of the nominal speed.

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

P 4.1.23 Motor Power Output
Description: Select an output for the motor power signal. The scale of the signal is 0–100% of the nominal power.

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

P 4.1.24 AMA Progress
Description: Shows the progress of the Automatic Motor Adaptation (AMA).

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

6.5.2 Motor Data (Menu Index 4.2)

6.5.2.1 General Settings (Menu Index 4.2.1)

P 4.2.1.1 Motor Type
Description: Select the motor type.

Default Value: 0 [Induction Motor]	**Parameter Type:** Selection	**Parameter Number:** 407
Unit: -	**Data Type:** UINT	**Access Type:** Read/Conditional Write

The following are the selections for the parameter.

Selection number	Selection name
0	Induction Motor
1	Permanent Magnet Motor

P 4.2.1.2 Number of Pole Pairs

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

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

P 4.2.1.3 AMA Mode

Description: Select the Automatic Motor Adaptation (AMA) mode.

Default Value: NA	**Parameter Type:** Selection	**Parameter Number:** 420
Unit: -	**Data Type:** UINT	**Access Type:** Read/Conditional Write

The following are the selections for the parameter.

Selection number	Selection name
0	Off
3	Motor Data
4	Reduced Motor Data (Rs)

P 4.2.1.5 Motor Cable Length

Description: Set the motor cable length.

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

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

6.5.2.2 Motor Nameplate Data (Menu Index 4.2.2)

P 4.2.2.1 Nominal Power

Description: Set the nominal motor shaft power.

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

Depending on whether metric or imperial units are in use, you can give the value for the parameter in either kilowatt (kW) or horsepower (HP). The value range is different with the different units.

P 4.2.2.2 Nominal Current

Description: Set the nominal motor current.

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

P 4.2.2.3 Nominal Speed
Description: Set the nominal motor shaft speed.

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

P 4.2.2.4 Nominal Frequency
Description: Set the nominal motor frequency.

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

P 4.2.2.5 Nominal Voltage
Description: Set the nominal motor voltage.

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

P 4.2.2.6 Nominal Torque
Description: Set the nominal torque from the nameplate of the motor.

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

6.5.2.3 Induction Motor (Menu Index 4.2.3)

P 4.2.3.1 Stator Resistance Rs
Description: Set the motor stator resistance. Overwritten by AMA.

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

P 4.2.3.2 Rotor Resistance Rr
Description: Set the motor rotor resistance. Overwritten by AMA.

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

P 4.2.3.3 Iron Loss Resistance Rfe
Description: Set the motor iron-loss equivalent resistance.

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

P 4.2.3.4 Stator Leakage Reactance Xls
Description: Set the motor stator leakage reactance. Overwritten by AMA.

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

P 4.2.3.5 Rotor Leakage Reactance Xlr
Description: Set the motor rotor leakage reactance. Overwritten by AMA.

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

P 4.2.3.6 Magnetizing Reactance Xm
Description: Set the motor magnetizing reactance. Overwritten by AMA.

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

6.5.2.4 Permanent Magnet Motor (Menu Index 4.2.4)

P 4.2.4.1 Back EMF
Description: Set the stator nominal induced voltage (back-EMF voltage) when running at 1000 RPM (line-to-line RMS). Overwritten by AMA.

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

P 4.2.4.2 Stator Resistance Rs
Description: Set the motor stator resistance. Overwritten by AMA.

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

P 4.2.4.3 d-axis Inductance Ld
Description: Set the motor non-saturated d-axis inductance. Overwritten by AMA.

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

P 4.2.4.4 d-axis Inductance LdSat
Description: Set the motor saturated d-axis inductance. Overwritten by AMA.

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

P 4.2.4.5 Ld Saturation Point
Description: Set the point (in % of nominal motor current) at which the Ld inductance saturates (average of non-saturated and saturated). Overwritten by AMA.

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

P 4.2.4.6 q-axis Inductance Lq
Description: Set the motor non-saturated q-axis inductance. Overwritten by AMA.

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

P 4.2.4.7 q-axis Inductance LqSat
Description: Set the motor saturated q-axis inductance. Overwritten by AMA.

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

P 4.2.4.8 Lq Saturation Point
Description: Set the point (in % of nominal motor current) at which the Lq inductance saturates (average of non-saturated and saturated). Overwritten by AMA.

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

6.5.3 Motor Control (Menu Index 4.3)

6.5.3.1 General Settings (Menu Index 4.3.1)

P 4.3.1.1 Motor Control Principle

Description: Select the motor control principle.

Default Value: 1 [VVC+ Control]	**Parameter Type:** Selection	**Parameter Number:** 2503
Unit: -	**Data Type:** UINT	**Access Type:** Read/Conditional Write

The following are the selections for the parameter.

Selection number	Selection name
0	U/f Control
1	VVC+ Control
2	FVC+ Control

P 4.3.1.2 Breakaway Current Boost

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

Default Value: 0 [Disabled]	**Parameter Type:** Selection	**Parameter Number:** 2930
Unit: -	**Data Type:** BOOL	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Disabled
1	Enabled

6.5.3.2 U/f Settings (Menu Index 4.3.2)

P 4.3.2.1 Voltage Point 0

Description: Set the U/f curve voltage point 0.

Default Value: 8	**Parameter Type:** Range (0 — 1000 V)	**Parameter Number:** 2600
Unit: V	**Data Type:** REAL	**Access Type:** Read/Write

P 4.3.2.2 Voltage Point 1

Description: Set the U/f curve voltage point 1.

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

P 4.3.2.3 Voltage Point 2

Description: Set the U/f curve voltage point 2.

Default Value: 160	**Parameter Type:** Range (0 — *)	**Parameter Number:** 2602
Unit: V	**Data Type:** REAL	**Access Type:** Read/Write

P 4.3.2.4 Voltage Point 3

Description: Set the U/f curve voltage point 3.

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

P 4.3.2.5 Voltage Point 4
Description: Set the U/f curve voltage point 4.

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

P 4.3.2.6 Voltage Point 5
Description: Set the U/f curve voltage point 5.

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

P 4.3.2.7 Frequency Point 0
Description: Set the U/f curve frequency point 0.

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

P 4.3.2.8 Frequency Point 1
Description: Set the U/f curve frequency point 1.

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

P 4.3.2.9 Frequency Point 2
Description: Set the U/f curve frequency point 2.

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

P 4.3.2.10 Frequency Point 3
Description: Set the U/f curve frequency point 3.

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

P 4.3.2.11 Frequency Point 4
Description: Set the U/f curve frequency point 4.

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

P 4.3.2.12 Frequency Point 5
Description: Set the U/f curve frequency point 5.

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

6.5.3.3 FVC+ Settings (Menu Index 4.3.3)

P 4.3.3.1 Continuous Rs Estimation
Description: Enables Rs estimation while running, to compensate for changing operating conditions.

Default Value: 1 [Enabled]	**Parameter Type:** Selection	**Parameter Number:** 428
Unit: -	**Data Type:** BOOL	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Disabled
1	Enabled

P 4.3.3.2 Current Controller Kp

Description: Set the scaling of the current controller nominal proportional gain.

Default Value: 100	**Parameter Type:** Range (0 — 100000)	**Parameter Number:** 8021
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 4.3.3.3 Current Controller Ti

Description: Set the scaling of the current controller nominal integral time.

Default Value: 100	**Parameter Type:** Range (0.1 — 100000)	**Parameter Number:** 8022
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 4.3.3.5 Low-speed Mode

Description: Select the motor control mode used at low speeds.

Default Value: 0 [Selected motor control]	**Parameter Type:** Selection	**Parameter Number:** 2816
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Selected motor control
1	Forced current mode (I/f Control)
3	Low speed minimum current (only in FVC SM)

P 4.3.3.6 I/f Control Current Reference

Description: Set the I/f control current reference in % of nominal motor current.

Default Value: 100	**Parameter Type:** Range (0 — 500)	**Parameter Number:** 2817
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 4.3.3.7 I/f Control Speed Threshold

Description: Set the speed below which the I/f control is used.

Default Value: 10	**Parameter Type:** Range (1 — *)	**Parameter Number:** 2818
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

Default unit: RPM. The unit can be changed with parameter 4321.

P 4.3.3.8 Low Speed Minimum Current

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

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

P 4.3.3.9 Minimum Current Speed Threshold
Description: Set the speed below which the minimum current control is used.

Default Value: 10	**Parameter Type:** Range (1 — *)	**Parameter Number:** 2838
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

P 4.3.3.10 Motor Feedback Mode
Description: Select the feedback mode.

Default Value: 0 [Open loop]	**Parameter Type:** Selection	**Parameter Number:** 2502
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Open loop
1	Closed loop

P 4.3.3.11 Relative HF Injection Voltage Gain
Description: Set the voltage gain for HF injection relative to the recommended voltage.

Default Value: 100	**Parameter Type:** Range (5 — 2000)	**Parameter Number:** 2821
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 4.3.3.12 Relative HF Inject Bandwidth
Description: Set the bandwidth for HF injection relative to the recommended bandwidth.

Default Value: 100	**Parameter Type:** Range (1 — 1000)	**Parameter Number:** 2826
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 4.3.3.13 HF Injection Angle Comp. Gain
Description: Set the HF injection angle error compensation gain in degrees per nominal load torque.

Default Value: 0	**Parameter Type:** Range (-35 — 35)	**Parameter Number:** 2822
Unit: °	**Data Type:** REAL	**Access Type:** Read/Write

P 4.3.3.14 HF Injection Angle Comp. Offset
Description: Set the HF injection angle error compensation offset in degrees.

Default Value: 0	**Parameter Type:** Range (-25 — 25)	**Parameter Number:** 2824
Unit: °	**Data Type:** REAL	**Access Type:** Read/Write

P 4.3.3.15 HF Injection Frequency
Description: Set the HF injection frequency. Setting 0 is equal to automatic setting of injection frequency.

Default Value: 0	**Parameter Type:** Range (0 — *)	**Parameter Number:** 2823
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

P 4.3.3.16 IdIq Reference Ratio
Description: Set the synchronous motor Id/Iq current reference ratio in %. It is used instead of the default MTPA, if it is set to be different from 0.

Default Value: 0	**Parameter Type:** Range (-100 — 100)	**Parameter Number:** 1219
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 4.3.3.17 Maximum Motor Voltage
Description: Set the maximum output voltage applied to the motor. This can be used to avoid a field-weakening operation when running at speeds above the nominal motor speed, when the drive is supplied with a voltage higher than the nominal motor voltage.

Default Value: 400	**Parameter Type:** Range (* — *)	**Parameter Number:** 5433
Unit: V	**Data Type:** REAL	**Access Type:** Read/Write

P 4.3.3.18 Encoder Slip Adjustment
Description: Enables the encoder slip correction function for permanent magnet motors in closed loop FVC+ control.

Default Value: 0 [Disabled]	**Parameter Type:** Selection	**Parameter Number:** 4602
Unit: -	**Data Type:** BOOL	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Disabled
1	Enabled

P 4.3.3.19 Torque Estimation Bandwidth
Description: Scaling factor for torque estimation correction bandwidth. 100% = default tuning, 0% = disable.

Default Value: 100	**Parameter Type:** Range (0 — 1000)	**Parameter Number:** 4612
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

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

P 4.3.4.1 Slip Compensation
Description: Set the slip compensation in % of nominal motor slip.

Default Value: 100	**Parameter Type:** Range (0 — 1000)	**Parameter Number:** 2804
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 4.3.4.2 Slip Compensation Tc
Description: Set the slip compensation time constant.

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

P 4.3.4.3 High-speed Load Comp.
Description: Set the high-speed load compensation in % of the motor voltage drop.

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

P 4.3.4.4 Low-speed Load Comp.
Description: Set the low-speed load compensation in % of the motor voltage drop.

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

P 4.3.4.5 Res. Damp. Gain
Description: Set the resonance damping gain in % of nominal slip for induction motors, and 0.1 times the nominal frequency for permanent magnet motors.

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

P 4.3.4.6 Res. Damp. High Pass Tc
Description: Set the resonance damping high-pass time constant.

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

P 4.3.4.7 Res. Damp Low Pass Tc
Description: Set the resonance damping low-pass time constant.

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

P 4.3.4.9 Res. Damp. High Pass Tc (SM)
Description: Set time constant of resonance damping for VVC+ control of synchronous motors (SM).

Default Value: 0.06	**Parameter Type:** Range (0 — 1)	**Parameter Number:** 2819
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 4.3.4.10 Motor Model Tc (SM)
Description: Set the time constant of the internal model used for VVC+ control of synchronous motors (SM). A lower value improves the dynamic control performance. A higher value improves the noise reduction.

Default Value: 0.25	**Parameter Type:** Range (0 — 1)	**Parameter Number:** 2820
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 4.3.4.11 Low Speed Minimum Current
Description: Set the low-speed minimum current reference in % of nominal motor current.

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

P 4.3.4.12 Nominal Magnetization Speed
Description: Set the minimum speed for nominal motor magnetization. Used by constant torque (CT).

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

P 4.3.4.13 Zero Speed Magnetization
Description: Set the % of motor magnetization at 0 speed used by constant torque (CT). The selection of a low value reduces energy loss in the motor, but also reduces load capacity.

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

P 4.3.4.14 Current Limiter Kp
Description: Set the proportional gain of the current limit controller.

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

P 4.3.4.15 Current Limiter Ti
Description: Set the integration time of the current limit controller. The value is scaled to % of the nominal setting.

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

6.5.4 Protection (Menu Index 4.5)

P 4.5.1 Missing Phase Start-up Detection

Description: Enables detection of missing motor phase at start-up.

Default Value: 0 [Disabled]	**Parameter Type:** Selection	**Parameter Number:** 6070
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Disabled
1	Enabled

P 4.5.2 Missing Motor Phase Response

Description: Select the response to a missing motor phase.

Default Value: 1 [Fault]	**Parameter Type:** Selection	**Parameter Number:** 2348
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	No response
2	Warning
1	Fault

P 4.5.3 Disconnected Motor Response

Description: Select the response to a disconnected motor.

Default Value: 0 [No response]	**Parameter Type:** Selection	**Parameter Number:** 2349
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	No response
3	Motor Check

P 4.5.4 ETR Overtemperature Response

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

Default Value: 0 [No response]	**Parameter Type:** Selection	**Parameter Number:** 2825
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	No response
1	Info
3	Warning
9	Fault, ramp to coast
10	Fault

6.6 Application (Menu Index 5)

6.6.1 Application Status (Menu Index 5.1)

P 5.1.1 Motor Ctrl. Status Word

Description: Shows the motor control status word.

Default Value: NA	**Parameter Type:** Range (0 — 65535)	**Parameter Number:** 1714
Unit: -	**Data Type:** WORD	**Access Type:** Read Only

The following are the bit descriptions.

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

P 5.1.2 Motor Ctrl. Ready Status Word

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

Default Value: NA	**Parameter Type:** Range (0 — 65535)	**Parameter Number:** 1716
Unit: -	**Data Type:** WORD	**Access Type:** Read Only

The *5302 Start Blocked* event is shown if this word is not ready.

The following are the bit descriptions.

Bit	Description
0	Run Enable high.
1	No fault active.
2	DC-link precharging done.
3	DC Voltage within limits.
4	Power manager initialized.

Bit	Description
5	Brake test not running.
6	System software is not blocking start.
7	Grid voltage within limits.
8	Temperature within limits.
9	Valid motor data.
10	Valid control configuration.

P 5.1.3 Motor Regulator Status Word

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

Default Value: NA	**Parameter Type:** Range (0 — 65535)	**Parameter Number:** 1715
Unit: -	**Data Type:** WORD	**Access Type:** Read Only

The following are the bit descriptions.

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

P 5.1.5 Fault Status Word 1

Description: Shows the fault status word 1.

Default Value: -	**Parameter Type:**	**Parameter Number:** 6203
Unit:	**Data Type:** DWORD	**Access Type:** -

The following are the bit descriptions.

Bit	Description	Event number
0	Overcurrent	4384, 4373, 5170, 4368, 4369, 4375, 4377, 4380, 4097
1	Overvoltage	4164, 4162, 4144 4145
2	Undervoltage	4165, 4146
3	Unit temperature high	4117, 4118, 4119
4	Unit temperature low	4116

Bit	Description	Event number
5	Control board overtemperature	4121, 4122, 4123, 4120
6	Input phase	4160, 4163
7	Output phase	4175, 4176
8	Ground fault	4379, 4352, 4353, 4354, 4355
9	Fan failure	4128, 4129, 4133, 4130
10	Fieldbus communication	5162, 4256, 4257, 4258, 4260, 4261, 4263, 4265, 4266 ,4267, 4268, 4269, 4280, 4281, 4270, 4271, 4272, 4273, 4282, 4274, 4275, 4276, 4277, 4283, 4278, 4279
11	HMI connection	5141, 5142
12	Feedback connection	4418
13	Thermistor input	5157
14	Auxiliary device (temperature)	4200, 4201, 4203, 4202
15	External temperature measurement	5132, 5133, 5134, 5135, 5136, 5137, 5158

P 5.1.8 Warning Status Word 1

Description: Shows the warning status word 1.

Default Value: -	**Parameter Type:**	**Parameter Number:** 6205
Unit:	**Data Type:** DWORD	**Access Type:** -

The following are the bit descriptions.

Bit	Description	Event number
0	Overcurrent	4384, 4373, 5170, 4368, 4369, 4375, 4377, 4380, 4097
1	Overvoltage	4164, 4162, 4144 4145
2	Undervoltage	4165, 4146
3	Unit temperature high	4117, 4118, 4119
4	Unit temperature low	4116
5	Control board overtemperature	4121, 4122, 4123, 4120
6	Input phase	4160, 4163
7	Output phase	4175, 4176
8	Ground fault	4379, 4352, 4353, 4354, 4355
9	Fan failure	4128, 4129, 4133, 4130
10	Fieldbus communication	5162, 4256, 4257, 4258, 4260, 4261, 4263, 4265, 4266 ,4267, 4268, 4269, 4280, 4281, 4270, 4271, 4272, 4273, 4282, 4274, 4275, 4276, 4277, 4283, 4278, 4279
11	HMI connection	5141, 5142
12	Feedback connection	4418

Bit	Description	Event number
13	Thermistor input	5157
14	Auxiliary device (temperature)	4200, 4201, 4203, 4202
15	External temperature measurement	5132, 5133, 5134, 5135, 5136, 5137, 5158

P 5.1.13 Application Status Word
Description: Shows the application-specific status word.

Default Value: NA	**Parameter Type:** Range (0 — 65535)	**Parameter Number:** 1608
Unit: -	**Data Type:** WORD	**Access Type:** Read Only

Following are the bits and description.

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

P 5.1.22 Motion Error Function Block Instance
Description:

Default Value: NA	**Parameter Type:** Range (0 — 4294967295)	**Parameter Number:** 1170
Unit: -	**Data Type:** UDINT	**Access Type:** Read Only

P 5.1.23 Motion Error Information
Description: Shows the specific error information which was raised by a function block.

Default Value: NA	**Parameter Type:** Selection	**Parameter Number:** 1171
Unit: -	**Data Type:** UINT	**Access Type:** Read Only

The following are the selections for the parameter.

Selection number	Selection name
0	No motion error
1	No communication
2	Fault active; Please reset
3	Timeout Op mode change
4	Internal error
5	Command rejected
6	Drive not started
7	In stopping state
8	In homing state
9	Unknown drive state
10	Executing non-abortable command
11	Parameter out of range
12	Local Control Active
13	Invalid enumeration value
14	Internal homing error
15	Home mode not allowed in stopped
16	Invalid Home Mode
17	Homing error, ending in standstill
18	Homing error, not in standstill
19	Drive is not homed
20	Executing continuous motion
21	Executing discrete motion
22	Executing synchronized motion
23	Invalid Superimposed Mode
24	Superimposed error
25	Touchprobe timeout
26	Not at zero speed
256	Too many buffered commands
512	Continuous update not applicable for buffered command

6.6.2 Protection (Menu Index 5.2)

6.6.2.1 Cooling Monitor (Menu Index 5.2.1)

P 5.2.1.1 Cooling Monitor Input

Description: Select the input for the negated cooling monitor signal.

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

P 5.2.1.2 Cooling Monitor Fault Delay
Description: Set a delay before the cooling monitor issues a fault. Only valid if fault is selected.

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

P 5.2.1.3 Cooling Monitor Response
Description: Select the response to a missing cooling monitor signal. The response is selected for both stopped and running states.

Default Value: 2 [Warning, Fault after Timeout]	**Parameter Type:** Selection	**Parameter Number:** 2402
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	While running, Warning after Timeout
1	Warning
2	Warning, Fault after Timeout
3	No response/Warning, Fault after Timeout

6.6.2.2 External Event (Menu Index 5.2.2)

P 5.2.2.1 External Event 1 Input
Description: Select an input for the external event.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 4557
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.2.2.3 External Event 1 Response
Description: Select the response to an external event.

Default Value: 9 [Fault, ramp to coast]	**Parameter Type:** Selection	**Parameter Number:** 4559
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	No response
1	Info
3	Warning
9	Fault, ramp to coast
10	Fault

P 5.2.2.4 External Event 2 Input
Description: Select an input for the external event.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 4560
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.2.2.6 External Event 2 Response
Description: Select the response to an external event.

Default Value: 9 [Fault, ramp to coast]	**Parameter Type:** Selection	**Parameter Number:** 4562
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	No response
1	Info
3	Warning
9	Fault, ramp to coast
10	Fault

P 5.2.2.7 External Event Active Output
Description: Select an output indicating an external event.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 5184
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

6.6.2.3 Measured Temp. Protection (Menu Index 5.2.3)

6.6.2.3.1 Measured Temp. Protection Status (Menu Index 5.2.3.1)

P 5.2.3.1.1 Protection 1 Temp.
Description: Shows the temperature measured for the temperature protection.

Default Value: NA	**Parameter Type:** Range (-300 — 300)	**Parameter Number:** 5200
Unit: °C	**Data Type:** REAL	**Access Type:** Read Only

Depending on whether metric or imperial units are in use, you can give the value for the parameter in either Celsius (C) or Fahrenheit (F). The value range is different with the different units.

P 5.2.3.1.2 Protection 2 Temp.
Description: Shows the temperature measured for the temperature protection.

Default Value: NA	**Parameter Type:** Range (-300 — 300)	**Parameter Number:** 5201
Unit: °C	**Data Type:** REAL	**Access Type:** Read Only

Depending on whether metric or imperial units are in use, you can give the value for the parameter in either Celsius (C) or Fahrenheit (F). The value range is different with the different units.

P 5.2.3.1.3 Protection 3 Temp.
Description: Shows the temperature measured for the temperature protection.

Default Value: NA	**Parameter Type:** Range (-300 — 300)	**Parameter Number:** 5202
Unit: °C	**Data Type:** REAL	**Access Type:** Read Only

Depending on whether metric or imperial units are in use, you can give the value for the parameter in either Celsius (C) or Fahrenheit (F). The value range is different with the different units.

P 5.2.3.1.4 Protection 4 Temp.
Description: Shows the temperature measured for the temperature protection.

Default Value: NA	**Parameter Type:** Range (-300 — 300)	**Parameter Number:** 5203
Unit: °C	**Data Type:** REAL	**Access Type:** Read Only

Depending on whether metric or imperial units are in use, you can give the value for the parameter in either Celsius (C) or Fahrenheit (F). The value range is different with the different units.

P 5.2.3.1.5 Protection 5 Temp.
Description: Shows the temperature measured for the temperature protection.

Default Value: NA	**Parameter Type:** Range (-300 — 300)	**Parameter Number:** 5204
Unit: °C	**Data Type:** REAL	**Access Type:** Read Only

Depending on whether metric or imperial units are in use, you can give the value for the parameter in either Celsius (C) or Fahrenheit (F). The value range is different with the different units.

P 5.2.3.1.6 Protection 6 Temp.
Description: Shows the temperature measured for the temperature protection.

Default Value: NA	**Parameter Type:** Range (-300 — 300)	**Parameter Number:** 5205
Unit: °C	**Data Type:** REAL	**Access Type:** Read Only

Depending on whether metric or imperial units are in use, you can give the value for the parameter in either Celsius (C) or Fahrenheit (F). The value range is different with the different units.

6.6.2.3.2 Temp. 1 Protection (Menu Index 5.2.3.2)

P 5.2.3.2.1 Temp. 1 Input
Description: Select the temperature sensor input for the temperature protection.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 5206
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.2.3.2.2 Temp. 1 Limit 1
Description: Set the temperature level for issuing a warning.

Default Value: 120	**Parameter Type:** Range (-300 — 300)	**Parameter Number:** 5207
Unit: °C	**Data Type:** REAL	**Access Type:** Read/Write

Depending on whether metric or imperial units are in use, you can give the value for the parameter in either Celsius (C) or Fahrenheit (F). The value range is different with the different units.

P 5.2.3.2.3 Temp. 1 Limit 2
Description: Set the temperature level for issuing a protection response.

Default Value: 150	**Parameter Type:** Range (-300 — 300)	**Parameter Number:** 5208
Unit: °C	**Data Type:** REAL	**Access Type:** Read/Write

Depending on whether metric or imperial units are in use, you can give the value for the parameter in either Celsius (C) or Fahrenheit (F). The value range is different with the different units.

P 5.2.3.2.4 Temp. 1 Limit 2 Response
Description: Select the response for exceeding the limit.

Default Value: 9 [Fault, ramp to coast]	**Parameter Type:** Selection	**Parameter Number:** 5209
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
3	Warning
9	Fault, ramp to coast
10	Fault

6.6.2.3.3 Temp. 2 Protection (Menu Index 5.2.3.3)

P 5.2.3.3.1 Temp. 2 Input

Description: Select the temperature sensor input for the temperature protection.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 5210
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.2.3.3.2 Temp. 2 Limit 1

Description: Set the temperature level for issuing a warning.

Default Value: 120	**Parameter Type:** Range (-300 — 300)	**Parameter Number:** 5211
Unit: °C	**Data Type:** REAL	**Access Type:** Read/Write

Depending on whether metric or imperial units are in use, you can give the value for the parameter in either Celsius (C) or Fahrenheit (F). The value range is different with the different units.

P 5.2.3.3.3 Temp. 2 Limit 2

Description: Set the temperature level for issuing a protection response.

Default Value: 150	**Parameter Type:** Range (-300 — 300)	**Parameter Number:** 5212
Unit: °C	**Data Type:** REAL	**Access Type:** Read/Write

Depending on whether metric or imperial units are in use, you can give the value for the parameter in either Celsius (C) or Fahrenheit (F). The value range is different with the different units.

P 5.2.3.3.4 Temp. 2 Limit 2 Response

Description: Select the response for exceeding the limit.

Default Value: 9 [Fault, ramp to coast]	**Parameter Type:** Selection	**Parameter Number:** 5213
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
3	Warning
9	Fault, ramp to coast
10	Fault

6.6.2.3.4 Temp. 3 Protection (Menu Index 5.2.3.4)

P 5.2.3.4.1 Temp. 3 Input

Description: Select the temperature sensor input for the temperature protection.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 5214
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.2.3.4.2 Temp. 3 Limit 1

Description: Set the temperature level for issuing a warning.

Default Value: 120	**Parameter Type:** Range (-300 — 300)	**Parameter Number:** 5215
Unit: °C	**Data Type:** REAL	**Access Type:** Read/Write

Depending on whether metric or imperial units are in use, you can give the value for the parameter in either Celsius (C) or Fahrenheit (F). The value range is different with the different units.

P 5.2.3.4.3 Temp. 3 Limit 2
Description: Set the temperature level for issuing a protection response.

Default Value: 150	**Parameter Type:** Range (-300 — 300)	**Parameter Number:** 5216
Unit: °C	**Data Type:** REAL	**Access Type:** Read/Write

Depending on whether metric or imperial units are in use, you can give the value for the parameter in either Celsius (C) or Fahrenheit (F). The value range is different with the different units.

P 5.2.3.4.4 Temp. 3 Limit 2 Response
Description: Select the response for exceeding the limit.

Default Value: 9 [Fault, ramp to coast]	**Parameter Type:** Selection	**Parameter Number:** 5217
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
3	Warning
9	Fault, ramp to coast
10	Fault

6.6.2.3.5 Temp. 4 Protection (Menu Index 5.2.3.5)

P 5.2.3.5.1 Temp. 4 Input
Description: Select the temperature sensor input for the temperature protection.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 5218
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.2.3.5.2 Temp. 4 Limit 1
Description: Set the temperature level for issuing a warning.

Default Value: 120	**Parameter Type:** Range (-300 — 300)	**Parameter Number:** 5219
Unit: °C	**Data Type:** REAL	**Access Type:** Read/Write

Depending on whether metric or imperial units are in use, you can give the value for the parameter in either Celsius (C) or Fahrenheit (F). The value range is different with the different units.

P 5.2.3.5.3 Temp. 4 Limit 2
Description: Set the temperature level for issuing a protection response.

Default Value: 150	**Parameter Type:** Range (-300 — 300)	**Parameter Number:** 5220
Unit: °C	**Data Type:** REAL	**Access Type:** Read/Write

Depending on whether metric or imperial units are in use, you can give the value for the parameter in either Celsius (C) or Fahrenheit (F). The value range is different with the different units.

P 5.2.3.5.4 Temp. 4 Limit 2 Response
Description: Select the response for exceeding the limit.

Default Value: 9 [Fault, ramp to coast]	**Parameter Type:** Selection	**Parameter Number:** 5221
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
3	Warning
9	Fault, ramp to coast
10	Fault

6.6.2.3.6 Temp. 5 Protection (Menu Index 5.2.3.6)

P 5.2.3.6.1 Temp. 5 Input

Description: Select the temperature sensor input for the temperature protection.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 5222
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.2.3.6.2 Temp. 5 Limit 1

Description: Set the temperature level for issuing a warning.

Default Value: 120	**Parameter Type:** Range (-300 — 300)	**Parameter Number:** 5223
Unit: °C	**Data Type:** REAL	**Access Type:** Read/Write

Depending on whether metric or imperial units are in use, you can give the value for the parameter in either Celsius (C) or Fahrenheit (F). The value range is different with the different units.

P 5.2.3.6.3 Temp. 5 Limit 2

Description: Set the temperature level for issuing a protection response.

Default Value: 150	**Parameter Type:** Range (-300 — 300)	**Parameter Number:** 5224
Unit: °C	**Data Type:** REAL	**Access Type:** Read/Write

Depending on whether metric or imperial units are in use, you can give the value for the parameter in either Celsius (C) or Fahrenheit (F). The value range is different with the different units.

P 5.2.3.6.4 Temp. 5 Limit 2 Response

Description: Select the response for exceeding the limit.

Default Value: 9 [Fault, ramp to coast]	**Parameter Type:** Selection	**Parameter Number:** 5225
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
3	Warning
9	Fault, ramp to coast
10	Fault

6.6.2.3.7 Temp. 6 Protection (Menu Index 5.2.3.7)

P 5.2.3.7.1 Temp. 6 Input

Description: Select the temperature sensor input for the temperature protection.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 5226
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.2.3.7.2 Temp. 6 Limit 1
Description: Set the temperature level for issuing a warning.

Default Value: 120	**Parameter Type:** Range (-300 — 300)	**Parameter Number:** 5227
Unit: °C	**Data Type:** REAL	**Access Type:** Read/Write

Depending on whether metric or imperial units are in use, you can give the value for the parameter in either Celsius (C) or Fahrenheit (F). The value range is different with the different units.

P 5.2.3.7.3 Temp. 6 Limit 2
Description: Set the temperature level for issuing a protection response.

Default Value: 150	**Parameter Type:** Range (-300 — 300)	**Parameter Number:** 5228
Unit: °C	**Data Type:** REAL	**Access Type:** Read/Write

Depending on whether metric or imperial units are in use, you can give the value for the parameter in either Celsius (C) or Fahrenheit (F). The value range is different with the different units.

P 5.2.3.7.4 Temp. 6 Limit 2 Response
Description: Select the response for exceeding the limit.

Default Value: 9 [Fault, ramp to coast]	**Parameter Type:** Selection	**Parameter Number:** 5229
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
3	Warning
9	Fault, ramp to coast
10	Fault

6.6.2.4 Lost Load Detection (Menu Index 5.2.7)

P 5.2.7.1 Lost-load Response
Description: Select an action for the lost-load detection. The lost-load detection is active if the motor speed is above 15 Hz.

Default Value: 0 [No response]	**Parameter Type:** Selection	**Parameter Number:** 9072
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	No response
1	Info
3	Warning
9	Fault, ramp to coast
10	Fault

P 5.2.7.2 Lost-load Detection Torque Level
Description: Set the minimum allowed torque level in % of nominal motor torque. The lost-load detection can be activated below the set level.

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

P 5.2.7.3 Lost-load Detection Delay
Description: Set the minimum duration that the torque has to be below the detection limit before activating the lost-load exception.

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

6.6.2.5 HMI Connection Loss (Menu Index 5.2.9)

P 5.2.9.1 HMI Connection Loss
Description: Select the response after lost connection to control panel or PC tool while they are in control. The timeout occurs after 5 s.

Default Value: 0 [No response]	**Parameter Type:** Selection	**Parameter Number:** 5420
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	No response
2	Info
4	Warning - Persistent
9	Fault, ramp to coast
10	Fault

6.6.3 Load (Menu Index 5.3)

6.6.3.1 Load Status (Menu Index 5.3.1)

P 5.3.1.1 Inertia Estimation Status
Description: Shows the status of the inertia estimation routine. 0 = Inactive, 1 = In progress, 2 = Completed successfully, 3 = Completed unsuccessfully.

Default Value: NA	**Parameter Type:** Selection	**Parameter Number:** 666
Unit: -	**Data Type:** UINT	**Access Type:** Read Only

The following are the selections for the parameter.

Selection number	Selection name
0	Inactive
1	In progress
2	Completed successfully
3	Completed unsuccessfully

6.6.3.2 Inertia (Menu Index 5.3.2)

P 5.3.2.1 Inertia Estimation Mode

Description: Set the mode for the intertia estimation.

Default Value: NA	**Parameter Type:** Selection	**Parameter Number:** 668
Unit: -	**Data Type:** UINT	**Access Type:** Read/Conditional Write

The following are the selections for the parameter.

Selection number	Selection name
0	Off
1	Without load profile
2	With load profile

P 5.3.2.2 Inertia Estimation Timeout

Description: Set the time after which an event message will be generated if inertia estimation cannot be finalized.

Default Value: 900	**Parameter Type:** Range (120 — 1800)	**Parameter Number:** 669
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.3.2.3 System Inertia

Description: Set the system inertia.

Default Value: 0	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 667
Unit: kgm^2	**Data Type:** REAL	**Access Type:** Read/Write

Depending on whether metric or imperial units are in use, you can give the value for the parameter in either kilogram meters squared (kgm^2) or pound-foot-seconds squared ($lbf\ ft\ s^2$). The value range is different with the different units.

6.6.3.3 Torque & AEO (Menu Index 5.3.3)

P 5.3.3.1 Torque Characteristic

Description: Select the torque characteristics matching the application needs.

Default Value: 0 [Constant torque (CT)]	**Parameter Type:** Selection	**Parameter Number:** 2809
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Constant torque (CT)
1	Variable torque (VT)
2	Automatic Energy Optimization (AEO)

P 5.3.3.2 AEO Minimum Speed

Description: Set the speed above which Automatic Energy Optimization (AEO) is active.

Default Value: 10	**Parameter Type:** Range (0 — 2000)	**Parameter Number:** 2810
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.3.3.3 AEO Minimum Magnetization

Description: Set the minimum magnetization current used by Automatic Energy Optimization (AEO).

Default Value: 40	**Parameter Type:** Range (0 — 100)	**Parameter Number:** 2811
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 5.3.3.4 Variable Torque Zero Speed Magnetization
Description: Set the magnetization current level at 0 speed. Used in variable torque (VT) setting.

Default Value: 66	**Parameter Type:** Range (40 — 90)	**Parameter Number:** 8020
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

6.6.4 Operation Mode (Menu Index 5.4)

6.6.4.1 Settings (Menu Index 5.4.2)

P 5.4.2.16 Operation Mode
Description: Select the drive operation mode.

Default Value: 0 [Speed control]	**Parameter Type:** Selection	**Parameter Number:** 2500
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Speed control
1	Torque control
3	Position control
5	Gear control

P 5.4.2.19 Motor Feedback Mode
Description: Select the feedback mode.

Default Value: 0 [Open loop]	**Parameter Type:** Selection	**Parameter Number:** 2502
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Open loop
1	Closed loop

6.6.5 Control Places (Menu Index 5.5)

6.6.5.1 Control Places Status (Menu Index 5.5.1)

P 5.5.1.1 Active Control Place
Description: Shows the control place that controls the drive.

Default Value: NA	**Parameter Type:** Selection	**Parameter Number:** 113
Unit: -	**Data Type:** UINT	**Access Type:** Read Only

The following are the selections for the parameter.

Selection number	Selection name
0	PC control
1	Local control
2	Fieldbus control
3	I/O control
4	Advanced control

P 5.5.1.2 Local Control Active Output
Description: Select an output terminal indicating that the drive is in local control.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 5178
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.5.1.3 Fieldbus Control Active Output
Description: Select an output terminal indicating that the drive is in fieldbus control.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 5197
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.5.1.4 I/O Control Active Output
Description: Select an output terminal indicating that the drive is in I/O control.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 5177
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.5.1.5 Advanced Control Active Output
Description: Select an output terminal indicating that the drive is in advanced control.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 4727
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

6.6.5.2 Control Place Settings (Menu Index 5.5.2)

P 5.5.2.1 Control Place Selection
Description: Select the active control place.

Default Value: 4 [Advanced control]	**Parameter Type:** Selection	**Parameter Number:** 114
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
1	Local control
2	Fieldbus control
3	I/O control
4	Advanced control

P 5.5.2.7 Control Place Independent Reset
Description: Enable faults to be reset from all control places.

Default Value: 1 [Enabled]	**Parameter Type:** Selection	**Parameter Number:** 109
Unit: -	**Data Type:** BOOL	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Disabled
1	Enabled

P 5.5.2.9 Alternate Control Place Selection
Description: Select the alternate control place.

Default Value: 4 [Advanced control]	**Parameter Type:** Selection	**Parameter Number:** 115
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
1	Local control
2	Fieldbus control
3	I/O control
4	Advanced control

P 5.5.2.10 Alternate Control Place Input
Description: Select the digital input terminal for activating the alternate control place.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 111
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

6.6.5.3 Local Control (Menu Index 5.5.3)

6.6.5.3.1 Settings (Menu Index 5.5.3.1)

P 5.5.3.1.1 Allow Local Control Force Stop
Description: Select whether the control panel stop button always stops the drive, regardless of the selected control place. Pressing the stop button also places the drive in local control.

Default Value: 1 [Enabled]	**Parameter Type:** Selection	**Parameter Number:** 106
Unit: -	**Data Type:** BOOL	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Disabled
1	Enabled

P 5.5.3.1.2 Local Control Mode
Description: Select restrictions of local control by the control panel.

Default Value: 0 [Allow Local Control]	**Parameter Type:** Selection	**Parameter Number:** 107
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Allow Local Control
1	Deny Local Start
2	Deny Local Control

P 5.5.3.1.3 Continue Operation in Local Control
Description: Enables running state when changing to local control.

Default Value: 1 [Enabled]	**Parameter Type:** Selection	**Parameter Number:** 108
Unit: -	**Data Type:** BOOL	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Disabled
1	Enabled

P 5.5.3.1.4 Local Control Stop Button Action
Description: Select the action of the stop button in the control panel. Selecting 'Stop, Hold to Coast' will stop and coast if the stop button is pressed for 2 s.

Default Value: 2 [Stop, Hold to Coast]	**Parameter Type:** Selection	**Parameter Number:** 110
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Stop
1	Coast Stop
2	Stop, Hold to Coast

6.6.5.3.2 References (Menu Index 5.5.3.2)

P 5.5.3.2.1 Local Speed Ref. Source
Description: Select the speed reference source for when the drive is in local control.

Default Value: 1 [Local reference]	**Parameter Type:** Selection	**Parameter Number:** 1912
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
1	Local reference
2	Fieldbus reference
3	Reference 1 input
4	Reference 2 input
5	Preset reference

P 5.5.3.2.2 Local Torque Ref. Source
Description: Select the torque reference source for when the drive is in local control.

Default Value: 1 [Local reference]	**Parameter Type:** Selection	**Parameter Number:** 1925
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
1	Local reference
2	Fieldbus reference
3	Reference 1 input
4	Reference 2 input
5	Preset reference
8	Process ctrl. reference

P 5.5.3.2.6 CP Position Reference
Description: Select the position reference source for when the drive operates in local control.

Default Value: 1 [Local reference]	**Parameter Type:** Selection	**Parameter Number:** 1948
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
1	Local reference
2	Fieldbus reference
3	Reference 1 input
4	Reference 2 input
5	Preset reference

6.6.5.4 Fieldbus control (Menu Index 5.5.4)

6.6.5.4.1 References (Menu Index 5.5.4.1)

P 5.5.4.1.1 Fieldbus Speed Reference
Description: Select the speed reference sources for when the drive operates in fieldbus control. Select 2 sources to combine them into 1 reference value.

Default Value: [2,0]	**Parameter Type:** Selection	**Parameter Number:** 1914
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	None
2	Fieldbus reference

Selection number	Selection name
3	Reference 1 input
4	Reference 2 input
5	Preset reference

P 5.5.4.1.2 Fieldbus Speed Reference Logic
Description: Select how to form the speed reference out of the 2 inputs when operating in fieldbus control.

Default Value: 0 [Source 1]	**Parameter Type:** Selection	**Parameter Number:** 1911
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Source 1
1	Source 2
2	Sum
3	Subtract
4	Divide
5	Multiply
6	Maximum
7	Minimum
8	Toggle

P 5.5.4.1.3 Fieldbus Speed Reference Toggle Input
Description: Select an input for toggling between the 2 speed reference sources selected, when operating in fieldbus control and toggling logic is used. A low signal selects the 1st source and high signal selects the 2nd source.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 1939
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.5.4.1.4 Fieldbus Torque Reference
Description: Select the torque reference sources for when the drive operates in fieldbus control. Select 2 sources to combine them into 1 reference value.

Default Value: [2,0]	**Parameter Type:** Selection	**Parameter Number:** 1928
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	None
2	Fieldbus reference
3	Reference 1 input

Selection number	Selection name
4	Reference 2 input
5	Preset reference
8	Process ctrl. reference

P 5.5.4.1.5 Fieldbus Torque Reference Logic
Description: Select how to form the torque reference out of the 2 sources when operating in fieldbus control.

Default Value: 0 [Source 1]	**Parameter Type:** Selection	**Parameter Number:** 1918
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Source 1
1	Source 2
2	Sum
3	Subtract
4	Divide
5	Multiply
6	Maximum
7	Minimum

P 5.5.4.1.12 FB Position Reference
Description: Select the position reference sources for when the drive operates in fieldbus control. Define multiple entries for combining several sources into 1 reference value.

Default Value: [2,0]	**Parameter Type:** Selection	**Parameter Number:** 1944
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	None
2	Fieldbus reference
3	Reference 1 input
4	Reference 2 input
5	Preset reference

P 5.5.4.1.13 FB Position Reference Logic
Description: Select how to form the position reference out of the 2 inputs when operating in fieldbus control.

Default Value: 0 [Source 1]	**Parameter Type:** Selection	**Parameter Number:** 1943
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Source 1
1	Source 2
2	Sum
3	Subtract
4	Divide
5	Multiply
6	Maximum
7	Minimum
8	Toggle

P 5.5.4.1.14 FB Position Reference Toggle Input
Description: Select an input for toggling between the 2 position reference sources selected when operating in fieldbus control and toggling logic is used. A low signal selects the first source and high signal selects the second source.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 1942
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

6.6.5.5 I/O Control (Menu Index 5.5.5)

6.6.5.5.1 Commands (Menu Index 5.5.5.1)

P 5.5.5.1.1 Start Input
Description: Select the digital input for the start command.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 200
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.5.5.1.2 Start Backward Input
Description: Select the digital input for the start command in the backward direction.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 210
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.5.5.1.3 Stop Inverse Input
Description: Select the digital input for the inverted stop command.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 201
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.5.5.1.4 Coast Inverse Input
Description: Select the digital input for the inverted coast command.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 202
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.5.5.1.5 Reversing Input
Description: Select the digital input for inverting the reference signal. The reverse command does not provide a start signal.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 204
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.5.5.1.6 Reset Input
Description: Select the digital input for resetting faults.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 203
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.5.5.1.8 Start Signal Mode
Description: Select the mode of the start signal.

Default Value: 0 [State High Start]	**Parameter Type:** Selection	**Parameter Number:** 211
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	State High Start
1	Rising Edge Start
2	High Pulse Start

6.6.5.5.2 References (Menu Index 5.5.5.2)

P 5.5.5.2.1 I/O Speed Reference
Description: Select the speed reference sources for when the drive operates in I/O control. Select 2 sources to combine them into 1 reference value.

Default Value: [3,0]	**Parameter Type:** Selection	**Parameter Number:** 1913
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	None
2	Fieldbus reference
3	Reference 1 input
4	Reference 2 input
5	Preset reference

P 5.5.5.2.2 I/O Speed Reference Logic
Description: Select how to form the speed reference out of the 2 sources when operating in I/O control.

Default Value: 0 [Source 1]	**Parameter Type:** Selection	**Parameter Number:** 1910
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Source 1
1	Source 2
2	Sum
3	Subtract
4	Divide
5	Multiply
6	Maximum
7	Minimum
8	Toggle

P 5.5.5.2.3 I/O Speed Reference Toggle Input

Description: Select an input for toggling between the 2 speed reference sources selected, when operating in I/O control and toggling logic is used. A low signal selects the 1st source and high signal selects the 2nd source.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 1940
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.5.5.2.4 I/O Torque Reference

Description: Select the torque reference sources for when the drive operates in I/O control. Select 2 sources to combine them into 1 reference value.

Default Value: [3,0]	**Parameter Type:** Selection	**Parameter Number:** 1927
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	None
2	Fieldbus reference
3	Reference 1 input
4	Reference 2 input
5	Preset reference
8	Process ctrl. reference

P 5.5.5.2.5 I/O Torque Reference Logic

Description: Select how to form the torque reference out of the 2 sources when operating in I/O control.

Default Value: 0 [Source 1]	**Parameter Type:** Selection	**Parameter Number:** 1917
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Source 1
1	Source 2
2	Sum
3	Subtract
4	Divide
5	Multiply
6	Maximum
7	Minimum

P 5.5.5.2.12 I/O Position Reference

Description: Select the position reference sources for when the drive operates in I/O control. Define multiple entries for combining several sources into 1 reference value.

Default Value: [5,0]	**Parameter Type:** Selection	**Parameter Number:** 1947
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	None
2	Fieldbus reference
3	Reference 1 input
4	Reference 2 input
5	Preset reference

P 5.5.5.2.13 I/O Position Reference Logic

Description: Select how to form the position reference out of the 2 inputs when operating in I/O control.

Default Value: 0 [Source 1]	**Parameter Type:** Selection	**Parameter Number:** 1946
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Source 1
1	Source 2
2	Sum
3	Subtract
4	Divide
5	Multiply

Selection number	Selection name
6	Maximum
7	Minimum
8	Toggle

P 5.5.5.2.14 I/O Position Reference Toggle Input
Description: Select an input for toggling between the 2 position reference sources selected when operating in I/O control and toggling logic is used. A low signal selects the first source and high signal selects the second source.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 1945
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

6.6.5.6 Advanced control (Menu Index 5.5.6)

6.6.5.6.1 Commands (Menu Index 5.5.6.1)

P 5.5.6.1.1 Advanced Start Input
Description: Select inputs for starting in the forward direction when operating in advanced control.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 4722
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.5.6.1.2 Advanced Start Logic
Description: Select the combination logic for the start command of advanced control.

Default Value: 3 [OR]	**Parameter Type:** Selection	**Parameter Number:** 1933
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Source 1
1	Source 2
2	AND
3	OR
4	NAND
5	NOR
6	XOR
7	XNOR

P 5.5.6.1.3 Advanced Start Backward Input
Description: Select inputs for starting in the backward direction when operating in advanced control.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 4725
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.5.6.1.4 Advanced Start Backward Logic
Description: Select the combination logic for the start-backward command of advanced control.

Default Value: 0 [Source 1]	**Parameter Type:** Selection	**Parameter Number:** 1934
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Source 1
1	Source 2
2	AND
3	OR
4	NAND
5	NOR
6	XOR
7	XNOR

P 5.5.6.1.5 Advanced Stop Inverse Input

Description: Select inputs for stopping when operating in advanced control. False means the drive is stopped.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 4723
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.5.6.1.6 Advanced Stop Inverse Logic

Description: Select the combination logic for the stop command of advanced control.

Default Value: 0 [Source 1]	**Parameter Type:** Selection	**Parameter Number:** 1935
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Source 1
1	Source 2
2	AND
3	OR
4	NAND
5	NOR
6	XOR
7	XNOR

P 5.5.6.1.7 Advanced Coast Inverse Input

Description: Select inputs for the coast when operating in advanced control. False means the drive is coasted.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 4724
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.5.6.1.8 Advanced Coast Inverse Logic
Description: Select the combination logic for the inverted coast command of advanced control.

Default Value: 0 [Source 1]	**Parameter Type:** Selection	**Parameter Number:** 1936
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Source 1
1	Source 2
2	AND
3	OR
4	NAND
5	NOR
6	XOR
7	XNOR

P 5.5.6.1.9 Advanced Reversing Input
Description: Select inputs for inverting the reference signal when operating in advanced control. The reverse command does not provide a start signal.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 4730
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.5.6.1.10 Advanced Reverse Logic
Description: Select the combination logic for the reverse command of advanced control.

Default Value: 2 [AND]	**Parameter Type:** Selection	**Parameter Number:** 1937
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Source 1
1	Source 2
2	AND
3	OR
4	NAND
5	NOR
6	XOR
7	XNOR

P 5.5.6.1.11 Advanced Reset Input
Description: Select inputs for resetting faults when operating in advanced control.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 4731
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.5.6.1.13 Advanced Start Mode
Description: Select the starting logic for advanced control.

Default Value: 0 [State High Start]	**Parameter Type:** Selection	**Parameter Number:** 4726
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	State High Start
1	Rising Edge Start
2	High Pulse Start

P 5.5.6.1.15 Fieldbus CTW Feature Bits
Description: Enables non-control-place-dependent control word bits to be active in advanced control place.

Default Value: 1 [Enabled]	**Parameter Type:** Selection	**Parameter Number:** 4627
Unit: -	**Data Type:** BOOL	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Disabled
1	Enabled

6.6.5.6.2 References (Menu Index 5.5.6.2)

P 5.5.6.2.1 Adv. Speed Reference
Description: Select the speed reference sources for when the drive operates in advanced control. Select 2 sources to combine them into 1 reference value.

Default Value: [2,3]	**Parameter Type:** Selection	**Parameter Number:** 1915
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	None
2	Fieldbus reference
3	Reference 1 input
4	Reference 2 input
5	Preset reference

P 5.5.6.2.2 Adv. Speed Reference Logic
Description: Select how to form the speed reference out of the 2 sources when operating in advanced control.

Default Value: 2 [Sum]	**Parameter Type:** Selection	**Parameter Number:** 1916
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Source 1
1	Source 2
2	Sum
3	Subtract
4	Divide
5	Multiply
6	Maximum
7	Minimum
8	Toggle

P 5.5.6.2.3 Adv. Speed Reference Toggle Input

Description: Select an input for toggling between the 2 speed reference sources selected, when operating in advanced control and toggling logic is used. A low signal selects the 1st source and high signal selects the 2nd source.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 1941
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.5.6.2.4 Adv. Torque Reference

Description: Select the torque reference sources for when the drive operates in advanced control. Select 2 sources to combine them into 1 reference value.

Default Value: [2,0]	**Parameter Type:** Selection	**Parameter Number:** 1929
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	None
2	Fieldbus reference
3	Reference 1 input
4	Reference 2 input
5	Preset reference
8	Process ctrl. reference

P 5.5.6.2.5 Adv. Torque Reference Logic

Description: Select how to form the torque reference out of the 2 inputs when operating in advanced control.

Default Value: 0 [Source 1]	**Parameter Type:** Selection	**Parameter Number:** 1919
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Source 1
1	Source 2
2	Sum
3	Subtract
4	Divide
5	Multiply
6	Maximum
7	Minimum

P 5.5.6.2.12 Adv Position Reference

Description: Select the position reference sources for when the drive operates in advanced control. Define multiple entries for combining several sources into 1 reference value.

Default Value: [2,5]	**Parameter Type:** Selection	**Parameter Number:** 1976
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	None
2	Fieldbus reference
3	Reference 1 input
4	Reference 2 input
5	Preset reference

P 5.5.6.2.13 Adv Position Reference Logic

Description: Select how to form the position reference out of the 2 inputs when operating in advanced control.

Default Value: 2 [Sum]	**Parameter Type:** Selection	**Parameter Number:** 1949
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Source 1
1	Source 2
2	Sum
3	Subtract
4	Divide
5	Multiply

Selection number	Selection name
6	Maximum
7	Minimum
8	Toggle

P 5.5.6.2.14 Adv Position Reference Toggle Input
Description: Select an input for toggling between the 2 position reference sources selected when operating in advanced control and toggling logic is used. A low signal selects the first source and high signal selects the second source.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 1977
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

6.6.6 Start Settings (Menu Index 5.6)

6.6.6.1 General Settings (Menu Index 5.6.1)

P 5.6.1.1 Magnetization Time
Description: Set a delay to magnetize the motor or synchronize parallel motors before starting ramping. Set to -1 for automatic calculation.

Default Value: -1	**Parameter Type:** Range (-1 — 10000)	**Parameter Number:** 2328
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.6.1.2 Flying Start
Description: Enables a flying start. The drive will detect its current speed at the moment the start signal is given, and start to ramp towards the given reference.

Default Value: 0 [Disabled]	**Parameter Type:** Selection	**Parameter Number:** 4025
Unit: -	**Data Type:** BOOL	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Disabled
1	Enabled

P 5.6.1.5 Run Enable Input
Description: Select an input enabling the drive to run.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 103
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

6.6.6.2 DC Start (Menu Index 5.6.2)

P 5.6.2.1 DC Start Time
Description: Set the duration of the current injection during DC start.

Default Value: 0	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 2264
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.6.2.2 DC Start Current Rise Time
Description: Set the time to ramp the current from 0 to the specified injection level.

Default Value: 0	**Parameter Type:** Range (0 — 100)	**Parameter Number:** 2265
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.6.2.3 DC Start Current
Description: Set the DC current in % of nominal motor current. This current is injected during the DC start time.

Default Value: 0	**Parameter Type:** Range (0 — 1000)	**Parameter Number:** 2263
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

6.6.6.3 Synchronous Motor Start (Menu Index 5.6.3)

P 5.6.3.1 Sync. Motor Start Mode
Description: Set the synchronous motor initial postion handling.

Default Value: 1 [Rotor angle detection]	**Parameter Type:** Selection	**Parameter Number:** 2322
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Disabled
1	Rotor angle detection
2	Rotor angle parking

P 5.6.3.2 Sync. Motor Detection Current
Description: Set the rotor angle detection gain in % of the nominal motor current.

Default Value: 150	**Parameter Type:** Range (0 — 200)	**Parameter Number:** 2323
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 5.6.3.3 Sync. Motor Parking Time
Description: Set the duration of the rotor parking.

Default Value: 3	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 2324
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.6.3.4 Sync. Motor Parking Current
Description: Set the rotor angle parking current in % of the nominal motor current.

Default Value: 100	**Parameter Type:** Range (0 — 1000)	**Parameter Number:** 2325
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 5.6.3.5 Sync. Motor Parking Angle
Description: Set the electrical parking angle for the rotor.

Default Value: 0	**Parameter Type:** Range (0 — 360)	**Parameter Number:** 2326
Unit: °	**Data Type:** REAL	**Access Type:** Read/Write

6.6.7 Stop Settings (Menu Index 5.7)

6.6.7.1 Settings (Menu Index 5.7.1)

P 5.7.1.1 Stop Zero Speed Time
Description: Set the time that motor control stays active after reaching 0 speed. The value -1 means indefinitely.

Default Value: 0	**Parameter Type:** Range (-1 — 10000)	**Parameter Number:** 2331
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.7.1.3 Torque Ramp Down Time
Description: Set the time for ramping down the remaining torque after reaching standstill.

Default Value: 0	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 2336
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.7.1.4 Zero-speed Detection Level
Description: Set the speed that is considered standstill.

Default Value: 0.20	**Parameter Type:** Range (0 — 2.0)	**Parameter Number:** 2339
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

P 5.7.1.5 Zero-speed Detection Delay
Description: Set the time that the speed must be below zero-speed detection level before standstill is detected.

Default Value: 0.02	**Parameter Type:** Range (0 — 2)	**Parameter Number:** 2356
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

6.6.7.2 DC Injection (Menu Index 5.7.2)

P 5.7.2.1 DC-brake Time
Description: Set the duration for a DC braking current injection.

Default Value: 0	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 2267
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.7.2.2 DC-brake Current
Description: Set the DC braking current in % of nominal motor current.

Default Value: 0	**Parameter Type:** Range (0 — 1000)	**Parameter Number:** 2266
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 5.7.2.3 DC-brake Speed
Description: Set the speed below which DC braking is activated.

Default Value: 0	**Parameter Type:** Range (0 — *)	**Parameter Number:** 2268
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.7.2.4 DC Stop Time
Description: Set the DC stopping injection duration. The value -1 means indefinitely.

Default Value: 0	**Parameter Type:** Range (-1 — 10000)	**Parameter Number:** 2320
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.7.2.5 DC Stop Current
Description: Set the DC stopping current in % of nominal motor current. Applied after the drive has reached standstill.

Default Value: 0	**Parameter Type:** Range (0 — 1000)	**Parameter Number:** 2321
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

6.6.7.3 Quick Stop (Menu Index 5.7.3)

P 5.7.3.1 Quick Stop Inverse Input

Description: Select an input terminal for activating the Quick Stop Inverse function.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 212
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.7.3.2 Quick Stop Ramp Time

Description: Set the deceleration time for the quick stop ramp.

Default Value: 1	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 1129
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

6.6.7.4 AC Brake (Menu Index 5.7.4)

P 5.7.4.1 AC Brake

Description: Enables the AC Brake.

Default Value: 0 [Disabled]	**Parameter Type:** Selection	**Parameter Number:** 4026
Unit: -	**Data Type:** BOOL	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Disabled
1	Enabled

P 5.7.4.2 AC-brake Voltage Control Kp

Description: Set the scaling of the proportional gain of the AC-brake controller.

Default Value: 100	**Parameter Type:** Range (0 — 500)	**Parameter Number:** 4027
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 5.7.4.3 AC-brake Voltage Control Ti

Description: Set the scaling of the integral time of the AC-brake controller.

Default Value: 100	**Parameter Type:** Range (0 — 500)	**Parameter Number:** 4028
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 5.7.4.4 AC-brake Current

Description: Set the maximum allowed motor current in % of nominal motor current when AC brake is enabled.

Default Value: 100	**Parameter Type:** Range (0 — 150)	**Parameter Number:** 4057
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

6.6.8 Speed Control (Menu Index 5.8)

6.6.8.1 Speed Control Status (Menu Index 5.8.1)

P 5.8.1.1 Motor Shaft Speed

Description: Shows the shaft speed in RPM.

Default Value: NA	**Parameter Type:** Range (-100000 — 100000)	**Parameter Number:** 9010
Unit: rpm	**Data Type:** REAL	**Access Type:** Read Only

P 5.8.1.2 Motor Speed
Description: Shows the actual motor speed.

Default Value: NA	**Parameter Type:** Range (* — *)	**Parameter Number:** 9011
Unit: Hz	**Data Type:** REAL	**Access Type:** Read Only

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.8.1.3 Output Frequency
Description: Shows the output frequency.

Default Value: NA	**Parameter Type:** Range (* — *)	**Parameter Number:** 9015
Unit: Hz	**Data Type:** REAL	**Access Type:** Read Only

P 5.8.1.4 Feedback Speed
Description: Shows the feedback speed.

Default Value: NA	**Parameter Type:** Range (-10000 — 10000)	**Parameter Number:** 9007
Unit: rpm	**Data Type:** REAL	**Access Type:** Read Only

P 5.8.1.5 Feedback Electrical Angle
Description: Shows the feedback device angle in the electrical domain. Its value is needed for manually tuning the feedback angle offset.

Default Value: NA	**Parameter Type:** Range (0 — 360)	**Parameter Number:** 9016
Unit: °	**Data Type:** REAL	**Access Type:** Read Only

P 5.8.1.6 Speed Error
Description: Shows the difference between speed reference after ramp and motor speed.

Default Value: NA	**Parameter Type:** Range (* — *)	**Parameter Number:** 4023
Unit: Hz	**Data Type:** REAL	**Access Type:** Read Only

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.8.1.7 Speed Reference
Description: Shows the speed reference.

Default Value: NA	**Parameter Type:** Range (-2000 — 2000)	**Parameter Number:** 1718
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.8.1.8 Speed Reference Before Ramp
Description: Shows the value of speed reference before the ramp generator.

Default Value: NA	**Parameter Type:** Range (-2000 — 2000)	**Parameter Number:** 6049
Unit: Hz	**Data Type:** REAL	**Access Type:** Read Only

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.8.1.9 Speed Reference After Ramp
Description: Shows the value of the speed reference after the ramp generator.

Default Value: NA	**Parameter Type:** Range (* — *)	**Parameter Number:** 6150
Unit: Hz	**Data Type:** REAL	**Access Type:** Read Only

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.8.1.10 Final Speed Reference
Description: Shows the value of the speed reference before feeding it to the speed controller.

Default Value: NA	**Parameter Type:** Range (* — *)	**Parameter Number:** 6151
Unit: Hz	**Data Type:** REAL	**Access Type:** Read Only

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.8.1.11 Control Panel Speed Reference

Description: Shows the value of the speed reference given from the control panel.

Default Value: NA	**Parameter Type:** Range (* — *)	**Parameter Number:** 6153
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.8.1.12 Absolute Output Frequency Output

Description: Select an output terminal for the output frequency scaled between 0 Hz and positive speed limits in Hz.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 2300
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.8.1.13 Absolute Speed Reference Output

Description: Select an output terminal for the absolute speed reference, scaled between 0 and positive speed limit.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 2304
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.8.1.14 Output Frequency Output

Description: Select an output terminal for the output frequency scaled between minimum speed limit and positive speed limits in Hz.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 2308
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.8.1.16 Load Drooping Speed

Description: Shows the load drooping speed.

Default Value: NA	**Parameter Type:** Range (0 — 2000)	**Parameter Number:** 674
Unit: Hz	**Data Type:** REAL	**Access Type:** Read Only

Default unit: RPM. The unit can be changed with parameter 4321.

6.6.8.2 Speed Controller (Menu Index 5.8.2)

6.6.8.2.1 Basic Settings (Menu Index 5.8.2.1)

P 5.8.2.1.1 Speed Controller Type

Description: Select the speed controller type.

Default Value: 1 [PI-Controller]	**Parameter Type:** Selection	**Parameter Number:** 5005
Unit: -	**Data Type:** UINT	**Access Type:** Read/Conditional Write

The following are the selections for the parameter.

Selection number	Selection name
0	P-Controller
1	PI-Controller

P 5.8.2.1.2 Speed Controller Kp FVC+
Description: Set the proportional gain of the speed controller.

Default Value: 15	**Parameter Type:** Range (0 — 1000)	**Parameter Number:** 4020
Unit: PercentPerHertz	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.2.1.3 Speed Controller Ti FVC+
Description: Set the integration time of the speed controller.

Default Value: 0.1	**Parameter Type:** Range (0 — 100)	**Parameter Number:** 4021
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.2.1.4 Acceleration Feedforward Gain
Description: Set the acceleration feedforward gain. It bypasses the speed controller by adding torque reference based on requested acceleration and system inertia. Improves tracking of speed reference changes.

Default Value: 0	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 4022
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.2.1.5 Acceleration Feedforward Filter Tc
Description: Set the acceleration feedforward filter time constant.

Default Value: 0.00	**Parameter Type:** Range (0.00 — 1000000.00)	**Parameter Number:** 4039
Unit: ms	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.2.1.7 Speed Controller Kp VVC+
Description: Set the proportional gain of the speed controller.

Default Value: 0.015	**Parameter Type:** Range (0 — 1)	**Parameter Number:** 4080
Unit: -	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.2.1.8 Speed Controller Ti VVC+
Description: Set the integration time of the speed controller.

Default Value: 0.008	**Parameter Type:** Range (0.001 — 20)	**Parameter Number:** 4081
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

6.6.8.2.2 Advanced Settings (Menu Index 5.8.2.2)

P 5.8.2.2.1 Virtual Friction Gain
Description: Set the virtual friction gain, adding friction to the speed control loop to increase damping and stability. It is automatically adjusted when the system inertia is changed and parameter "5.8.11.1 Speed Controller Auto Tuning" is enabled.

Default Value: 0	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 4549
Unit: -	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.2.2.2 Low-speed Controller
Description: Enables the low-speed controller. It should be enabled if fast torque reaction at low speed references is needed.

Default Value: 0 [Disabled]	**Parameter Type:** Selection	**Parameter Number:** 4070
Unit: -	**Data Type:** BOOL	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Disabled
1	Enabled

P 5.8.2.2.3 Low-speed Controller Gain
Description: Set the proportional part of the low-speed controller. A higher value leads to higher dynamics.

Default Value: 50	**Parameter Type:** Range (0 — 1000)	**Parameter Number:** 4071
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.2.2.4 Kp Ratio at Low Speed
Description: Set the gain ratio for the proportional part of the speed controller at frequencies below the value set in "5.8.2.2.5 Kp Adaptation Low Speed".

Default Value: 100	**Parameter Type:** Range (1 — 1000)	**Parameter Number:** 4072
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.2.2.5 Kp Adaptation Low Speed
Description: Set the speed below which the speed controller proportional gain is fully using the value set in "5.8.2.2.4 Kp Ratio at Low Speed".

Default Value: 0	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 4073
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.2.2.6 Kp Adaptation High Speed
Description: Set the speed above which the speed controller proportional gain is fully using the value set in "5.8.2.1.2 Speed Controller Kp FVC+".

Default Value: 0	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 4074
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.2.2.7 Kp Ratio at Low Torque
Description: Set the gain ratio for the proportional part of the speed controller at a torque level below the lower torque limit.

Default Value: 100	**Parameter Type:** Range (1 — 1000)	**Parameter Number:** 4075
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.2.2.8 Kp Adaptation Low Torque
Description: Set the torque level below which the speed controller proportional gain is fully using the value set in "5.8.2.2.7 Kp Ratio at Low Torque".

Default Value: 0	**Parameter Type:** Range (0 — 1000)	**Parameter Number:** 4077
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.2.2.9 Kp Adaptation High Torque
Description: Set the torque level above which the speed controller proportional gain is fully using the value set in "5.8.2.1.2 Speed Controller Kp FVC+".

Default Value: 0	**Parameter Type:** Range (0 — 1000)	**Parameter Number:** 4078
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.2.2.10 Kp Adaptation Min at Low Flux
Description: Set the gain ratio for the proportional part, if flux is reduced by field weakening or Automatic Energy Optimization (AEO).

Default Value: 40	**Parameter Type:** Range (0 — 100)	**Parameter Number:** 4079
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.2.2.11 Zero-speed Damping Gain
Description: Set the zero-speed damping gain. It dampens speed fluctuations when the speed reference is 0.

Default Value: 100	**Parameter Type:** Range (0 — 1000)	**Parameter Number:** 5434
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

6.6.8.3 Speed Limits and Monitor (Menu Index 5.8.3)

P 5.8.3.1 Positive Speed Limit
Description: Set the speed limit for positive direction.

Default Value: 50	**Parameter Type:** Range (0 — *)	**Parameter Number:** 1729
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.8.3.2 Negative Speed Limit
Description: Set the speed limit for negative direction.

Default Value: -50	**Parameter Type:** Range (* — 0)	**Parameter Number:** 1728
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.8.3.3 Minimum Speed Limit
Description: Set the minimum speed for positive and negative direction.

Default Value: 0	**Parameter Type:** Range (* — *)	**Parameter Number:** 1722
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.8.3.4 High Speed Warning
Description: Set the speed value which activates the high speed warning. Activated after 1 s.

Default Value: 1000	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 1200
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.8.3.5 High Speed Fault
Description: Set the speed value which activates the high speed fault after a delay.

Default Value: 1000	**Parameter Type:** Range (0 — 1000)	**Parameter Number:** 1201
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.8.3.6 High Speed Fault Delay
Description: Set the delay time after which a fault is issued if the speed set for high speed fault is exceeded.

Default Value: 10	**Parameter Type:** Range (0 — 360)	**Parameter Number:** 1202
Unit: s	**Data Type:** UDINT	**Access Type:** Read/Write

6.6.8.4 Speed Reference (Menu Index 5.8.4)

P 5.8.4.1 Speed Reference 1 Input
Description: Select the input terminal or a predefined fixed value for the speed reference.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 501
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.8.4.2 Speed Reference 2 Input
Description: Select the input terminal or a predefined fixed value for the speed reference.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 502
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.8.4.3 Speed Reference 1 Max.
Description: Set the maximum value of the reference. It defines the upper point for the scaling of the reference input.

Default Value: 100	**Parameter Type:** Range (-1000 — 1000)	**Parameter Number:** 1724
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.8.4.4 Speed Reference 1 Min.
Description: Set the minimum value of the reference. It defines the lower point for the scaling of the reference input.

Default Value: 0	**Parameter Type:** Range (-1000 — 1000)	**Parameter Number:** 1725
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.8.4.5 Speed Reference 2 Max.
Description: Set the maximum value of the reference. It defines the upper point for the scaling of the reference input.

Default Value: 100	**Parameter Type:** Range (-1000 — 1000)	**Parameter Number:** 1726
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.8.4.6 Speed Reference 2 Min.
Description: Set the minimum value of the reference. It defines the lower point for the scaling of the reference input.

Default Value: 0	**Parameter Type:** Range (-1000 — 1000)	**Parameter Number:** 1727
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.8.4.7 Preset Speed Reference Selector
Description: Select the preset reference. The preset reference can be selected as a fixed value or by 3 digital inputs.

Default Value: 1 [Preset 1]	**Parameter Type:** Selection	**Parameter Number:** 702
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Bit Selection
1	Preset 1
2	Preset 2
3	Preset 3
4	Preset 4

Selection number	Selection name
5	Preset 5
6	Preset 6
7	Preset 7
8	Preset 8

P 5.8.4.8 Preset Speed 1
Description: Set the value of the preset reference.

Default Value: 10	**Parameter Type:** Range (-1000 — 1000)	**Parameter Number:** 703
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.8.4.9 Preset Speed 2
Description: Set the value of the preset reference.

Default Value: 20	**Parameter Type:** Range (-1000 — 1000)	**Parameter Number:** 704
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.8.4.10 Preset Speed 3
Description: Set the value of the preset reference.

Default Value: 30	**Parameter Type:** Range (-1000 — 1000)	**Parameter Number:** 705
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.8.4.11 Preset Speed 4
Description: Set the value of the preset reference.

Default Value: 40	**Parameter Type:** Range (-1000 — 1000)	**Parameter Number:** 706
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.8.4.12 Preset Speed 5
Description: Set the value of the preset reference.

Default Value: 50	**Parameter Type:** Range (-1000 — 1000)	**Parameter Number:** 707
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.8.4.13 Preset Speed 6
Description: Set the value of the preset reference.

Default Value: 60	**Parameter Type:** Range (-1000 — 1000)	**Parameter Number:** 708
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.8.4.14 Preset Speed 7
Description: Set the value of the preset reference.

Default Value: 70	**Parameter Type:** Range (-1000 — 1000)	**Parameter Number:** 709
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.8.4.15 Preset Speed 8

Description: Set the value of the preset reference.

Default Value: 80	**Parameter Type:** Range (-1000 — 1000)	**Parameter Number:** 710
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.8.4.16 Preset Speed Reference Bit 0 Input

Description: Select the digital input used as bit 0 addressing the preset reference.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 711
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.8.4.17 Preset Speed Reference Bit 1 Input

Description: Select the digital input used as bit 1 for addressing the preset reference.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 712
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.8.4.18 Preset Speed Reference Bit 2 Input

Description: Select the digital input used as bit 2 for addressing the preset reference.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 713
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.8.4.19 Fieldbus Speed Reference Scale

Description: Set the fieldbus reference scale equal to 100% reference.

Default Value: 50	**Parameter Type:** Range (0 — 1000)	**Parameter Number:** 1723
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.8.4.21 Speed Ref. Filter Tc

Description: Set the time constant of the reference filter. Set to 0 disables the filter.

Default Value: 0	**Parameter Type:** Range (0 — 1000)	**Parameter Number:** 1719
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

6.6.8.5 Reference Freeze (Menu Index 5.8.5)

P 5.8.5.1 Freeze Input

Description: Select the digital input for freezing the reference. Freezing is used to control the speed reference with 2 digital inputs, 1 increasing the reference and the other decreasing the reference.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 1000
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.8.5.2 Freeze Up Input

Description: Select the digital input for increasing the reference while reference freezing is activated.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 1001
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.8.5.3 Freeze Down Input
Description: Select the digital input for decreasing the reference while reference freezing is activated.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 1002
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.8.5.4 Freeze Ramp Time
Description: Set the ramp time for increasing/decreasing the reference while reference freeze is active.

Default Value: 10	**Parameter Type:** Range (0 — 1000)	**Parameter Number:** 1003
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.5.5 Freeze Ramp Delay
Description: Set the delay before ramping the reference while reference freeze is active.

Default Value: 4	**Parameter Type:** Range (0 — 3600)	**Parameter Number:** 1004
Unit: s	**Data Type:** UDINT	**Access Type:** Read/Write

P 5.8.5.6 Freeze Step Delta
Description: Set the reference step for increasing/decreasing the reference while reference freeze is active.

Default Value: 1	**Parameter Type:** Range (0 — 1000)	**Parameter Number:** 1005
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.8.5.7 Freeze Initialization
Description: Enables freeze initialization. If enabled, freeze reference is initialized to the minimum speed after start-up or a start signal is applied. If disabled, the latest value is used.

Default Value: 0 [Disabled]	**Parameter Type:** Selection	**Parameter Number:** 1006
Unit: -	**Data Type:** BOOL	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Disabled
1	Enabled

P 5.8.5.8 Freeze Ramp/Step Mode
Description: Select how to increase or decrease the reference while reference freeze is active.

Default Value: 0 [Step and Ramp]	**Parameter Type:** Selection	**Parameter Number:** 1007
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Step and Ramp
1	Ramp
2	Step

6.6.8.6 Speed Ramps (Menu Index 5.8.6)

6.6.8.6.1 Speed Ramp Settings (Menu Index 5.8.6.1)

P 5.8.6.1.1 Ramp Selector

Description: Select the speed ramp.

Default Value: 0 [Ramp 1]	**Parameter Type:** Selection	**Parameter Number:** 1100
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
4	Bit Selection
0	Ramp 1
1	Ramp 2
2	Ramp 3
3	Ramp 4
5	Variable Ramp.

P 5.8.6.1.2 Ramp Selection Bit 0 Input

Description: Select the digital input used as bit 0 addressing the speed ramp.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 1130
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.8.6.1.3 Ramp Selection Bit 1 Input

Description: Select the digital input used as bit 1 addressing the speed ramp.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 1131
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

6.6.8.6.2 Ramp 1 (Menu Index 5.8.6.2)

P 5.8.6.2.1 Ramp 1 Type

Description: Select the ramp type.

Default Value: 0 [Linear Ramp]	**Parameter Type:** Selection	**Parameter Number:** 1125
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Linear Ramp
1	S-Ramp

P 5.8.6.2.2 Ramp 1 Accel. Time
Description: Set the acceleration time from 0 to nominal motor speed.

Default Value: 5	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 1101
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.6.2.3 Ramp 1 Decel. Time
Description: Set the deceleration time from nominal motor speed to 0.

Default Value: 5	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 1105
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.6.2.4 S-Ramp 1 Accel. Increase Time
Description: Set the ramp acceleration increase time for S-ramp.

Default Value: 1	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 1109
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.6.2.5 S-Ramp 1 Accel. Decrease Time
Description: Set the ramp acceleration decrease time for S-ramp.

Default Value: 1	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 1113
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.6.2.6 S-Ramp 1 Decel. Increase Time
Description: Set the ramp deceleration increase time for S-ramp.

Default Value: 1	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 1117
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.6.2.7 S-Ramp 1 Decel. Decrease Time
Description: Set the ramp deceleration decrease time for S-ramp.

Default Value: 1	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 1121
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

6.6.8.6.3 Ramp 2 (Menu Index 5.8.6.3)

P 5.8.6.3.1 Ramp 2 Type
Description: Select the ramp type.

Default Value: 0 [Linear Ramp]	**Parameter Type:** Selection	**Parameter Number:** 1126
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Linear Ramp
1	S-Ramp

P 5.8.6.3.2 Ramp 2 Accel. Time
Description: Set the acceleration time from 0 to nominal motor speed.

Default Value: 5	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 1106
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.6.3.3 Ramp 2 Decel. Time
Description: Set the deceleration time from nominal motor speed to 0.

Default Value: 5	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 1102
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.6.3.4 S-Ramp 2 Accel. Increase Time
Description: Set the ramp acceleration increase time for S-ramp.

Default Value: 1	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 1110
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.6.3.5 S-Ramp 2 Accel. Decrease Time
Description: Set the ramp acceleration decrease time for S-ramp.

Default Value: 1	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 1114
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.6.3.6 S-Ramp 2 Decel. Increase Time
Description: Set the ramp deceleration increase time for S-ramp.

Default Value: 1	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 1118
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.6.3.7 S-Ramp 2 Decel. Decrease Time
Description: Set the ramp deceleration decrease time for S-ramp.

Default Value: 1	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 1122
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

6.6.8.6.4 Ramp 3 (Menu Index 5.8.6.4)

P 5.8.6.4.1 Ramp 3 Type
Description: Select the ramp type.

Default Value: 0 [Linear Ramp]	**Parameter Type:** Selection	**Parameter Number:** 1127
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Linear Ramp
1	S-Ramp

P 5.8.6.4.2 Ramp 3 Accel. Time
Description: Set the acceleration time from 0 to nominal motor speed.

Default Value: 5	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 1103
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.6.4.3 Ramp 3 Decel. Time
Description: Set the deceleration time from nominal motor speed to 0.

Default Value: 5	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 1107
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.6.4.4 S-Ramp 3 Accel. Increase Time
Description: Set the ramp acceleration increase time for S-ramp.

Default Value: 1	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 1111
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.6.4.5 S-Ramp 3 Accel. Decrease Time
Description: Set the ramp acceleration decrease time for S-ramp.

Default Value: 1	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 1115
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.6.4.6 S-Ramp 3 Decel. Increase Time
Description: Set the ramp deceleration increase time for S-ramp.

Default Value: 1	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 1119
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.6.4.7 S-Ramp 3 Decel. Decrease Time
Description: Set the ramp deceleration decrease time for S-ramp.

Default Value: 1	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 1123
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

6.6.8.6.5 Ramp 4 (Menu Index 5.8.6.5)

P 5.8.6.5.1 Ramp 4 Type
Description: Select the ramp type.

Default Value: 0 [Linear Ramp]	**Parameter Type:** Selection	**Parameter Number:** 1128
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Linear Ramp
1	S-Ramp

P 5.8.6.5.2 Ramp 4 Accel. Time
Description: Set the acceleration time from 0 to nominal motor speed.

Default Value: 5	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 1104
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.6.5.3 Ramp 4 Decel. Time
Description: Set the deceleration time from nominal motor speed to 0.

Default Value: 5	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 1108
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.6.5.4 S-Ramp 4 Accel. Increase Time
Description: Set the ramp acceleration increase time for S-ramp.

Default Value: 1	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 1112
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.6.5.5 S-Ramp 4 Accel. Decrease Time
Description: Set the ramp acceleration decrease time for S-ramp.

Default Value: 1	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 1116
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.6.5.6 S-Ramp 4 Decel. Increase Time
Description: Set the ramp deceleration increase time for S-ramp.

Default Value: 1	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 1120
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.6.5.7 S-Ramp 4 Decel. Decrease Time
Description: Set the ramp deceleration decrease time for S-ramp.

Default Value: 1	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 1124
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

6.6.8.6.6 Variable Ramp (Menu Index 5.8.6.6)

P 5.8.6.6.1 Accel. Time Input
Description: Select the input or a fixed value for adjusting the variable ramp acceleration time.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 1132
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.8.6.6.2 Accel. Time Maximum
Description: Set the maximum of the acceleration time for the variable ramp.

Default Value: 120	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 1134
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.6.6.3 Accel. Time Minimum
Description: Set the minimum of the acceleration time for the variable ramp.

Default Value: 0	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 1135
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.6.6.4 Decel. Time Input
Description: Select the input or a fixed value for adjusting the variable ramp deceleration time.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 1133
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.8.6.6.5 Decel. Time Maximum
Description: Set the maximum of the deceleration time for the variable ramp.

Default Value: 120	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 1136
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.6.6.6 Decel. Time Minimum
Description: Set the minimum of the deceleration time for the variable ramp.

Default Value: 0	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 1137
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

6.6.8.7 Speed Feedback (Menu Index 5.8.7)

P 5.8.7.1 Speed Feedback Filter Tc

Description: Set the speed feedback filter time constant (when the speed is controlled with speed sensor).

Default Value: 5.00	**Parameter Type:** Range (0.00 — 1000.00)	**Parameter Number:** 4544
Unit: ms	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.7.2 Estimated Speed Filter Tc

Description: Set the filter time constant for the estimated speed (when the speed is controlled without speed sensor).

Default Value: 10.00	**Parameter Type:** Range (5.00 — 100000.00)	**Parameter Number:** 4545
Unit: ms	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.7.3 Feedback Angle Offset

Description: Set the offset between permanent magnet (direct axis) angle and absolute feedback angle in the electrical domain. The offset value is summed with the feedback angle to attain the permanent magnet angle used in the control. Its correct setting is important when running FVC+ with synchronous motors in closed loop.

Default Value: 0	**Parameter Type:** Range (0 — 360)	**Parameter Number:** 9017
Unit: °	**Data Type:** REAL	**Access Type:** Read/Write

6.6.8.8 Speed Bypass (Menu Index 5.8.8)

P 5.8.8.1 Band 1, Low Limit

Description: Set the bypass hysteresis speed band, low limit.

Default Value: 0	**Parameter Type:** Range (0 — 100)	**Parameter Number:** 4520
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.8.8.2 Band 1, High Limit

Description: Set the bypass hysteresis speed band, high limit.

Default Value: 0	**Parameter Type:** Range (0 — 100)	**Parameter Number:** 4521
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.8.8.3 Band 2, Low Limit

Description: Set the bypass hysteresis speed band, low limit.

Default Value: 0	**Parameter Type:** Range (0 — 100)	**Parameter Number:** 4522
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.8.8.4 Band 2, High Limit

Description: Set the bypass hysteresis speed band, high limit.

Default Value: 0	**Parameter Type:** Range (0 — 100)	**Parameter Number:** 4523
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.8.8.5 Band 3, Low Limit

Description: Set the bypass hysteresis speed band, low limit.

Default Value: 0	**Parameter Type:** Range (0 — 100)	**Parameter Number:** 4524
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.8.8.6 Band 3, High Limit

Description: Set the bypass hysteresis speed band, high limit.

Default Value: 0	**Parameter Type:** Range (0 — 100)	**Parameter Number:** 4525
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.8.8.7 Band 4, Low Limit

Description: Set the bypass hysteresis speed band, low limit.

Default Value: 0	**Parameter Type:** Range (0 — 100)	**Parameter Number:** 4526
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.8.8.8 Band 4, High Limit

Description: Set the bypass hysteresis speed band, high limit.

Default Value: 0	**Parameter Type:** Range (0 — 100)	**Parameter Number:** 4527
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

Default unit: RPM. The unit can be changed with parameter 4321.

6.6.8.9 Load Drooping (Menu Index 5.8.9)

P 5.8.9.1 Load Drooping Mode

Description: Select the load drooping mode - Only available in FVC+ mode.

Default Value: 0 [Static]	**Parameter Type:** Selection	**Parameter Number:** 670
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Static
1	Dynamic
2	Combined

P 5.8.9.2 Load Drooping %

Description: Set the load drooping amount in % of nominal motor speed at nominal load conditions.

Default Value: 0	**Parameter Type:** Range (0 — 1000)	**Parameter Number:** 671
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.9.3 Load Drooping LP Tc

Description: Set the load drooping low pass filter time constant.

Default Value: 5.00	**Parameter Type:** Range (0.00 — 1000.00)	**Parameter Number:** 672
Unit: ms	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.9.4 Load Drooping HP Tc

Description: Set the load drooping high pass filter time constant. Only active in dynamic drooping mode.

Default Value: 1000.00	**Parameter Type:** Range (0.00 — 100000.00)	**Parameter Number:** 673
Unit: ms	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.9.15 Enhanced Static Part
Description: Set the % of static drooping at speeds lower than the value set in "5.8.9.16 Enhanced Lower Transition Speed". 0% means dynamic drooping only and 100% static drooping only.

Default Value: 1.5	**Parameter Type:** Range (0 — 100)	**Parameter Number:** 675
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.9.16 Enhanced Lower Transition Speed
Description: Set the speed at which transition from combined static and dynamic drooping to dynamic drooping only starts.

Default Value: 589.999	**Parameter Type:** Range (0 — *)	**Parameter Number:** 676
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.9.17 Enhanced Higher Transition Speed
Description: Set the speed at which the transition from combined static and dynamic drooping to dynamic drooping only is complete.

Default Value: 590	**Parameter Type:** Range (* — *)	**Parameter Number:** 677
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

6.6.8.10 Auto Tuning (Menu Index 5.8.11)

P 5.8.11.1 Speed Controller Auto Tuning
Description: Enables the auto tuning of the speed controller. Auto tuning is started when the value of the parameter "5.3.2.4 System Inertia" is changed and unequal to "0".

Default Value: 0	**Parameter Type:** Range (0 — 1)	**Parameter Number:** 4546
Unit: -	**Data Type:** BOOL	**Access Type:** Read/Conditional Write

P 5.8.11.2 Auto Tuning Bandwidth
Description: Set the auto tuning bandwidth. A higher value leads to a faster response to speed or reference changes.

Default Value: 100	**Parameter Type:** Range (0 — 1000)	**Parameter Number:** 4547
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 5.8.11.3 System Friction
Description: Set the total system friction in % of the nominal motor torque at nominal motor speed.

Default Value: 0	**Parameter Type:** Range (0 — 100)	**Parameter Number:** 4548
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

6.6.9 Torque control (Menu Index 5.9)

6.6.9.1 Torque Control Status (Menu Index 5.9.1)

P 5.9.1.1 Motor Torque
Description: Shows the actual motor torque.

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

Depending on whether metric or imperial units are in use, you can give the value for the parameter in either newton meters (Nm) or pound-feet (lb ft). The value range is different with the different units.

P 5.9.1.2 Relative Motor Torque
Description: Shows the motor torque in % of the nominal motor torque.

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

P 5.9.1.3 Torque Limit Motoring
Description: Shows the torque limit in motoring mode in % of nominal motor torque.

Default Value: NA	**Parameter Type:** Range (0 — 500)	**Parameter Number:** 1812
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 5.9.1.4 Torque Limit Regenerative
Description: Shows the regenerative torque limit in % of nominal motor torque.

Default Value: NA	**Parameter Type:** Range (0 — 500)	**Parameter Number:** 1813
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 5.9.1.5 Local Torque Reference
Description: Shows the local torque reference set in the control panel.

Default Value: NA	**Parameter Type:** Range (-300 — 300)	**Parameter Number:** 6155
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 5.9.1.6 Torque Reference
Description: Shows the value of the current torque reference in the reference chain in % of nominal motor torque.

Default Value: NA	**Parameter Type:** Range (-300 — 300)	**Parameter Number:** 6152
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 5.9.1.7 Torque Reference Final
Description: Shows the value of the final torque reference given to the motor controller in % of nominal motor torque.

Default Value: NA	**Parameter Type:** Range (-300 — 300)	**Parameter Number:** 6154
Unit: %	**Data Type:** REAL	**Access Type:** Read Only

6.6.9.2 Limits (Menu Index 5.9.2)

P 5.9.2.1 Positive Torque Limit
Description: Set the positive torque limit (quadrants 1 and 2) in % of nominal motor torque.

Default Value: 300	**Parameter Type:** Range (0 — 500)	**Parameter Number:** 1810
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 5.9.2.2 Negative Torque Limit
Description: Set the negative torque limit (quadrants 3 and 4) in % of nominal motor torque.

Default Value: -300	**Parameter Type:** Range (-500 — 0)	**Parameter Number:** 1811
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 5.9.2.3 Motoring Torque Limit
Description: Set the torque limit in motoring mode (quadrants 1 and 3) in % of nominal motor torque.

Default Value: 300	**Parameter Type:** Range (0 — 500)	**Parameter Number:** 1321
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 5.9.2.4 Regenerative Torque Limit
Description: Set the torque limit in regenerative mode (quadrants 2 and 4) in % of nominal motor torque.

Default Value: 300	**Parameter Type:** Range (0 — 500)	**Parameter Number:** 1323
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 5.9.2.5 Speed Limit Mode Torque Ctrl.
Description: Select the speed limiting mode during torque control.

Default Value: 0 [Pos./Neg. Speed Limit]	**Parameter Type:** Selection	**Parameter Number:** 2332
Unit: -	**Data Type:** UINT	**Access Type:** Read/Conditional Write

The following are the selections for the parameter.

Selection number	Selection name
0	Pos./Neg. Speed Limit
1	Speed Limit Setpoint
2	Window around Speed Limit Setpoint

P 5.9.2.6 Lower Window Limit
Description: Set the window size towards the positive speed direction.

Default Value: 0	**Parameter Type:** Range (0 — 10)	**Parameter Number:** 2333
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.9.2.7 Upper Window Limit
Description: Set the window size towards the negative speed direction.

Default Value: 0	**Parameter Type:** Range (0 — 10)	**Parameter Number:** 2334
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.9.2.26 Speed Limit Setpoint
Description: Set the variable speed limit setpoint in torque mode. This is used when fixed speed limits are not desired.

Default Value: 50	**Parameter Type:** Range (0 — 1000)	**Parameter Number:** 1336
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

P 5.9.2.27 Speed Limit Setpoint Ramp Time
Description: Set the speed limit setpoint ramp time. When running in speed limit in torque mode, the drive will accelerate/decelerate towards the speed limit setpoint using this ramp time.

Default Value: 5	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 1337
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.9.2.28 Motoring Torque Limit Scale Input
Description: Select the input for scaling motoring torque limit between 0% and 100% value defined in motoring torque limit. Off equals 100%.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 1324
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.9.2.29 Regenerative Torque Limit Scale Input
Description: Select the input for scaling regenerative torque limit between 0% and 100% value defined in regenerative torque limit. Off equals 100%.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 1326
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.9.2.30 Negative Torque Limit Scale Input
Description: Select the input for scaling negative torque limit between 0% and 100% value defined in negative torque limit. Off equals 100%.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 1330
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.9.2.31 Positive Torque Limit Scale Input
Description: Select the input for scaling positive torque limit between 0% and 100% value defined in positive torque limit. Off equals 100%.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 1333
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.9.2.32 Speed Limit setpoint Scale Input
Description: Select the input for scaling speed limit setpoint in torque mode between 0% and 100% of parameter value. Off equals 100%.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 1334
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.9.2.33 Motoring Torque Limit Response
Description: Select the response for running in motoring torque limit after the time delay defined.

Default Value: 0 [No response]	**Parameter Type:** Selection	**Parameter Number:** 2361
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	No response
1	Info
10	Fault

P 5.9.2.34 Motoring Torque Limit Delay
Description: Set the delay the drive is allowed to be in motoring torque limit before a response is issued.

Default Value:	**Parameter Type:** Range (0 — 65000)	**Parameter Number:** 2358
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.9.2.35 Regenerative Torque Limit Response
Description: Select the response for running in regenerative torque limit after the time delay defined.

Default Value: 0 [No response]	**Parameter Type:** Selection	**Parameter Number:** 2362
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	No response
1	Info
10	Fault

P 5.9.2.36 Regenerative Torque Limit Delay
Description: Set the delay the drive is allowed to be in regenerative torque limit before a response is issued.

Default Value:	**Parameter Type:** Range (0 — 65000)	**Parameter Number:** 2363
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

6.6.9.3 Torque Reference (Menu Index 5.9.3)

P 5.9.3.1 Torque Reference 1 Input
Description: Select the input terminal or a predefined fixed value for the torque reference.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 4534
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.9.3.2 Torque Reference 2 Input
Description: Select the input terminal or a predefined fixed value for the torque reference.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 4535
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.9.3.3 Torque Reference 1 Max.
Description: Set the maximum torque reference value in % of nominal motor torque.

Default Value: 100	**Parameter Type:** Range (-300 — 300)	**Parameter Number:** 4530
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 5.9.3.4 Torque Reference 1 Min.
Description: Set the minimum torque reference value in % of nominal motor torque.

Default Value: 0	**Parameter Type:** Range (-300 — 300)	**Parameter Number:** 4531
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 5.9.3.5 Torque Reference 2 Max.
Description: Set the maximum torque reference value in % of nominal motor torque.

Default Value: 100	**Parameter Type:** Range (-300 — 300)	**Parameter Number:** 4532
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 5.9.3.6 Torque Reference 2 Min.
Description: Set the torque minimum reference value in % of nominal motor torque.

Default Value: 0	**Parameter Type:** Range (-300 — 300)	**Parameter Number:** 4533
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 5.9.3.7 Preset Torque Selector
Description: Select the preset torque number.

Default Value: 1 [Preset 1]	**Parameter Type:** Selection	**Parameter Number:** 724
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Bit Selection
1	Preset 1
2	Preset 2
3	Preset 3
4	Preset 4

P 5.9.3.8 Preset Torque 1
Description: Set the torque preset value in % of the nominal motor torque.

Default Value: 10	**Parameter Type:** Range (-300 — 300)	**Parameter Number:** 725
Unit: -	**Data Type:** REAL	**Access Type:** Read/Write

P 5.9.3.9 Preset Torque 2
Description: Set the torque preset value in % of the nominal motor torque.

Default Value: 25	**Parameter Type:** Range (-300 — 300)	**Parameter Number:** 726
Unit: -	**Data Type:** REAL	**Access Type:** Read/Write

P 5.9.3.10 Preset Torque 3
Description: Set the torque preset value in % of the nominal motor torque.

Default Value: 50	**Parameter Type:** Range (-300 — 300)	**Parameter Number:** 727
Unit: -	**Data Type:** REAL	**Access Type:** Read/Write

P 5.9.3.11 Preset Torque 4
Description: Set the torque preset value in % of the nominal motor torque.

Default Value: 100	**Parameter Type:** Range (-300 — 300)	**Parameter Number:** 728
Unit: -	**Data Type:** REAL	**Access Type:** Read/Write

P 5.9.3.12 Preset Torque Bit 0 Input
Description: Select the digital input used as bit 0 addressing the preset reference.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 721
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.9.3.13 Preset Torque Bit 1 Input
Description: Select the digital input used as bit 1 addressing the preset reference.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 722
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.9.3.14 Torque Reference Ramp Time
Description: Set the ramping time from 0 to nominal motor torque.

Default Value: 0	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 2330
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.9.3.15 Torque Ref. Lowpass Filter Tc
Description: Set the time constant of the reference filter. Setting it to 0 disables the filter.

Default Value: 0.00	**Parameter Type:** Range (0.00 — 1000000.00)	**Parameter Number:** 2335
Unit: ms	**Data Type:** REAL	**Access Type:** Read/Write

6.6.10 Inching (Menu Index 5.11)

P 5.11.1 Inching Mode

Description: Select the inching mode. Inching is used for operating the motor for periods with a specific inching reference.

Default Value: 1 [Jogging Mode]	**Parameter Type:** Selection	**Parameter Number:** 1081
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Slow Down Mode
1	Jogging Mode
2	Override Mode

P 5.11.2 Enable Inching Input

Description: Select a terminal to enable inching.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 1080
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.11.3 Inching Ramp Time

Description: Set the ramp time for inching.

Default Value: 10	**Parameter Type:** Range (0.01 — 3600)	**Parameter Number:** 1083
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.11.4 Inching Reference 1

Description: Set reference 1 for inching.

Default Value: 15	**Parameter Type:** Range (-1000 — 1000)	**Parameter Number:** 1082
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.11.5 Inching Activate Input 1

Description: Select the terminal to inching with reference 1. Enable inching input must be active.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 1084
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.11.6 Inching Reference 2

Description: Set reference 2 for inching.

Default Value: -15	**Parameter Type:** Range (-1000 — 1000)	**Parameter Number:** 1085
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.11.7 Inching Activate Input 2

Description: Select the terminal to inching with reference 2. Enable inching input must be active.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 1086
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.11.8 Inching Active Output
Description: Select the output terminal or status bit indicating that inching is active.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 1087
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

6.6.11 Mechanical Brake Control (Menu Index 5.12)

6.6.11.1 Mechanical Brake Control Status (Menu Index 5.12.1)

P 5.12.1.1 Mechanical Brake Status Word
Description: Shows the mechanical brake status word.

Default Value: NA	**Parameter Type:** Range (0 — 65535)	**Parameter Number:** 3016
Unit: -	**Data Type:** WORD	**Access Type:** Read Only

P 5.12.1.2 Mechanical Brake State
Description: Shows the state of the mechanical brake controller.

Default Value: NA	**Parameter Type:** Range (0 — 32767)	**Parameter Number:** 3017
Unit: -	**Data Type:** INT	**Access Type:** Read Only

6.6.11.2 Brake Settings (Menu Index 5.12.2)

P 5.12.2.1 Brake Output
Description: Select the output terminal for controlling the mechanical brake.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 3007
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.12.2.2 Brake Priming Torque
Description: Set the torque to be build up against the mechanical brake during priming before releasing the brake.

Default Value: 100	**Parameter Type:** Range (0 — 200)	**Parameter Number:** 3012
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 5.12.2.3 Brake Priming Direction
Description: Select the direction of the applied torque during priming before releasing the brake.

Default Value: 0 [Clockwise]	**Parameter Type:** Selection	**Parameter Number:** 3001
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Clockwise
1	Counter clockwise
2	Reference Direction

P 5.12.2.4 Brake Priming Time
Description: Set the priming time duration.

Default Value: 0.2	**Parameter Type:** Range (0 — 5)	**Parameter Number:** 3000
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.12.2.5 Brake Priming Timeout
Description: Set the time after which a warning will be generated if priming cannot be finalized.

Default Value: 5	**Parameter Type:** Range (2 — 10)	**Parameter Number:** 3006
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.12.2.6 Brake Release Time
Description: Set the time it takes for the mechanical brake to open and to release the load.

Default Value: 0.5	**Parameter Type:** Range (0.1 — 30)	**Parameter Number:** 3003
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.12.2.7 Brake Open Input
Description: Select the input terminal for an open indication signal from the mechanical brake.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 3010
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.12.2.8 Brake Hover Time
Description: Set the hover time. Hover time is the duration where the drive holds the load before the mechanical brake closes to allow an instant restart.

Default Value: 0	**Parameter Type:** Range (0 — 60)	**Parameter Number:** 3013
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.12.2.9 Brake Closing Speed
Description: Set the speed at which the brake gets active (control terminal goes low).

Default Value: 5	**Parameter Type:** Range (0 — 25)	**Parameter Number:** 3002
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.12.2.10 Brake Close Time
Description: Set the time it takes for the mechanical brake to close and to hold the load.

Default Value: 0.5	**Parameter Type:** Range (0.1 — 30)	**Parameter Number:** 3004
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.12.2.11 Brake Closed Input
Description: Select the input terminal for a closed signal from the mechanical brake.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 3011
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.12.2.12 Brake Disengaging Time
Description: Set the duration from the brake is closed to the holding torque is released.

Default Value: 0.2	**Parameter Type:** Range (0 — 5)	**Parameter Number:** 3005
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.12.2.13 Brake Release Bandwidth
Description: Set the release control bandwidth.

Default Value: 100	**Parameter Type:** Range (0 — 10000)	**Parameter Number:** 3015
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

6.6.12 Position Control (Menu Index 5.13)

6.6.12.1 Position Control Status (Menu Index 5.13.1)

P 5.13.1.1 Reference Position

Description: Shows the reference/target position in position units.

Default Value: NA	**Parameter Type:** Range (-2147483648 — 2147483647)	**Parameter Number:** 736
Unit: PositionUnit	**Data Type:** DINT	**Access Type:** Read Only

P 5.13.1.2 Actual Position

Description: Shows the actual position in position units.

Default Value: NA	**Parameter Type:** Range (-2147483648 — 2147483647)	**Parameter Number:** 729
Unit: PositionUnit	**Data Type:** DINT	**Access Type:** Read Only

P 5.13.1.3 Actual Position Output

Description: Select an analog output to represent the actual position. The signal is scaled between Min. Position Limit and Max. Position Limit.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 735
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.13.1.4 Position Demanded

Description: Shows the demanded position (output of the profile generator).

Default Value: NA	**Parameter Type:** Range (-2147483648 — 2147483647)	**Parameter Number:** 741
Unit: PositionUnit	**Data Type:** DINT	**Access Type:** Read Only

P 5.13.1.6 Actual Position Error

Description: Shows the position error (difference between actual position and demanded position).

Default Value: NA	**Parameter Type:** Range (-2147483648 — 2147483647)	**Parameter Number:** 737
Unit: PositionUnit	**Data Type:** DINT	**Access Type:** Read Only

P 5.13.1.7 Actual Position Error Output

Description: Select an analog output to represent the position error. The signal is scaled between Min. Position Limit and Max. Position Limit.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 738
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.13.1.8 Max. Position Error Exceeded Output

Description: Select a digital output to signal that the maximum allowed position error has been exceeded.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 739
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.13.1.9 Control Panel Position Reference

Description: Shows the value of the position reference given from the control panel.

Default Value: NA	**Parameter Type:** Range (-2147483648 — 2147483647)	**Parameter Number:** 759
Unit: PositionUnit	**Data Type:** DINT	**Access Type:** Read/Write

P 5.13.1.10 Position Speed
Description: Shows the set positioning speed reference in position units per second.

Default Value: NA	**Parameter Type:** Range (0 — 16777216)	**Parameter Number:** 769
Unit: -	**Data Type:** REAL	**Access Type:** Read/Write

P 5.13.1.11 Position Acceleration
Description: Shows the set positioning acceleration in position units per second^2.

Default Value: NA	**Parameter Type:** Range (0 — 16777216)	**Parameter Number:** 761
Unit: -	**Data Type:** REAL	**Access Type:** Read Only

P 5.13.1.12 Position Deceleration
Description: Shows the set positioning deceleration in position units per second^2.

Default Value: NA	**Parameter Type:** Range (0 — 16777216)	**Parameter Number:** 762
Unit: -	**Data Type:** REAL	**Access Type:** Read Only

P 5.13.1.13 Position Jerk
Description: Shows the maximum positioning jerk for s-ramps in position units per second^3. Shows 0 when selecting linear ramps.

Default Value: NA	**Parameter Type:** Range (0 — 16777216)	**Parameter Number:** 760
Unit: -	**Data Type:** REAL	**Access Type:** Read Only

6.6.12.2 Position Feedback (Menu Index 5.13.2)

P 5.13.2.1 Position Feedback Source
Description: Select the source of the feedback signal for position control.

Default Value: 0 [Inherit from motor feedback mode]	**Parameter Type:** Selection	**Parameter Number:** 740
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Inherit from motor feedback mode
1	Sensor less
2	Feedback Device 1
3	Feedback Device 2

6.6.12.3 Position Controller (Menu Index 5.13.3)

P 5.13.3.1 Proportional Gain Kp
Description: Set the proportional gain of the position controller.

Default Value: 2	**Parameter Type:** Range (0 — 1000)	**Parameter Number:** 4030
Unit: -	**Data Type:** REAL	**Access Type:** Read/Write

P 5.13.3.2 Integral Time Ti
Description: Set the integral time of the position controller.

Default Value: 1000	**Parameter Type:** Range (0.001 — 1000)	**Parameter Number:** 4032
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.13.3.3 Derivative Time Td
Description: Set the derivative time of the position controller. 0 = off.

Default Value: 0	**Parameter Type:** Range (0 — 1)	**Parameter Number:** 4031
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.13.3.4 Speed Feedforward Gain
Description: Set the speed feedforward gain to improve ability to follow dynamic speed profiles.

Default Value: 100	**Parameter Type:** Range (0 — 200)	**Parameter Number:** 4033
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

6.6.12.4 Position Scaling (Menu Index 5.13.4)

P 5.13.4.1 Axis Mode
Description: Select Linear for linear axis without wraparound. Select Rotary for endless operation with wraparound at minimum and maximum position.

Default Value: 0 [Linear Axis]	**Parameter Type:** Selection	**Parameter Number:** 4029
Unit: -	**Data Type:** UINT	**Access Type:** Read/Conditional Write

The following are the selections for the parameter.

Selection number	Selection name
0	Linear Axis
1	Rotary Axis

P 5.13.4.4 Position Unit Numerator
Description: Set the distance moved in the desired unit per number of motor rotations set as Position Unit Denominator.

Default Value: 360	**Parameter Type:** Range (-2147483648 — 2147483647)	**Parameter Number:** 770
Unit: -	**Data Type:** DINT	**Access Type:** Read/Conditional Write

P 5.13.4.5 Position Unit Denominator
Description: Set the number of motor rotations for moving the distance set as Position Unit Numerator.

Default Value: 1	**Parameter Type:** Range (-2147483648 — 2147483647)	**Parameter Number:** 771
Unit: -	**Data Type:** DINT	**Access Type:** Read/Conditional Write

6.6.12.5 Limit handling/Protection (Menu Index 5.13.5)

P 5.13.5.1 Position Error Window
Description: Set window for maximum tolerated position error (difference between demanded and actual position).

Default Value: 10	**Parameter Type:** Range (0 — 2147483647)	**Parameter Number:** 772
Unit: PositionUnit	**Data Type:** DINT	**Access Type:** Read/Write

P 5.13.5.2 Position Error Delay
Description: Set the time where the actual position error must be outside the position error window before the position error response is activated.

Default Value: 100.00	**Parameter Type:** Range (0.00 — 16777216000.00)	**Parameter Number:** 773
Unit: ms	**Data Type:** REAL	**Access Type:** Read/Write

P 5.13.5.3 Position Error Response
Description: Select the reaction of the drive when the actual position error is outside the position error window for the position error delay time.

Default Value: 0 [Ignore]	**Parameter Type:** Selection	**Parameter Number:** 774
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Ignore
1	Warning
2	Fault, Ramp down to stop

P 5.13.5.4 Min. Position Limit
Description: Set the minimum position limit. Minimum position limit and maximum position limit define the allowed range of movement in linear-axis mode and the rotary range in rotary-axis mode.

Default Value: -100000	**Parameter Type:** Range (-2147483648 — 2147483647)	**Parameter Number:** 766
Unit: PositionUnit	**Data Type:** DINT	**Access Type:** Read/Conditional Write

P 5.13.5.5 Max. Position Limit
Description: Set the maximum position limit. Minimum position limit and maximum position limit define the allowed range of movement in linear-axis mode and the rotary range in rotary-axis mode.

Default Value: 100000	**Parameter Type:** Range (-2147483648 — 2147483647)	**Parameter Number:** 767
Unit: PositionUnit	**Data Type:** DINT	**Access Type:** Read/Conditional Write

P 5.13.5.6 Position Limit Response
Description: Select the reaction of the drive when exceeding the configured position limits. This reaction applies for linear-axis mode.

Default Value: 0 [Disabled]	**Parameter Type:** Selection	**Parameter Number:** 777
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Disabled
1	Warning
2	Fault

P 5.13.5.7 Negative Limit Switch Inverted Input
Description: Select a digital input for the inverted negative limit switch.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 841
Unit: -	**Data Type:** UINT	**Access Type:** Read/Conditional Write

P 5.13.5.8 Positive Limit Switch Inverted Input
Description: Select a digital input for the inverted positive limit switch.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 842
Unit: -	**Data Type:** UINT	**Access Type:** Read/Conditional Write

P 5.13.5.9 Limit Switch Response
Description: Select the reaction of the drive when a limit switch is activated.

Default Value: 7 [Fault]	**Parameter Type:** Selection	**Parameter Number:** 843
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Disabled
1	Ramp down to stand still Warning
2	Ramp stop with Warning
3	Ramp stop with Fault
4	Quick stop with Warning
5	Quick stop with Fault
6	Coast with Warning
7	Fault

6.6.13 Positioning Mode (Menu Index 5.14)

6.6.13.1 Positioning Mode Status (Menu Index 5.14.1)

P 5.14.1.1 Positioning Status
Description: Shows the status of positioning.

Default Value: NA	**Parameter Type:** Selection	**Parameter Number:** 730
Unit: -	**Data Type:** UINT	**Access Type:** Read Only

The following are the selections for the parameter.

Selection number	Selection name
0	Idle
1	Active
2	Done
3	Error
4	Aborted

P 5.14.1.2 Positioning Active Output
Description: Select a digital output to signal that positioning is active.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 731
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.14.1.3 Positioning Target Reached Output
Description: Select a digital output to signal that target is reached.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 732
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.14.1.4 Positioning Aborted Output
Description: Select a digital output to signal that positioning was interrupted before the target was reached.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 733
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.14.1.5 Positioning Error Output
Description: Select a digital output to signal that positioning was interrupted by an error before target was reached.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 734
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

6.6.13.2 Reference (Menu Index 5.14.2)

P 5.14.2.1 Enable Reference Input
Description: Select a digtal input for the enable reference signal which activates the next position reference/target. The signal is level-triggered for absolute positioning and edge-triggered for relative positioning.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 780
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.14.2.2 Preset Position Selector
Description: Select an external preset selector or a specific preset position reference/target.

Default Value: 1 [Preset 1]	**Parameter Type:** Selection	**Parameter Number:** 786
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Bit Selection
1	Preset 1
2	Preset 2
3	Preset 3
4	Preset 4
5	Preset 5
6	Preset 6
7	Preset 7
8	Preset 8

P 5.14.2.3 Preset Position Ref. 1
Description: Set the value for preset position reference/target 1.

Default Value: 0	**Parameter Type:** Range (-2147483648 — 2147483647)	**Parameter Number:** 750
Unit: PositionUnit	**Data Type:** DINT	**Access Type:** Read/Write

P 5.14.2.4 Preset Position Ref. 2
Description: Set the value for preset position reference/target 2.

Default Value: 2000	**Parameter Type:** Range (-2147483648 — 2147483647)	**Parameter Number:** 751
Unit: PositionUnit	**Data Type:** DINT	**Access Type:** Read/Write

P 5.14.2.5 Preset Position Ref. 3
Description: Set the value for preset position reference/target 3.

Default Value: 3000	**Parameter Type:** Range (-2147483648 — 2147483647)	**Parameter Number:** 752
Unit: PositionUnit	**Data Type:** DINT	**Access Type:** Read/Write

P 5.14.2.6 Preset Position Ref. 4
Description: Set the value for preset position reference/target 4.

Default Value: 4000	**Parameter Type:** Range (-2147483648 — 2147483647)	**Parameter Number:** 753
Unit: PositionUnit	**Data Type:** DINT	**Access Type:** Read/Write

P 5.14.2.7 Preset Position Ref. 5
Description: Set the value for preset position reference/target 5.

Default Value: 5000	**Parameter Type:** Range (-2147483648 — 2147483647)	**Parameter Number:** 754
Unit: PositionUnit	**Data Type:** DINT	**Access Type:** Read/Write

P 5.14.2.8 Preset Position Ref. 6
Description: Set the value for preset position reference/target 6.

Default Value: 6000	**Parameter Type:** Range (-2147483648 — 2147483647)	**Parameter Number:** 755
Unit: PositionUnit	**Data Type:** DINT	**Access Type:** Read/Write

P 5.14.2.9 Preset Position Ref. 7
Description: Set the value for preset position reference/target 7.

Default Value: 7000	**Parameter Type:** Range (-2147483648 — 2147483647)	**Parameter Number:** 756
Unit: PositionUnit	**Data Type:** DINT	**Access Type:** Read/Write

P 5.14.2.10 Preset Position Ref. 8
Description: Set the value for preset position reference/target 8.

Default Value: 8000	**Parameter Type:** Range (-2147483648 — 2147483647)	**Parameter Number:** 757
Unit: PositionUnit	**Data Type:** DINT	**Access Type:** Read/Write

P 5.14.2.11 Preset Position Bit 0 Input
Description: Select a digital input for bit 0 of the preset position selector.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 783
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.14.2.12 Preset Position Bit 1 Input
Description: Select a digital input for bit 1 of the preset position selector.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 784
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.14.2.13 Preset Position Bit 2 Input
Description: Select a digital input for bit 2 of the preset position selector.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 785
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.14.2.14 Relative Positioning Input
Description: Select a digital input for selecting between absolute or relative positioning.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 776
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.14.2.15 Relative Positioning Mode
Description: Select the reference/starting point for calculating the relative positioning target.

Default Value: 1 [Relative to Position Demanded]	**Parameter Type:** Selection	**Parameter Number:** 768
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Additive
1	Relative to Position Demanded
2	Relative to Actual Position
3	Relative to Touch Probe 1
4	Relative to Touch Probe 2

P 5.14.2.16 Touch Probe Positioning Input
Description: Select a digital input for activating touch probe positioning.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 789
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.14.2.17 Absolute Positioning Direction
Description: Select the direction of movement for absolute positioning in rotary mode.

Default Value: 0 [Disable Direction Selection]	**Parameter Type:** Selection	**Parameter Number:** 775
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Disable Direction Selection
1	Positive Direction
2	Shortest Way
3	Negative Direction

P 5.14.2.18 On-target Window
Description: Set a position window for activating the on-target position signal. The on-target signal is set when the actual position has been within +/- the on-target window for the time set by on-target delay.

Default Value: 5	**Parameter Type:** Range (0 — 2147483647)	**Parameter Number:** 790
Unit: PositionUnit	**Data Type:** DINT	**Access Type:** Read/Write

P 5.14.2.19 On-target Delay
Description: Set a delay for the on-target signal. Relates to the on-target window.

Default Value: 1.00	**Parameter Type:** Range (0.00 — 16777216000.00)	**Parameter Number:** 791
Unit: ms	**Data Type:** REAL	**Access Type:** Read/Write

P 5.14.2.20 Position Reference 1 Input
Description: Select the input (terminal or as a percentage) for position reference 1.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 781
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.14.2.21 Position Reference 2 Input
Description: Select the input (terminal or as a percentage) for position reference 2.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 782
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

6.6.14 Synchronous Modes (Menu Index 5.15)

6.6.14.1 Synchronous Modes Status (Menu Index 5.15.1)

P 5.15.1.1 Synchronizing Status
Description: Shows the status of synchronizing.

Default Value: NA	**Parameter Type:** Selection	**Parameter Number:** 319
Unit: -	**Data Type:** UINT	**Access Type:** Read Only

The following are the selections for the parameter.

Selection number	Selection name
0	Idle
1	Active
3	Error
4	Aborted
5	In Sync

P 5.15.1.2 Synchronizing Active Output
Description: Select a digital output to signal that synchronizing is active.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 320
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.15.1.3 Synchronizing In Sync Output
Description: Select a digital output to signal that the drive is in sync with the master. Tolerance for in sync is set by the synchronization window.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 321
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.15.1.4 Synchronizing Aborted Output
Description: Select a digital output to signal that synchronizing has been aborted, for example, by a stop command.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 322
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.15.1.5 Synchronizing Error Output
Description: Select a digital output to signal that synchronizing has been aborted or not started due to an error.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 323
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

6.6.14.2 Configuration (Menu Index 5.15.2)

P 5.15.2.1 Start Synchronizing Input
Description: Select a digital input for starting synchronization. Start behavior defines at which point the follower position is locked to the master position. The signal is level triggered.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 324
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.15.2.2 Synchronization Window
Description: Set a synchronization window for activating the in-sync signal. The in sync is set when the difference between follower position and master position has been within +/- the synchronization window for the time set by synchronization window delay.

Default Value: 100	**Parameter Type:** Range (0 — 2147483647)	**Parameter Number:** 325
Unit: PositionUnit	**Data Type:** DINT	**Access Type:** Read/Write

P 5.15.2.3 Synchronization Window Delay
Description: Set a delay for the in-sync signal. Relates to synchronization window.

Default Value: 50.00	**Parameter Type:** Range (0.00 — 16777216000.00)	**Parameter Number:** 326
Unit: ms	**Data Type:** REAL	**Access Type:** Read/Write

6.6.14.3 Gear Mode Settings (Menu Index 5.15.3)

P 5.15.3.1 Start Behavior
Description: Select the behavior for start synchronizing. This defines at which point the follower position is locked to the master position.

Default Value: 0 [Relative Sync At Start]	**Parameter Type:** Selection	**Parameter Number:** 327
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Relative Sync At Start
1	Relative Sync
2	Absolute Sync

P 5.15.3.2 Gear Ratio Numerator
Description: Set the numerator for the gear ratio used in gear mode. Is used in combination with gear ratio denominator.

Default Value: 1	**Parameter Type:** Range (-2147483648 — 2147483647)	**Parameter Number:** 328
Unit: -	**Data Type:** DINT	**Access Type:** Read/Write

P 5.15.3.3 Gear Ratio Denominator
Description: Set the denominator for the gear ratio used in gear mode. Is used in combination with gear ratio numerator.

Default Value: 1	**Parameter Type:** Range (-2147483648 — 2147483647)	**Parameter Number:** 329
Unit: -	**Data Type:** DINT	**Access Type:** Read/Write

P 5.15.3.4 Superimposed Speed Difference
Description: Set the speed reference for the superimposed motion which will be added to the acutal speed of the underlying motion.

Default Value: 10	**Parameter Type:** Range (0.000000001 — 16777216)	**Parameter Number:** 823
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

6.6.15 Master (Menu Index 5.16)

6.6.15.1 Master Status (Menu Index 5.16.1)

P 5.16.1.1 Master Position
Description: Shows the actual position of the master in position units.

Default Value: NA	**Parameter Type:** Range (-2147483648 — 2147483647)	**Parameter Number:** 350
Unit: PositionUnit	**Data Type:** DINT	**Access Type:** Read Only

6.6.15.2 Configuration (Menu Index 5.16.2)

P 5.16.2.1 Master Source Selection
Description: Select a source that provides the master signal.

Default Value: 0 [Disabled]	**Parameter Type:** Selection	**Parameter Number:** 351
Unit: -	**Data Type:** USINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Disabled
2	Feedback Device 1
3	Feedback Device 2

P 5.16.2.2 Master Home Input
Description: Select a digital input for activating homing of the master. The actual master position is set to the value of the master home position.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 354
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.16.2.3 Master Home Position
Description: Set the master home position.

Default Value: 0	**Parameter Type:** Range (-2147483648 — 2147483647)	**Parameter Number:** 355
Unit: PositionUnit	**Data Type:** DINT	**Access Type:** Read/Write

6.6.16 Homing (Menu Index 5.17)

6.6.16.1 Homing Status (Menu Index 5.17.1)

P 5.17.1.1 Home Status
Description: Shows the status of homing.

Default Value: NA	**Parameter Type:** Selection	**Parameter Number:** 5103
Unit: -	**Data Type:** UINT	**Access Type:** Read Only

The following are the selections for the parameter.

Selection number	Selection name
0	Idle
1	Active
2	Done
3	Error
4	Aborted

P 5.17.1.2 Home Active Output
Description: Select a digital output to signal that homing is active.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 5105
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.17.1.3 Home Done Output
Description: Select a digital output to signal that homing is done.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 5106
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.17.1.4 Home Error Output
Description: Select a digital output to signal that homing is incomplete due to an error.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 5107
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.17.1.5 Home Speed
Description: Shows the set home seach speed reference in position units per second.

Default Value: NA	**Parameter Type:** Range (0 — 16777216)	**Parameter Number:** 861
Unit: -	**Data Type:** REAL	**Access Type:** Read Only

P 5.17.1.6 Home Acceleration
Description: Shows the set homing acceleration in position units per second^2.

Default Value: NA	**Parameter Type:** Range (0 — 16777216)	**Parameter Number:** 862
Unit: -	**Data Type:** REAL	**Access Type:** Read Only

P 5.17.1.7 Home Deceleration
Description: Shows the set homing deceleration in position units per second^2.

Default Value: NA	**Parameter Type:** Range (0 — 16777216)	**Parameter Number:** 863
Unit: -	**Data Type:** REAL	**Access Type:** Read Only

P 5.17.1.8 Home Jerk
Description: Shows the maximum jerk for homing when using s-ramps in position units per second^3. Shows 0 when selecting linear ramps.

Default Value: NA	**Parameter Type:** Range (0 — 16777216)	**Parameter Number:** 864
Unit: -	**Data Type:** REAL	**Access Type:** Read Only

P 5.17.1.9 Home Aborted Output
Description: Select a digital output to signal that homing was interrupted before the home position is reached.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 5108
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

6.6.16.2 Configuration (Menu Index 5.17.2)

P 5.17.2.1 Home Enable Input
Description: Select a digital input for activating the selected home function.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 850
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.17.2.2 Home Sensor Input
Description: Select a digital input for connection of the home sensor.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 840
Unit: -	**Data Type:** UINT	**Access Type:** Read/Conditional Write

P 5.17.2.3 Home Mode
Description: Select a homing function.

Default Value: 4 [Home Direct]	**Parameter Type:** Selection	**Parameter Number:** 851
Unit: -	**Data Type:** USINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Home on Switch (Rising Edge)
1	Home on Switch (Falling Edge)
2	Home on Block
4	Home Direct

P 5.17.2.4 Home Search Direction
Description: Select the direction in which the search for home event is started.

Default Value: 0 [Positive Direction]	**Parameter Type:** Selection	**Parameter Number:** 853
Unit: -	**Data Type:** USINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Positive Direction
1	Negative Direction

P 5.17.2.5 Home Position
Description: Set the home position which will be set as actual position at the found home position.

Default Value: 0	**Parameter Type:** Range (-2147483648 — 2147483647)	**Parameter Number:** 855
Unit: PositionUnit	**Data Type:** DINT	**Access Type:** Read/Write

P 5.17.2.6 Home Speed
Description: Set the speed reference for home search.

Default Value: 10	**Parameter Type:** Range (0.000000001 — 16777216)	**Parameter Number:** 852
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

P 5.17.2.7 Home Speed Low
Description: Set the low homing speed reference for accurate detection of the home position after the sensor is found. If set to 0, home speed is used.

Default Value: 0	**Parameter Type:** Range (0 — 16777216)	**Parameter Number:** 866
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

P 5.17.2.8 Home Ramp Selection
Description: Select the set of ramp type and ramp times for homing.

Default Value: 0 [Ramp 1]	**Parameter Type:** Selection	**Parameter Number:** 793
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
4	Bit Selection
0	Ramp 1
1	Ramp 2
2	Ramp 3
3	Ramp 4
5	Variable Ramp.

P 5.17.2.10 Home Time Limit
Description: Set a timeout for finding the home position. A fault will be raised if time runs out before home has been found. 0 disables time limit monitoring.

Default Value: 0.0	**Parameter Type:** Range (0.0 — 16777216)	**Parameter Number:** 859
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 5.17.2.11 Home Distance Limit
Description: Set a distance limit for finding the home position. A fault will be raised if the home position is not found within the distance limit. 0 disables distance limit monitoring.

Default Value: 0	**Parameter Type:** Range (0 — 2147483647)	**Parameter Number:** 860
Unit: PositionUnit	**Data Type:** DINT	**Access Type:** Read/Write

P 5.17.2.12 Function After Home Found
Description: Select the function that is executed after home position is found.

Default Value: 0 [Position Stop]	**Parameter Type:** Selection	**Parameter Number:** 5101
Unit: -	**Data Type:** USINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Position Stop
1	Speed Stop

P 5.17.2.13 Home Offset
Description: Set the position offset relative to the home position which is used for position stop after home found. Stop position = Home position + Home offset.

Default Value: 0	**Parameter Type:** Range (-16777216 — 16777216)	**Parameter Number:** 5102
Unit: PositionUnit	**Data Type:** DINT	**Access Type:** Read/Write

P 5.17.2.14 Reset of Home Done
Description: Select when homing done shall be reset.

Default Value: 0 [Power Down]	**Parameter Type:** Selection	**Parameter Number:** 854
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Power Down
1	Coast
2	Coast Running
3	Homing Only

P 5.17.2.15 Homing On The Fly
Description: Activate the desired homing on the fly function.

Default Value: 0 [Disabled]	**Parameter Type:** Selection	**Parameter Number:** 856
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Disabled
1	1st time after power up
2	1st time after power up (running in positive direction)
3	1st time after power up (running in negative direction)
4	1st time after start
5	1st time after start (running in positive direction)
6	1st time after start (running in negative direction)
7	1st time after coast
8	1st time after coast (running in positive direction)
9	1st time after coast (running in negative direction)

Selection number	Selection name
10	Every time
11	Every time (running in positive direction)
12	Every time (running in negative direction)

6.6.17 Touch Probe (Menu Index 5.18)

6.6.17.1 Touch Probe 1 (Menu Index 5.18.1)

6.6.17.1.1 Touch Probe 1 Status (Menu Index 5.18.1.1)

P 5.18.1.1.1 Touch Probe 1 Event Detected

Description: Shows that an event has been detected for touch probe 1.

Default Value: NA	**Parameter Type:** Selection	**Parameter Number:** 879
Unit: -	**Data Type:** BOOL	**Access Type:** Read Only

The following are the selections for the parameter.

Selection number	Selection name
0	False
1	True

P 5.18.1.1.2 Touch Probe 1 Event Detected Output

Description: Select a digital output to signal that an event has been detected for touch probe 1.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 800
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.18.1.1.3 Touch Probe 1 Active

Description: Shows that monitoring of touch probe 1 is active.

Default Value: NA	**Parameter Type:** Selection	**Parameter Number:** 880
Unit: -	**Data Type:** BOOL	**Access Type:** Read Only

The following are the selections for the parameter.

Selection number	Selection name
0	False
1	True

P 5.18.1.1.4 Touch Probe 1 Active Output

Description: Select a digital output to signal that monitoring of touch probe 1 is active.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 801
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.18.1.1.5 Touch Probe 1 Recorded Position

Description: Shows the recorded actual position at the latest touch probe 1 event.

Default Value: NA	**Parameter Type:** Range (-16777216 — 16777216)	**Parameter Number:** 881
Unit: -	**Data Type:** DINT	**Access Type:** Read Only

P 5.18.1.1.6 Touch Probe 1 Recorded Position Output
Description: Select an analog output to represent the recorded actual position of the latest touch probe 1 event. The signal is scaled between Min. Position Limit and Max. Position Limit.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 802
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.18.1.1.7 Touch Probe 1 Counter
Description: Shows the number of detected touch probe 1 events since the counter was reset.

Default Value: NA	**Parameter Type:** Range (0 — 65535)	**Parameter Number:** 882
Unit: -	**Data Type:** UINT	**Access Type:** Read Only

P 5.18.1.1.8 Touch Probe 1 Counter Output
Description: Select an analog output to represent the number of detected touch probe 1 events. The signal is scaled between 0 and 65535.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 803
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

6.6.17.1.2 Configuration (Menu Index 5.18.1.2)

P 5.18.1.2.1 Touch Probe 1 Input
Description: Select a digital input for connection of the touch probe 1 sensor.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 870
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.18.1.2.2 Touch Probe 1 Enable Input
Description: Select a digital input for activating touch probe 1 monitoring.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 871
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.18.1.2.3 Touch Probe 1 Edge
Description: Select the signal edge to trigger touch probe 1.

Default Value: 0 [Rising]	**Parameter Type:** Selection	**Parameter Number:** 876
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Rising
1	Falling
2	Both

P 5.18.1.2.4 Touch Probe 1 Reset Counter
Description: Enable reset of touch probe 1 counter. Reset of the counter is also possible while the touch probe is active.

Default Value: 0 [Disabled]	**Parameter Type:** Selection	**Parameter Number:** 877
Unit: -	**Data Type:** BOOL	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Disabled
1	Enabled

P 5.18.1.2.5 Touch Probe 1 Mode
Description: Select if touch probe 1 monitoring automatically ends after a single event was detected or if a continuous monitoring shall be done.

Default Value: 1 [Continuous]	**Parameter Type:** Selection	**Parameter Number:** 878
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Single Shot
1	Continuous

P 5.18.1.2.6 Touch Probe 1 Enable Position Window
Description: Enable a position window defined by touch probe 1 first and last position for acceptance of events.

Default Value: 0 [Disabled]	**Parameter Type:** Selection	**Parameter Number:** 872
Unit: -	**Data Type:** BOOL	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Disabled
1	Enabled

P 5.18.1.2.7 Touch Probe 1 First Position
Description: Set the absolute start position of the window for touch probe 1 monitoring.

Default Value: 0	**Parameter Type:** Range (-2147483648 — 2147483647)	**Parameter Number:** 873
Unit: PositionUnit	**Data Type:** DINT	**Access Type:** Read/Write

P 5.18.1.2.8 Touch Probe 1 Last Position
Description: Set the absolute end position of the window for touch probe 1 monitoring.

Default Value: 0	**Parameter Type:** Range (-2147483648 — 2147483647)	**Parameter Number:** 874
Unit: PositionUnit	**Data Type:** DINT	**Access Type:** Read/Write

P 5.18.1.2.9 Touch Probe 1 Time Limit
Description: Set a timeout for detecting a touch probe 1 event. A fault will be raised if time runs out before a touch probe 1 event is detected. 0 disables the time limit monitoring.

Default Value: 0	**Parameter Type:** Range (0 — 16777216)	**Parameter Number:** 875
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

6.6.17.2 Touch Probe 2 (Menu Index 5.18.2)

6.6.17.2.1 Touch Probe 2 Status (Menu Index 5.18.2.1)

P 5.18.2.1.1 Touch Probe 2 Event Detected

Description: Shows that an event has been detected for touch probe 2.

Default Value: NA	**Parameter Type:** Selection	**Parameter Number:** 892
Unit: -	**Data Type:** BOOL	**Access Type:** Read Only

The following are the selections for the parameter.

Selection number	Selection name
0	False
1	True

P 5.18.2.1.2 Touch Probe 2 Event Detected Output

Description: Select a digital output to signal that an event has been detected for touch probe 2.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 804
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.18.2.1.3 Touch Probe 2 Active

Description: Shows that monitoring of touch probe 2 is active.

Default Value: NA	**Parameter Type:** Selection	**Parameter Number:** 893
Unit: -	**Data Type:** BOOL	**Access Type:** Read Only

The following are the selections for the parameter.

Selection number	Selection name
0	False
1	True

P 5.18.2.1.4 Touch Probe 2 Active Output

Description: Select a digital output to signal that monitoring of touch probe 2 is active.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 805
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.18.2.1.5 Touch Probe 2 Recorded Position

Description: Shows the recorded actual position at the latest touch probe 2 event.

Default Value: NA	**Parameter Type:** Range (-16777216 — 16777216)	**Parameter Number:** 894
Unit: -	**Data Type:** DINT	**Access Type:** Read Only

P 5.18.2.1.6 Touch Probe 2 Recorded Position Output

Description: Select an analog output to represent the recorded actual position of the latest touch probe 2 event. The signal is scaled between Min. Position Limit and Max. Position Limit.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 806
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.18.2.1.7 Touch Probe 2 Counter

Description: Shows the number of detected touch probe 2 events since the counter was reset.

Default Value: NA	**Parameter Type:** Range (0 — 65535)	**Parameter Number:** 895
Unit: -	**Data Type:** UINT	**Access Type:** Read Only

P 5.18.2.1.8 Touch Probe 2 Counter Output
Description: Select an analog output to represent the number of detected touch probe 2 events. The signal is scaled between 0 and 65535.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 807
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

6.6.17.2.2 Configuration (Menu Index 5.18.2.2)

P 5.18.2.2.1 Touch Probe 2 Input
Description: Select a digital input for connection of the touch probe 2 sensor.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 883
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.18.2.2.2 Touch Probe 2 Enable Input
Description: Select a digital input for activating touch probe 2 monitoring.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 884
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.18.2.2.3 Touch Probe 2 Edge
Description: Select the signal edge to trigger touch probe 2.

Default Value: 0 [Rising]	**Parameter Type:** Selection	**Parameter Number:** 889
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Rising
1	Falling
2	Both

P 5.18.2.2.4 Touch Probe 2 Reset Counter
Description: Enable reset of touch probe 2 counter. Reset of the counter is also possible while the touch probe is active.

Default Value: 0 [Disabled]	**Parameter Type:** Selection	**Parameter Number:** 890
Unit: -	**Data Type:** BOOL	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Disabled
1	Enabled

P 5.18.2.2.5 Touch Probe 2 Mode
Description: Select if touch probe 2 monitoring automatically ends after a single event was detected or if a continuous monitoring shall be done.

Default Value: 0 [Single Shot]	**Parameter Type:** Selection	**Parameter Number:** 891
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Single Shot
1	Continuous

P 5.18.2.2.6 Touch Probe 2 Enable Position Window
Description: Enable a position window defined by touch probe 2 first and last position for acceptance of events.

Default Value: 0 [Disabled]	**Parameter Type:** Selection	**Parameter Number:** 885
Unit: -	**Data Type:** BOOL	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Disabled
1	Enabled

P 5.18.2.2.7 Touch Probe 2 First Position
Description: Set the absolute start position of the window for touch probe 2 monitoring.

Default Value: 0	**Parameter Type:** Range (-2147483648 — 2147483647)	**Parameter Number:** 886
Unit: PositionUnit	**Data Type:** DINT	**Access Type:** Read/Write

P 5.18.2.2.8 Touch Probe 2 Last Position
Description: Set the absolute end position of the window for touch probe 2 monitoring.

Default Value: 0	**Parameter Type:** Range (-2147483648 — 2147483647)	**Parameter Number:** 887
Unit: PositionUnit	**Data Type:** DINT	**Access Type:** Read/Write

P 5.18.2.2.9 Touch Probe 2 Time Limit
Description: Set a timeout for detecting a touch probe 2 event. A fault will be raised if time runs out before a touch probe 2 event is detected. 0 disables the time limit monitoring.

Default Value: 0	**Parameter Type:** Range (0 — 16777216)	**Parameter Number:** 888
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

6.6.17.3 Distance Measurement (Menu Index 5.18.3)

6.6.17.3.1 Distance Measurement Status (Menu Index 5.18.3.1)

P 5.18.3.1.1 Touch Probe Distance
Description: Shows the distance between the events at source B and source A. The value is updated at the event of source B.

Default Value: NA	**Parameter Type:** Range (-2147483648 — 2147483647)	**Parameter Number:** 896
Unit: PositionUnit	**Data Type:** DINT	**Access Type:** Read Only

P 5.15.3.1.2 Touch Probe Distance Output
Description: Select an analog output to represent the distance between the events at source B and source A. The signal is scaled between Min. Position Limit and Max. Position Limit.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 808
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.15.3.1.3 Distance Measurement Counter
Description: Shows a continuous counter which is incremented with each occurrence of a distance calculation. The counter will start from 0 and wraps around when exeeding 65535. The counter is reset to 0 when a source selection is set to Disabled.

Default Value: NA	**Parameter Type:** Range (0 — 65535)	**Parameter Number:** 897
Unit: -	**Data Type:** UINT	**Access Type:** Read Only

P 5.15.3.1.4 Distance Measurement Counter Output
Description: Select an analog output to represent the value of the result counter. The signal is scaled between 0 and 65535.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 809
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

6.6.17.3.2 Configuration (Menu Index 5.18.3.2)

P 5.18.3.2.1 Selection Source A
Description: Select a digital input for source A for distance measurement.

Default Value: 0 [Off]	**Parameter Type:** Selection	**Parameter Number:** 898
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Off
1	Touch Probe 1
2	Touch Probe 2

P 5.18.3.2.2 Selection Source B
Description: Select a digital input for source B for distance measurement.

Default Value: 0 [Off]	**Parameter Type:** Selection	**Parameter Number:** 899
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Off
1	Touch Probe 1
2	Touch Probe 2

6.6.18 Superimposed (Menu Index 5.19)

6.6.18.1 Superimposed Status (Menu Index 5.19.1)

P 5.19.1.1 Superimposed Status
Description: Shows the status of the superimposed movements.

Default Value: NA	**Parameter Type:** Selection	**Parameter Number:** 833
Unit: -	**Data Type:** UINT	**Access Type:** Read Only

The following are the selections for the parameter.

Selection number	Selection name
0	Idle
1	Active
2	Done
3	Error
4	Aborted

P 5.19.1.2 Superimposed Active Output
Description: Select a digital output to signal that a superimposed movement is on going.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 828
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.19.1.3 Superimposed Target Reached Output
Description: Select a digital output to signal that the superimposed movement is completed.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 829
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.19.1.4 Superimposed Error Output
Description: Select a digital output to signal that the superimposed movement is incomplete due to an error.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 830
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.19.1.5 Superimposed Aborted Output
Description: Select a digital output to signal that the superimposed movement was aborted.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 831
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.19.1.6 Superimposed Actual Distance
Description: Shows the actual covered distance of an active superimposed movement. The value is reset a every start of a superimposed movement.

Default Value: NA	**Parameter Type:** Range (-2147483648 — 2147483647)	**Parameter Number:** 9013
Unit: PositionUnit	**Data Type:** DINT	**Access Type:** Read Only

P 5.19.1.7 Superimposed Actual Distance Output
Description: Select an analog output to represent the actual covered distance of an active superimposed movement. The signal is scaled between Min. Position Limit and Max. Position Limit.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 9014
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.19.1.8 Superimposed Speed Difference
Description: Shows the set speed reference for the superimposed movement in position units per second.

Default Value: NA	**Parameter Type:** Range (0 — 16777216)	**Parameter Number:** 832
Unit: -	**Data Type:** REAL	**Access Type:** Read Only

P 5.19.1.9 Superimposed Acceleration
Description: Shows the set acceleration for the superimposed movement in position units per second^2.

Default Value: NA	**Parameter Type:** Range (0 — 16777216)	**Parameter Number:** 820
Unit: -	**Data Type:** REAL	**Access Type:** Read Only

P 5.19.1.10 Superimposed Deceleration
Description: Shows the set deceleration for the superimposed movement in position units per second^2.

Default Value: NA	**Parameter Type:** Range (0 — 16777216)	**Parameter Number:** 821
Unit: -	**Data Type:** REAL	**Access Type:** Read Only

P 5.19.1.11 Superimposed Jerk
Description: Shows the maximum jerk in position units per second^3 for the superimposed movement when using s-ramps. Shows 0 when selecting linear ramps.

Default Value: NA	**Parameter Type:** Range (0 — 16777216)	**Parameter Number:** 822
Unit: -	**Data Type:** REAL	**Access Type:** Read Only

6.6.18.2 Configuration (Menu Index 5.19.2)

P 5.19.2.1 Superimposed Start Input
Description: Select a digital input for starting the configured superimposed movement.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 827
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.19.2.2 Superimposed Mode
Description: Select the starting point for the superimposed distance.

Default Value: 1 [Additive to Covered Distance]	**Parameter Type:** Selection	**Parameter Number:** 825
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Additive to Previous Target
1	Additive to Covered Distance
2	Absolute

P 5.19.2.3 Superimposed Abort
Description: Abort the currently ongoing superimposed motion.

Default Value: NA	**Parameter Type:** Selection	**Parameter Number:** 826
Unit: -	**Data Type:** BOOL	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Disabled
1	Enabled

P 5.19.2.4 Superimposed Speed Difference
Description: Set the speed reference for the superimposed motion which will be added to the acutal speed of the underlying motion.

Default Value: 10	**Parameter Type:** Range (0.000000001 — 16777216)	**Parameter Number:** 823
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

P 5.19.2.5 Superimposed Distance
Description: Set the distance for the superimposed movement in position units.

Default Value: 50	**Parameter Type:** Range (-16777216 — 16777216)	**Parameter Number:** 824
Unit: PositionUnit	**Data Type:** DINT	**Access Type:** Read/Write

P 5.19.2.6 Superimposed Ramp Selection
Description: Select the set of ramp type and ramp times for the superimposed movement.

Default Value: 0 [Ramp 1]	**Parameter Type:** Selection	**Parameter Number:** 796
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
4	Bit Selection
0	Ramp 1
1	Ramp 2
2	Ramp 3
3	Ramp 4
5	Variable Ramp.

6.6.19 Additional Status Outputs (Menu Index 5.26)

6.6.19.1 General Digital Outputs (Menu Index 5.26.1)

P 5.26.1.1 Ready Output
Description: Select an output to indicate that the unit is in ready mode.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 205
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.26.1.2 Run Output
Description: Select an output to indicate that the unit is in run mode.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 206
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.26.1.3 On Reference Output
Description: Select an output to indicate that the unit is on reference.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 207
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.26.1.4 Fault Event Output
Description: Select an output to indicate that a fault has occurred.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 208
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.26.1.5 Warning Event Output
Description: Select an output to indicate that a warning has occurred.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 209
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.26.1.26 Motor Disconnected Output
Description: Select an output to indicate that the motor is disconnected. Motor check must be enabled in disconnected motor response.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 216
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

6.6.20 Fieldbus Process Data (Menu Index 5.27)

6.6.20.1 Fieldbus Process Data (Menu Index 5.27.1)

P 5.27.1.42 Fieldbus Control Word
Description: Shows the profile specific fieldbus control word.

Default Value: NA	**Parameter Type:** Range (* — *)	**Parameter Number:** 1335
Unit: -	**Data Type:** WORD	**Access Type:** Read/Write

The fieldbus control word is either the PROFIdrive control word described in 2.4 PROFIdrive – Standard Telegram 1 or the iC Speed control word described in 2.5 iC Speed Profile. The fieldbus profile is selected with *parameter 10.3.1.2 Fieldbus Profile*.

P 5.27.1.43 Fieldbus Speed Reference 1
Description: Shows the fieldbus speed reference.

Default Value: NA	**Parameter Type:** Range (-32768 — 32767)	**Parameter Number:** 1339
Unit: -	**Data Type:** INT	**Access Type:** Read/Write

P 5.27.1.44 Fieldbus Torque Reference
Description: Shows the fieldbus torque reference.

Default Value: NA	**Parameter Type:** Range (-32768 — 32767)	**Parameter Number:** 1343
Unit: -	**Data Type:** INT	**Access Type:** Read/Write

P 5.27.1.45 Fieldbus Position Reference Process Data Value
Description: Fieldbus Position Reference Process Data Value.

Default Value: NA	**Parameter Type:** Range (-2147483648 — 2147483647)	**Parameter Number:** 1352
Unit: -	**Data Type:** DINT	**Access Type:** Read/Write

P 5.27.1.50 Fieldbus Status Word
Description: Shows the profile specific fieldbus status word.

Default Value: NA	**Parameter Type:** Range (0 — 65535)	**Parameter Number:** 1307
Unit: -	**Data Type:** WORD	**Access Type:** Read Only

The fieldbus status word is either the PROFIdrive status word described in 2.4 PROFIdrive – Standard Telegram 1 or the iC Speed status word described in 2.5 iC Speed Profile. The fieldbus profile is selected with *parameter 10.3.1.2 Fieldbus Profile*.

P 5.27.1.51 Fieldbus Speed Main Actual Value
Description: Shows the actual motor speed.

Default Value: NA	**Parameter Type:** Range (-32768 — 32767)	**Parameter Number:** 1308
Unit: -	**Data Type:** INT	**Access Type:** Read Only

P 5.27.1.54 Fieldbus Speed Reference
Description: Shows the fieldbus speed reference.

Default Value: NA	**Parameter Type:** Range (-1000 — 1000)	**Parameter Number:** 1345
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.27.1.73 Fieldbus Torque Main Actual Value
Description: Shows the torque applied by the motor.

Default Value: NA	**Parameter Type:** Range (-32768 — 32767)	**Parameter Number:** 1346
Unit: -	**Data Type:** INT	**Access Type:** Read Only

Depending on whether metric or imperial units are in use, you can give the value for the parameter in either newton meters (Nm) or pound-feet (lb ft). The value range is different with the different units.

P 5.27.1.89 Fieldbus Control Word 2
Description: Shows the fieldbus control word 2.

Default Value: NA	**Parameter Type:** Range (* — *)	**Parameter Number:** 1347
Unit: -	**Data Type:** WORD	**Access Type:** Read/Write

The fieldbus control and status words are freely configurable, and specific features can be assigned to the bits.

P 5.27.1.90 Fieldbus Status Word 2
Description: Shows the profile specific fieldbus status word 2.

Default Value: NA	**Parameter Type:** Range (0 — 65535)	**Parameter Number:** 1344
Unit: -	**Data Type:** WORD	**Access Type:** Read Only

The fieldbus control and status words are freely configurable, and specific features can be assigned to the bits.

P 5.27.1.100 Fieldbus Process Reference
Description: Shows the fieldbus process reference used in the process controller.

Default Value: 0	**Parameter Type:** Range (-32768 — 32767)	**Parameter Number:** 6046
Unit: -	**Data Type:** INT	**Access Type:** Read/Write

6.7 Maintenance & Service (Menu Index 6)

6.7.1 Status (Menu Index 6.1)

6.7.1.1 Grid Status (Menu Index 1.1)

P 1.1.1 Grid Frequency
Description: Shows the actual grid frequency.

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

P 1.1.2 Line-To-Line Voltage (RMS)
Description: Shows the average line-to-line voltage (RMS).

Default Value: NA	**Parameter Type:** Range (0 — *)	**Parameter Number:** 9040
Unit: V	**Data Type:** REAL	**Access Type:** Read Only

P 1.1.3 L1-L2 Line Voltage (RMS)
Description: Shows the L1-L2 line voltage (RMS).

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

P 1.1.4 L2-L3 Line Voltage (RMS)
Description: Shows the L2-L3 line voltage (RMS).

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

P 1.1.5 L3-L1 Line Voltage (RMS)
Description: Shows the L3-L1 line voltage (RMS).

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

P 1.1.6 Grid Voltage Imbalance
Description: Shows the grid voltage imbalance in %. A value greater than 3% may indicate grid problems.

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

P 1.1.7 Total Harmonic Distortion (THDv)
Description: Shows the total harmonic distortion of the grid voltage (THDv) in %.

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

P 1.1.12 Grid Active Power
Description: Shows the active power at the point of grid connection.

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

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

P 2.1.1 Unit Nominal Voltage
Description: Shows the nominal voltage setting as a result of the setting of parameter "2.2.1.1 Unit Voltage Class".

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

P 2.1.2 Unit Nominal Current
Description: Shows the nominal current of the unit.

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

P 2.1.3 DC-link Voltage
Description: Shows the actual DC-link voltage.

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

P 2.1.7 DC-link Power
Description: Shows the actual DC-link power.

Default Value: NA	**Parameter Type:** Range (* — *)	**Parameter Number:** 5117
Unit: kW	**Data Type:** REAL	**Access Type:** Read Only

P 2.1.10 U-phase RMS Current
Description: Shows the U-phase RMS current.

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

P 2.1.11 V-phase RMS Current
Description: Shows the V-phase RMS current.

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

P 2.1.12 W-phase RMS Current
Description: Shows the W-phase RMS current.

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

P 2.1.14 Actual Relative Output Current Limit
Description: Shows the actual output current limit relative to the nominal motor current.

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

P 2.1.15 Heat Sink Temperature
Description: Shows the temperature of the power unit heat sink.

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

Depending on whether metric or imperial units are in use, you can give the value for the parameter in either Celsius (C) or Fahrenheit (F). The value range is different with the different units.

P 2.1.16 Main Fan Speed
Description: Shows the speed of the main cooling fan.

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

P 2.1.17 Internal Fan Speed
Description: Shows the speed of the internal cooling fan.

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

P 2.1.19 Heat Sink Temperature Output
Description: Select the output indicating if the heat sink temperature is within range.

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

P 2.1.20 Drive DC-link Voltage Output
Description: Select the output indicating if the DC-link voltage is within range.

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

6.7.1.3 Filters & Brake Chopper Status (Menu Index 3.1)

P 3.1.1 Brake Power

Description: Shows the power dissipated in the brake resistor.

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

P 3.1.2 Average Brake Power

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

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

P 3.1.3 AHF Capacitor Connected

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

Default Value: NA	**Parameter Type:** Range (0 — 1)	**Parameter Number:** 5410
Unit: -	**Data Type:** BOOL	**Access Type:** Read Only

6.7.1.4 Motor Status (Menu Index 4.1)

P 4.1.1 Motor Current

Description: Shows the actual motor current.

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

P 4.1.2 Relative Motor Current

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

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

P 4.1.3 U-phase RMS Current

Description: Shows the U-phase RMS current.

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

P 4.1.4 V-phase RMS Current

Description: Shows the V-phase RMS current.

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

P 4.1.5 W-phase RMS Current

Description: Shows the W-phase RMS current.

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

P 4.1.6 Motor Voltage
Description: Shows the actual motor voltage.

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

P 4.1.7 Relative Motor Voltage
Description: Shows the actual motor voltage in % of the nominal motor voltage.

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

P 4.1.11 Motor Torque
Description: Shows the actual motor torque.

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

Depending on whether metric or imperial units are in use, you can give the value for the parameter in either newton meters (Nm) or pound-feet (lb ft). The value range is different with the different units.

P 4.1.12 Relative Motor Torque
Description: Shows the motor torque in % of the nominal motor torque.

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

P 4.1.13 Motor Shaft Power
Description: Shows the actual power at the motor shaft.

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

Depending on whether metric or imperial units are in use, you can give the value for the parameter in either kilowatt (kW) or horsepower (HP). The value range is different with the different units.

P 4.1.14 Relative Motor Shaft Power
Description: Shows the actual motor shaft power in % of the nominal motor shaft power.

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

P 4.1.15 Motor Electrical Power
Description: Shows the actual motor power.

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

P 4.1.16 Motor Thermal Load (ETR)
Description: Shows the estimated thermal load of the motor calculated by the ETR function.

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

P 4.1.17 Motor Current Output
Description: Select an output for the motor current signal. The scale of the signal is 0–100% of the nominal current.

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

P 4.1.18 Motor Voltage Output
Description: Select an output for the motor voltage signal. The scale of the signal is 0–100% of the nominal voltage.

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

P 4.1.19 Absolute Motor Torque Output
Description: Select an output for the motor torque signal. The scale of the signal is 0–100% of the absolute value of the nominal torque.

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

P 4.1.20 Extended Motor Torque Output
Description: Select an output for the motor torque signal. The scale of the signal is -200...200% of the nominal torque.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 2310
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 4.1.21 Absolute Motor Speed Output
Description: Select an output for the motor speed signal. The scale of the signal is 0–100% of the absolute value of the nominal speed.

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

P 4.1.22 Extended Motor Speed Output
Description: Select an output for the motor speed signal. The scale of the signal is -200...200% of the nominal speed.

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

P 4.1.23 Motor Power Output
Description: Select an output for the motor power signal. The scale of the signal is 0–100% of the nominal power.

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

P 4.1.24 AMA Progress
Description: Shows the progress of the Automatic Motor Adaptation (AMA).

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

6.7.1.5 Application Status (Menu Index 5.1)

P 5.1.1 Motor Ctrl. Status Word
Description: Shows the motor control status word.

Default Value: NA	**Parameter Type:** Range (0 — 65535)	**Parameter Number:** 1714
Unit: -	**Data Type:** WORD	**Access Type:** Read Only

The following are the bit descriptions.

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

P 5.1.2 Motor Ctrl. Ready Status Word

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

Default Value: NA	**Parameter Type:** Range (0 — 65535)	**Parameter Number:** 1716
Unit: -	**Data Type:** WORD	**Access Type:** Read Only

The *5302 Start Blocked* event is shown if this word is not ready.

The following are the bit descriptions.

Bit	Description
0	Run Enable high.
1	No fault active.
2	DC-link precharging done.
3	DC Voltage within limits.
4	Power manager initialized.
5	Brake test not running.
6	System software is not blocking start.
7	Grid voltage within limits.
8	Temperature within limits.
9	Valid motor data.
10	Valid control configuration.

P 5.1.3 Motor Regulator Status Word

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

Default Value: NA	**Parameter Type:** Range (0 — 65535)	**Parameter Number:** 1715
Unit: -	**Data Type:** WORD	**Access Type:** Read Only

The following are the bit descriptions.

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

P 5.1.5 Fault Status Word 1

Description: Shows the fault status word 1.

Default Value: -	**Parameter Type:**	**Parameter Number:** 6203
Unit:	**Data Type:** DWORD	**Access Type:** -

The following are the bit descriptions.

Bit	Description	Event number
0	Overcurrent	4384, 4373, 5170, 4368, 4369, 4375, 4377, 4380, 4097
1	Overvoltage	4164, 4162, 4144 4145
2	Undervoltage	4165, 4146
3	Unit temperature high	4117, 4118, 4119
4	Unit temperature low	4116
5	Control board overtemperature	4121, 4122, 4123, 4120
6	Input phase	4160, 4163
7	Output phase	4175, 4176
8	Ground fault	4379, 4352, 4353, 4354, 4355
9	Fan failure	4128, 4129, 4133, 4130
10	Fieldbus communication	5162, 4256, 4257, 4258, 4260, 4261, 4263, 4265, 4266 ,4267, 4268, 4269, 4280, 4281, 4270, 4271, 4272, 4273, 4282, 4274, 4275, 4276, 4277, 4283, 4278, 4279
11	HMI connection	5141, 5142
12	Feedback connection	4418
13	Thermistor input	5157
14	Auxiliary device (temperature)	4200, 4201, 4203, 4202
15	External temperature measurement	5132, 5133, 5134, 5135, 5136, 5137, 5158

P 5.1.8 Warning Status Word 1

Description: Shows the warning status word 1.

Default Value: -	**Parameter Type:**	**Parameter Number:** 6205
Unit:	**Data Type:** DWORD	**Access Type:** -

The following are the bit descriptions.

Bit	Description	Event number
0	Overcurrent	4384, 4373, 5170, 4368, 4369, 4375, 4377, 4380, 4097
1	Overvoltage	4164, 4162, 4144 4145
2	Undervoltage	4165, 4146
3	Unit temperature high	4117, 4118, 4119
4	Unit temperature low	4116
5	Control board overtemperature	4121, 4122, 4123, 4120
6	Input phase	4160, 4163
7	Output phase	4175, 4176
8	Ground fault	4379, 4352, 4353, 4354, 4355
9	Fan failure	4128, 4129, 4133, 4130
10	Fieldbus communication	5162, 4256, 4257, 4258, 4260, 4261, 4263, 4265, 4266 ,4267, 4268, 4269, 4280, 4281, 4270, 4271, 4272, 4273, 4282, 4274, 4275, 4276, 4277, 4283, 4278, 4279
11	HMI connection	5141, 5142
12	Feedback connection	4418
13	Thermistor input	5157
14	Auxiliary device (temperature)	4200, 4201, 4203, 4202
15	External temperature measurement	5132, 5133, 5134, 5135, 5136, 5137, 5158

P 5.1.13 Application Status Word

Description: Shows the application-specific status word.

Default Value: NA	**Parameter Type:** Range (0 — 65535)	**Parameter Number:** 1608
Unit: -	**Data Type:** WORD	**Access Type:** Read Only

Following are the bits and description.

Bit	Bit = False	Bit = True
0	Reserved	Reserved
1	Inching not Active	Inching Active
2	Process Control not Active	Process Control Active
3	Reserved	Reserved
4	Reserved	Reserved
5	Reserved	Reserved

Bit	Bit = False	Bit = True
6	Reserved	Reserved
7	Reserved	Reserved
8	Reserved	Reserved
9	Reserved	Reserved
10	Reserved	Reserved
11	Reserved	Reserved
12	Reserved	Reserved
13	Normal Reference	Freeze Reference
14	Normal Reference	Reverse Reference
15	Speed Within Limits	Speed Limit Active

P 5.1.22 Motion Error Function Block Instance

Description:

Default Value: NA	**Parameter Type:** Range (0 — 4294967295)	**Parameter Number:** 1170
Unit: -	**Data Type:** UDINT	**Access Type:** Read Only

P 5.1.23 Motion Error Information

Description: Shows the specific error information which was raised by a function block.

Default Value: NA	**Parameter Type:** Selection	**Parameter Number:** 1171
Unit: -	**Data Type:** UINT	**Access Type:** Read Only

The following are the selections for the parameter.

Selection number	Selection name
0	No motion error
1	No communication
2	Fault active; Please reset
3	Timeout Op mode change
4	Internal error
5	Command rejected
6	Drive not started
7	In stopping state
8	In homing state
9	Unknown drive state
10	Executing non-abortable command
11	Parameter out of range
12	Local Control Active

Selection number	Selection name
13	Invalid enumeration value
14	Internal homing error
15	Home mode not allowed in stopped
16	Invalid Home Mode
17	Homing error, ending in standstill
18	Homing error, not in standstill
19	Drive is not homed
20	Executing continuous motion
21	Executing discrete motion
22	Executing synchronized motion
23	Invalid Superimposed Mode
24	Superimposed error
25	Touchprobe timeout
26	Not at zero speed
256	Too many buffered commands
512	Continuous update not applicable for buffered command

6.7.1.6 Measured Temp. Protection Status (Menu Index 5.2.3.1)

P 5.2.3.1.1 Protection 1 Temp.

Description: Shows the temperature measured for the temperature protection.

Default Value: NA	**Parameter Type:** Range (-300 — 300)	**Parameter Number:** 5200
Unit: °C	**Data Type:** REAL	**Access Type:** Read Only

Depending on whether metric or imperial units are in use, you can give the value for the parameter in either Celsius (C) or Fahrenheit (F). The value range is different with the different units.

P 5.2.3.1.2 Protection 2 Temp.

Description: Shows the temperature measured for the temperature protection.

Default Value: NA	**Parameter Type:** Range (-300 — 300)	**Parameter Number:** 5201
Unit: °C	**Data Type:** REAL	**Access Type:** Read Only

Depending on whether metric or imperial units are in use, you can give the value for the parameter in either Celsius (C) or Fahrenheit (F). The value range is different with the different units.

P 5.2.3.1.3 Protection 3 Temp.

Description: Shows the temperature measured for the temperature protection.

Default Value: NA	**Parameter Type:** Range (-300 — 300)	**Parameter Number:** 5202
Unit: °C	**Data Type:** REAL	**Access Type:** Read Only

Depending on whether metric or imperial units are in use, you can give the value for the parameter in either Celsius (C) or Fahrenheit (F). The value range is different with the different units.

P 5.2.3.1.4 Protection 4 Temp.

Description: Shows the temperature measured for the temperature protection.

Default Value: NA	**Parameter Type:** Range (-300 — 300)	**Parameter Number:** 5203
Unit: °C	**Data Type:** REAL	**Access Type:** Read Only

Depending on whether metric or imperial units are in use, you can give the value for the parameter in either Celsius (C) or Fahrenheit (F). The value range is different with the different units.

P 5.2.3.1.5 Protection 5 Temp.
Description: Shows the temperature measured for the temperature protection.

Default Value: NA	**Parameter Type:** Range (-300 — 300)	**Parameter Number:** 5204
Unit: °C	**Data Type:** REAL	**Access Type:** Read Only

Depending on whether metric or imperial units are in use, you can give the value for the parameter in either Celsius (C) or Fahrenheit (F). The value range is different with the different units.

P 5.2.3.1.6 Protection 6 Temp.
Description: Shows the temperature measured for the temperature protection.

Default Value: NA	**Parameter Type:** Range (-300 — 300)	**Parameter Number:** 5205
Unit: °C	**Data Type:** REAL	**Access Type:** Read Only

Depending on whether metric or imperial units are in use, you can give the value for the parameter in either Celsius (C) or Fahrenheit (F). The value range is different with the different units.

6.7.1.7 Load Status (Menu Index 5.3.1)

P 5.3.1.1 Inertia Estimation Status
Description: Shows the status of the inertia estimation routine. 0 = Inactive, 1 = In progress, 2 = Completed successfully, 3 = Completed unsuccessfully.

Default Value: NA	**Parameter Type:** Selection	**Parameter Number:** 666
Unit: -	**Data Type:** UINT	**Access Type:** Read Only

The following are the selections for the parameter.

Selection number	Selection name
0	Inactive
1	In progress
2	Completed successfully
3	Completed unsuccessfully

6.7.1.8 Control Places Status (Menu Index 5.5.1)

P 5.5.1.1 Active Control Place
Description: Shows the control place that controls the drive.

Default Value: NA	**Parameter Type:** Selection	**Parameter Number:** 113
Unit: -	**Data Type:** UINT	**Access Type:** Read Only

The following are the selections for the parameter.

Selection number	Selection name
0	PC control
1	Local control

Selection number	Selection name
2	Fieldbus control
3	I/O control
4	Advanced control

P 5.5.1.2 Local Control Active Output
Description: Select an output terminal indicating that the drive is in local control.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 5178
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.5.1.3 Fieldbus Control Active Output
Description: Select an output terminal indicating that the drive is in fieldbus control.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 5197
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.5.1.4 I/O Control Active Output
Description: Select an output terminal indicating that the drive is in I/O control.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 5177
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.5.1.5 Advanced Control Active Output
Description: Select an output terminal indicating that the drive is in advanced control.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 4727
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

6.7.1.9 Speed Control Status (Menu Index 5.8.1)

P 5.8.1.1 Motor Shaft Speed
Description: Shows the shaft speed in RPM.

Default Value: NA	**Parameter Type:** Range (-100000 — 100000)	**Parameter Number:** 9010
Unit: rpm	**Data Type:** REAL	**Access Type:** Read Only

P 5.8.1.2 Motor Speed
Description: Shows the actual motor speed.

Default Value: NA	**Parameter Type:** Range (* — *)	**Parameter Number:** 9011
Unit: Hz	**Data Type:** REAL	**Access Type:** Read Only

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.8.1.3 Output Frequency
Description: Shows the output frequency.

Default Value: NA	**Parameter Type:** Range (* — *)	**Parameter Number:** 9015
Unit: Hz	**Data Type:** REAL	**Access Type:** Read Only

P 5.8.1.4 Feedback Speed
Description: Shows the feedback speed.

Default Value: NA	**Parameter Type:** Range (-10000 — 10000)	**Parameter Number:** 9007
Unit: rpm	**Data Type:** REAL	**Access Type:** Read Only

P 5.8.1.5 Feedback Electrical Angle

Description: Shows the feedback device angle in the electrical domain. Its value is needed for manually tuning the feedback angle offset.

Default Value: NA	**Parameter Type:** Range (0 — 360)	**Parameter Number:** 9016
Unit: °	**Data Type:** REAL	**Access Type:** Read Only

P 5.8.1.6 Speed Error

Description: Shows the difference between speed reference after ramp and motor speed.

Default Value: NA	**Parameter Type:** Range (* — *)	**Parameter Number:** 4023
Unit: Hz	**Data Type:** REAL	**Access Type:** Read Only

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.8.1.7 Speed Reference

Description: Shows the speed reference.

Default Value: NA	**Parameter Type:** Range (-2000 — 2000)	**Parameter Number:** 1718
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.8.1.8 Speed Reference Before Ramp

Description: Shows the value of speed reference before the ramp generator.

Default Value: NA	**Parameter Type:** Range (-2000 — 2000)	**Parameter Number:** 6049
Unit: Hz	**Data Type:** REAL	**Access Type:** Read Only

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.8.1.9 Speed Reference After Ramp

Description: Shows the value of the speed reference after the ramp generator.

Default Value: NA	**Parameter Type:** Range (* — *)	**Parameter Number:** 6150
Unit: Hz	**Data Type:** REAL	**Access Type:** Read Only

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.8.1.10 Final Speed Reference

Description: Shows the value of the speed reference before feeding it to the speed controller.

Default Value: NA	**Parameter Type:** Range (* — *)	**Parameter Number:** 6151
Unit: Hz	**Data Type:** REAL	**Access Type:** Read Only

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.8.1.11 Control Panel Speed Reference

Description: Shows the value of the speed reference given from the control panel.

Default Value: NA	**Parameter Type:** Range (* — *)	**Parameter Number:** 6153
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.8.1.12 Absolute Output Frequency Output

Description: Select an output terminal for the output frequency scaled between 0 Hz and positive speed limits in Hz.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 2300
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.8.1.13 Absolute Speed Reference Output
Description: Select an output terminal for the absolute speed reference, scaled between 0 and positive speed limit.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 2304
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.8.1.14 Output Frequency Output
Description: Select an output terminal for the output frequency scaled between minimum speed limit and positive speed limits in Hz.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 2308
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.8.1.16 Load Drooping Speed
Description: Shows the load drooping speed.

Default Value: NA	**Parameter Type:** Range (0 — 2000)	**Parameter Number:** 674
Unit: Hz	**Data Type:** REAL	**Access Type:** Read Only

Default unit: RPM. The unit can be changed with parameter 4321.

6.7.1.10 Torque Control Status (Menu Index 5.9.1)

P 5.9.1.1 Motor Torque
Description: Shows the actual motor torque.

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

Depending on whether metric or imperial units are in use, you can give the value for the parameter in either newton meters (Nm) or pound-feet (lb ft). The value range is different with the different units.

P 5.9.1.2 Relative Motor Torque
Description: Shows the motor torque in % of the nominal motor torque.

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

P 5.9.1.3 Torque Limit Motoring
Description: Shows the torque limit in motoring mode in % of nominal motor torque.

Default Value: NA	**Parameter Type:** Range (0 — 500)	**Parameter Number:** 1812
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 5.9.1.4 Torque Limit Regenerative
Description: Shows the regenerative torque limit in % of nominal motor torque.

Default Value: NA	**Parameter Type:** Range (0 — 500)	**Parameter Number:** 1813
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 5.9.1.5 Local Torque Reference
Description: Shows the local torque reference set in the control panel.

Default Value: NA	**Parameter Type:** Range (-300 — 300)	**Parameter Number:** 6155
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 5.9.1.6 Torque Reference
Description: Shows the value of the current torque reference in the reference chain in % of nominal motor torque.

Default Value: NA	**Parameter Type:** Range (-300 — 300)	**Parameter Number:** 6152
Unit: %	**Data Type:** REAL	**Access Type:** Read/Write

P 5.9.1.7 Torque Reference Final
Description: Shows the value of the final torque reference given to the motor controller in % of nominal motor torque.

Default Value: NA	**Parameter Type:** Range (-300 — 300)	**Parameter Number:** 6154
Unit: %	**Data Type:** REAL	**Access Type:** Read Only

6.7.1.11 Mechanical Brake Control Status (Menu Index 5.12.1)

P 5.12.1.1 Mechanical Brake Status Word
Description: Shows the mechanical brake status word.

Default Value: NA	**Parameter Type:** Range (0 — 65535)	**Parameter Number:** 3016
Unit: -	**Data Type:** WORD	**Access Type:** Read Only

P 5.12.1.2 Mechanical Brake State
Description: Shows the state of the mechanical brake controller.

Default Value: NA	**Parameter Type:** Range (0 — 32767)	**Parameter Number:** 3017
Unit: -	**Data Type:** INT	**Access Type:** Read Only

6.7.1.12 Position Control Status (Menu Index 5.13.1)

P 5.13.1.1 Reference Position
Description: Shows the reference/target position in position units.

Default Value: NA	**Parameter Type:** Range (-2147483648 — 2147483647)	**Parameter Number:** 736
Unit: PositionUnit	**Data Type:** DINT	**Access Type:** Read Only

P 5.13.1.2 Actual Position
Description: Shows the actual position in position units.

Default Value: NA	**Parameter Type:** Range (-2147483648 — 2147483647)	**Parameter Number:** 729
Unit: PositionUnit	**Data Type:** DINT	**Access Type:** Read Only

P 5.13.1.3 Actual Position Output
Description: Select an analog output to represent the actual position. The signal is scaled between Min. Position Limit and Max. Position Limit.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 735
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.13.1.4 Position Demanded
Description: Shows the demanded position (output of the profile generator).

Default Value: NA	**Parameter Type:** Range (-2147483648 — 2147483647)	**Parameter Number:** 741
Unit: PositionUnit	**Data Type:** DINT	**Access Type:** Read Only

P 5.13.1.6 Actual Position Error
Description: Shows the position error (difference between actual position and demanded position).

Default Value: NA	**Parameter Type:** Range (-2147483648 — 2147483647)	**Parameter Number:** 737
Unit: PositionUnit	**Data Type:** DINT	**Access Type:** Read Only

P 5.13.1.7 Actual Position Error Output
Description: Select an analog output to represent the position error. The signal is scaled between Min. Position Limit and Max. Position Limit.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 738
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.13.1.8 Max. Position Error Exceeded Output
Description: Select a digital output to signal that the maximum allowed position error has been exceeded.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 739
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

P 5.13.1.9 Control Panel Position Reference
Description: Shows the value of the position reference given from the control panel.

Default Value: NA	**Parameter Type:** Range (-2147483648 — 2147483647)	**Parameter Number:** 759
Unit: PositionUnit	**Data Type:** DINT	**Access Type:** Read/Write

P 5.13.1.10 Position Speed
Description: Shows the set positioning speed reference in position units per second.

Default Value: NA	**Parameter Type:** Range (0 — 16777216)	**Parameter Number:** 769
Unit: -	**Data Type:** REAL	**Access Type:** Read/Write

P 5.13.1.11 Position Acceleration
Description: Shows the set positioning acceleration in position units per second^2.

Default Value: NA	**Parameter Type:** Range (0 — 16777216)	**Parameter Number:** 761
Unit: -	**Data Type:** REAL	**Access Type:** Read Only

P 5.13.1.12 Position Deceleration
Description: Shows the set positioning deceleration in position units per second^2.

Default Value: NA	**Parameter Type:** Range (0 — 16777216)	**Parameter Number:** 762
Unit: -	**Data Type:** REAL	**Access Type:** Read Only

P 5.13.1.13 Position Jerk
Description: Shows the maximum positioning jerk for s-ramps in position units per second^3. Shows 0 when selecting linear ramps.

Default Value: NA	**Parameter Type:** Range (0 — 16777216)	**Parameter Number:** 760
Unit: -	**Data Type:** REAL	**Access Type:** Read Only

6.7.1.13 Fieldbus Process Data (Menu Index 5.27.1)

P 5.27.1.42 Fieldbus Control Word
Description: Shows the profile specific fieldbus control word.

Default Value: NA	**Parameter Type:** Range (* — *)	**Parameter Number:** 1335
Unit: -	**Data Type:** WORD	**Access Type:** Read/Write

The fieldbus control word is either the PROFIdrive control word described in 2.4 PROFIdrive – Standard Telegram 1 or the iC Speed control word described in 2.5 iC Speed Profile. The fieldbus profile is selected with *parameter 10.3.1.2 Fieldbus Profile*.

P 5.27.1.43 Fieldbus Speed Reference 1
Description: Shows the fieldbus speed reference.

Default Value: NA	**Parameter Type:** Range (-32768 — 32767)	**Parameter Number:** 1339
Unit: -	**Data Type:** INT	**Access Type:** Read/Write

P 5.27.1.44 Fieldbus Torque Reference
Description: Shows the fieldbus torque reference.

Default Value: NA	**Parameter Type:** Range (-32768 — 32767)	**Parameter Number:** 1343
Unit: -	**Data Type:** INT	**Access Type:** Read/Write

P 5.27.1.45 Fieldbus Position Reference Process Data Value
Description: Fieldbus Position Reference Process Data Value.

Default Value: NA	**Parameter Type:** Range (-2147483648 — 2147483647)	**Parameter Number:** 1352
Unit: -	**Data Type:** DINT	**Access Type:** Read/Write

P 5.27.1.50 Fieldbus Status Word
Description: Shows the profile specific fieldbus status word.

Default Value: NA	**Parameter Type:** Range (0 — 65535)	**Parameter Number:** 1307
Unit: -	**Data Type:** WORD	**Access Type:** Read Only

The fieldbus status word is either the PROFIdrive status word described in 2.4 PROFIdrive – Standard Telegram 1 or the iC Speed status word described in 2.5 iC Speed Profile. The fieldbus profile is selected with *parameter 10.3.1.2 Fieldbus Profile*.

P 5.27.1.51 Fieldbus Speed Main Actual Value
Description: Shows the actual motor speed.

Default Value: NA	**Parameter Type:** Range (-32768 — 32767)	**Parameter Number:** 1308
Unit: -	**Data Type:** INT	**Access Type:** Read Only

P 5.27.1.54 Fieldbus Speed Reference
Description: Shows the fieldbus speed reference.

Default Value: NA	**Parameter Type:** Range (-1000 — 1000)	**Parameter Number:** 1345
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

Default unit: RPM. The unit can be changed with parameter 4321.

P 5.27.1.73 Fieldbus Torque Main Actual Value
Description: Shows the torque applied by the motor.

Default Value: NA	**Parameter Type:** Range (-32768 — 32767)	**Parameter Number:** 1346
Unit: -	**Data Type:** INT	**Access Type:** Read Only

Depending on whether metric or imperial units are in use, you can give the value for the parameter in either newton meters (Nm) or pound-feet (lb ft). The value range is different with the different units.

P 5.27.1.89 Fieldbus Control Word 2
Description: Shows the fieldbus control word 2.

Default Value: NA	**Parameter Type:** Range (* — *)	**Parameter Number:** 1347
Unit: -	**Data Type:** WORD	**Access Type:** Read/Write

The fieldbus control and status words are freely configurable, and specific features can be assigned to the bits.

P 5.27.1.90 Fieldbus Status Word 2
Description: Shows the profile specific fieldbus status word 2.

Default Value: NA	**Parameter Type:** Range (0 — 65535)	**Parameter Number:** 1344
Unit: -	**Data Type:** WORD	**Access Type:** Read Only

The fieldbus control and status words are freely configurable, and specific features can be assigned to the bits.

P 5.27.1.100 Fieldbus Process Reference
Description: Shows the fieldbus process reference used in the process controller.

Default Value: 0	**Parameter Type:** Range (-32768 — 32767)	**Parameter Number:** 6046
Unit: -	**Data Type:** INT	**Access Type:** Read/Write

6.7.1.14 Maintenance & Service (Menu Index 6.1.1)

P 6.1.1.1 Last Fault Number
Description: Shows the number of the most recent active fault.

Default Value: NA	**Parameter Type:** Range (0 — 65535)	**Parameter Number:** 1610
Unit: -	**Data Type:** UINT	**Access Type:** Read Only

P 6.1.1.2 Last Warning Number
Description: Shows the number of the most recent active warning.

Default Value: NA	**Parameter Type:** Range (0 — 65535)	**Parameter Number:** 1609
Unit: -	**Data Type:** UINT	**Access Type:** Read Only

P 6.1.1.3 Control Unit Temperature
Description: Shows the temperature of the control unit.

Default Value: NA	**Parameter Type:** Range (-50 — 200)	**Parameter Number:** 2952
Unit: °C	**Data Type:** REAL	**Access Type:** Read Only

Depending on whether metric or imperial units are in use, you can give the value for the parameter in either Celsius (C) or Fahrenheit (F). The value range is different with the different units.

6.7.2 Software Information (Menu Index 6.2)

P 6.2.1 Application Version
Description: Shows the version of the application software.

Default Value: -	**Parameter Type:**	**Parameter Number:** 151
Unit:	**Data Type:** STRING	**Access Type:** -

6.7.3 Events (Menu Index 6.4)

6.7.3.1 Event Simulation (Menu Index 6.4.3)

P 6.4.3.1 Simulate Event
Description: Select a response to trigger a simulated event.

Default Value: 0 [No Action]	**Parameter Type:** Selection	**Parameter Number:** 1400
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	No Action
1	Response 1
2	Response 2
3	Response 3
4	Response 4
5	Response 5
6	Response 6
7	Response 7
8	Response 8
9	Response 9
10	Response 10

P 6.4.3.2 Simulate Persisting Event

Description: Select a response to trigger a persisting simulated event. Set back to 0 to allow a reset.

Default Value: 0 [No Action]	**Parameter Type:** Selection	**Parameter Number:** 1401
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	No Action
1	Response 1
2	Response 2
3	Response 3
4	Response 4
5	Response 5
6	Response 6
7	Response 7
8	Response 8
9	Response 9
10	Response 10

P 6.4.3.3 Simulate Event Number

Description: Set the number of the event to be simulated.

Default Value: 5260	**Parameter Type:** Range (0 — 65535)	**Parameter Number:** 1402
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

6.7.4 Operational Counters (Menu Index 6.5)

P 6.5.1 Control Unit On Time

Description: Shows the total operating time for the control unit.

Default Value: 0	**Parameter Type:** Range (0 — 4294967295)	**Parameter Number:** 2000
Unit: h	**Data Type:** UDINT	**Access Type:** Read Only

P 6.5.2 Power Unit On Time

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

Default Value: 0	**Parameter Type:** Range (0 — 4294967295)	**Parameter Number:** 2001
Unit: h	**Data Type:** UDINT	**Access Type:** Read Only

P 6.5.3 Energy Consumption

Description: Shows the energy consumed from the grid.

Default Value: 0	**Parameter Type:** Range (0 — 18446744073709600000)	**Parameter Number:** 2002
Unit: kWh	**Data Type:** ULINT	**Access Type:** Read Only

P 6.5.4 Ground Faults

Description: Shows the total number of ground faults.

Default Value: 0	**Parameter Type:** Range (0 — 50000)	**Parameter Number:** 2004
Unit: -	**Data Type:** UINT	**Access Type:** Read Only

P 6.5.5 Overvoltage Faults

Description: Shows the total number of overvoltage faults.

Default Value: 0	**Parameter Type:** Range (0 — 50000)	**Parameter Number:** 2005
Unit: -	**Data Type:** UINT	**Access Type:** Read Only

P 6.5.6 Overcurrent Faults

Description: Shows the total number of overcurrent faults.

Default Value: 0	**Parameter Type:** Range (0 — 50000)	**Parameter Number:** 2006
Unit: -	**Data Type:** UINT	**Access Type:** Read Only

P 6.5.7 Short Circuit Faults

Description: Shows the total number of short-circuit faults.

Default Value: 0	**Parameter Type:** Range (0 — 50000)	**Parameter Number:** 2007
Unit: -	**Data Type:** UINT	**Access Type:** Read Only

6.8 Functional Safety (Menu Index 7)

6.8.1 Status (Menu Index 7.1)

P 7.1.1 Functional Safety Status Word

Description: Shows the functional safety status word.

Default Value: NA	**Parameter Type:** Range (* — *)	**Parameter Number:** 4024
Unit: -	**Data Type:** WORD	**Access Type:** Read Only

6.8.2 STO (Menu Index 7.2)

P 7.2.1 Safe Torque Off Response

Description: Select the response of the drive to the activation of Safe Torque Off.

Default Value: 15 [Warning]	**Parameter Type:** Selection	**Parameter Number:** 9910
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
15	Warning
14	Fault

P 7.2.2 Safe Torque Off Output
Description: Select an output for signaling the activation of Safe Torque Off.

Default Value:	**Parameter Type:** Selection	**Parameter Number:** 9911
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

6.9 Customization (Menu Index 8)

6.9.1 Basic Settings (Menu Index 8.2)

P 8.2.1 Date and Time
Description: Set the actual time and date. Format is YYYY-MM-DD and HH:MM:SS.

Default Value:	**Parameter Type:** Range (* — *)	**Parameter Number:** 2800
Unit: -	**Data Type:** DATE_AND_TIME	**Access Type:** Read/Write

P 8.2.2 Unit Selection
Description: Select the unit system used.

Default Value: SI	**Parameter Type:** Selection	**Parameter Number:** 2801
Unit: -	**Data Type:** USINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	SI (metric units)
1	USCS (United States customary units)

P 8.2.3 Speed Unit
Description: Select the speed unit.

Default Value: 1 [RPM]	**Parameter Type:** Selection	**Parameter Number:** 2813
Unit: -	**Data Type:** USINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Hz
1	RPM

6.9.2 Control Panel (Menu Index 8.3)

6.9.2.1 Readout Screen 1 (Menu Index 8.3.1)

P 8.3.1.1 Readout Field 1.1

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

Default Value: 0 [Automatic]	**Parameter Type:** Selection	**Parameter Number:** 300
Unit: -	**Data Type:** UDINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Automatic
9011	Motor Speed
9000	Motor Current
9010	Motor Shaft Speed
9009	Motor Torque
1708	Relative Motor Torque
9008	Motor Shaft Power
6075	Process Controller Output
6090	Feedback Value
1718	Speed Reference
6092	Setpoint Value
6151	Final Speed Reference
9007	Feedback Speed
729	Actual Position
737	Actual Position Error
741	Position Demanded
736	Reference Position
350	Master Position
881	Touch Probe 1 Recorded Position
882	Touch Probe 1 Counter
894	Touch Probe 2 Recorded Position
895	Touch Probe 2 Counter
896	Touch Probe Distance
897	Distance Measurement Counter
9013	Superimposed Actual Distance

P 8.3.1.2 Readout Field 1.2

Description: Select the parameter for readout field (screen 1 field 2).

Default Value: 0 [None]	**Parameter Type:** Selection	**Parameter Number:** 301
Unit: -	**Data Type:** UDINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	None
9011	Motor Speed
9000	Motor Current
9010	Motor Shaft Speed
9009	Motor Torque
1708	Relative Motor Torque
9005	Motor Voltage
9008	Motor Shaft Power
674	Load Drooping Speed
666	Estimated Inertia
1718	Speed Reference
6151	Final Speed Reference
6153	Control Panel Speed Reference
6155	Local Torque Reference
9007	Feedback Speed
9044	DC-link Voltage
9041	Grid Frequency
9040	Line-To-Line Voltage (RMS)
9048	L1-L2 Line Voltage (RMS)
9049	L2-L3 Line Voltage (RMS)
9050	L3-L1 Line Voltage (RMS)
9047	Grid Voltage Imbalance
729	Actual Position
737	Actual Position Error
741	Position Demanded
736	Reference Position
350	Master Position
881	Touch Probe 1 Recorded Position
882	Touch Probe 1 Counter

Selection number	Selection name
894	Touch Probe 2 Recorded Position
895	Touch Probe 2 Counter
896	Touch Probe Distance
897	Distance Measurement Counter
9013	Superimposed Actual Distance

P 8.3.1.3 Readout Field 1.3

Description: Select the parameter for readout field (screen 1 field 3).

Default Value: 0 [None]	**Parameter Type:** Selection	**Parameter Number:** 302
Unit: -	**Data Type:** UDINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	None
9011	Motor Speed
9000	Motor Current
9010	Motor Shaft Speed
9009	Motor Torque
1708	Relative Motor Torque
9005	Motor Voltage
9008	Motor Shaft Power
674	Load Drooping Speed
666	Estimated Inertia
1718	Speed Reference
6151	Final Speed Reference
6153	Control Panel Speed Reference
6155	Local Torque Reference
9007	Feedback Speed
9044	DC-link Voltage
9041	Grid Frequency
9040	Line-To-Line Voltage (RMS)
9048	L1-L2 Line Voltage (RMS)
9049	L2-L3 Line Voltage (RMS)
9050	L3-L1 Line Voltage (RMS)
9047	Grid Voltage Imbalance

Selection number	Selection name
729	Actual Position
737	Actual Position Error
741	Position Demanded
736	Reference Position
350	Master Position
881	Touch Probe 1 Recorded Position
882	Touch Probe 1 Counter
894	Touch Probe 2 Recorded Position
895	Touch Probe 2 Counter
896	Touch Probe Distance
897	Distance Measurement Counter
9013	Superimposed Actual Distance

P 8.3.1.4 Readout Field 1.4

Description: Select the parameter for readout field (screen 1 field 4).

Default Value: 0 [None]	**Parameter Type:** Selection	**Parameter Number:** 303
Unit: -	**Data Type:** UDINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	None
9011	Motor Speed
9000	Motor Current
9010	Motor Shaft Speed
9009	Motor Torque
1708	Relative Motor Torque
9005	Motor Voltage
9008	Motor Shaft Power
674	Load Drooping Speed
666	Estimated Inertia
1718	Speed Reference
6151	Final Speed Reference
6153	Control Panel Speed Reference
6155	Local Torque Reference
9007	Feedback Speed

Selection number	Selection name
9044	DC-link Voltage
9041	Grid Frequency
9040	Line-To-Line Voltage (RMS)
9048	L1-L2 Line Voltage (RMS)
9049	L2-L3 Line Voltage (RMS)
9050	L3-L1 Line Voltage (RMS)
9047	Grid Voltage Imbalance
729	Actual Position
737	Actual Position Error
741	Position Demanded
736	Reference Position
350	Master Position
881	Touch Probe 1 Recorded Position
882	Touch Probe 1 Counter
894	Touch Probe 2 Recorded Position
895	Touch Probe 2 Counter
896	Touch Probe Distance
897	Distance Measurement Counter
9013	Superimposed Actual Distance

P 8.3.1.5 Readout Field 1.5

Description: Select the parameter for readout field (screen 1 field 5).

Default Value: 0 [None]	**Parameter Type:** Selection	**Parameter Number:** 304
Unit: -	**Data Type:** UDINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	None
9011	Motor Speed
9000	Motor Current
9010	Motor Shaft Speed
9009	Motor Torque
1708	Relative Motor Torque
9005	Motor Voltage
9008	Motor Shaft Power

Selection number	Selection name
674	Load Drooping Speed
666	Estimated Inertia
1718	Speed Reference
6151	Final Speed Reference
6153	Control Panel Speed Reference
6155	Local Torque Reference
9007	Feedback Speed
9044	DC-link Voltage
9041	Grid Frequency
9040	Line-To-Line Voltage (RMS)
9048	L1-L2 Line Voltage (RMS)
9049	L2-L3 Line Voltage (RMS)
9050	L3-L1 Line Voltage (RMS)
9047	Grid Voltage Imbalance
729	Actual Position
737	Actual Position Error
741	Position Demanded
736	Reference Position
350	Master Position
881	Touch Probe 1 Recorded Position
882	Touch Probe 1 Counter
894	Touch Probe 2 Recorded Position
895	Touch Probe 2 Counter
896	Touch Probe Distance
897	Distance Measurement Counter
9013	Superimposed Actual Distance

6.9.2.2 Readout Screen 2 (Menu Index 8.3.2)

P 8.3.2.1 Readout Field 2.1

Description: Select the parameter for readout field (screen 2 field 1).

Default Value: 9010 [Motor Shaft Speed]	**Parameter Type:** Selection	**Parameter Number:** 310
Unit: -	**Data Type:** UDINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	None
9011	Motor Speed
9000	Motor Current
9010	Motor Shaft Speed
9009	Motor Torque
1708	Relative Motor Torque
9005	Motor Voltage
9008	Motor Shaft Power
674	Load Drooping Speed
666	Estimated Inertia
1718	Speed Reference
6151	Final Speed Reference
6153	Control Panel Speed Reference
6155	Local Torque Reference
9007	Feedback Speed
9044	DC-link Voltage
9041	Grid Frequency
9040	Line-To-Line Voltage (RMS)
9048	L1-L2 Line Voltage (RMS)
9049	L2-L3 Line Voltage (RMS)
9050	L3-L1 Line Voltage (RMS)
9047	Grid Voltage Imbalance
729	Actual Position
737	Actual Position Error
741	Position Demanded
736	Reference Position
350	Master Position
881	Touch Probe 1 Recorded Position
882	Touch Probe 1 Counter
894	Touch Probe 2 Recorded Position
895	Touch Probe 2 Counter

Selection number	Selection name
896	Touch Probe Distance
897	Distance Measurement Counter
9013	Superimposed Actual Distance

P 8.3.2.2 Readout Field 2.2
Description: Select the parameter for readout field (screen 2 field 2).

Default Value: 9009 [Motor Torque]	**Parameter Type:** Selection	**Parameter Number:** 311
Unit: -	**Data Type:** UDINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	None
9011	Motor Speed
9000	Motor Current
9010	Motor Shaft Speed
9009	Motor Torque
1708	Relative Motor Torque
9005	Motor Voltage
9008	Motor Shaft Power
674	Load Drooping Speed
666	Estimated Inertia
1718	Speed Reference
6151	Final Speed Reference
6153	Control Panel Speed Reference
6155	Local Torque Reference
9007	Feedback Speed
9044	DC-link Voltage
9041	Grid Frequency
9040	Line-To-Line Voltage (RMS)
9048	L1-L2 Line Voltage (RMS)
9049	L2-L3 Line Voltage (RMS)
9050	L3-L1 Line Voltage (RMS)
9047	Grid Voltage Imbalance
729	Actual Position
737	Actual Position Error

Selection number	Selection name
741	Position Demanded
736	Reference Position
350	Master Position
881	Touch Probe 1 Recorded Position
882	Touch Probe 1 Counter
894	Touch Probe 2 Recorded Position
895	Touch Probe 2 Counter
896	Touch Probe Distance
897	Distance Measurement Counter
9013	Superimposed Actual Distance

P 8.3.2.3 Readout Field 2.3

Description: Select the parameter for readout field (screen 2 field 3).

Default Value: 9008 [Motor Shaft Power]	**Parameter Type:** Selection	**Parameter Number:** 312
Unit: -	**Data Type:** UDINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	None
9011	Motor Speed
9000	Motor Current
9010	Motor Shaft Speed
9009	Motor Torque
1708	Relative Motor Torque
9005	Motor Voltage
9008	Motor Shaft Power
674	Load Drooping Speed
666	Estimated Inertia
1718	Speed Reference
6151	Final Speed Reference
6153	Control Panel Speed Reference
6155	Local Torque Reference
9007	Feedback Speed
9044	DC-link Voltage
9041	Grid Frequency

Selection number	Selection name
9040	Line-To-Line Voltage (RMS)
9048	L1-L2 Line Voltage (RMS)
9049	L2-L3 Line Voltage (RMS)
9050	L3-L1 Line Voltage (RMS)
9047	Grid Voltage Imbalance
729	Actual Position
737	Actual Position Error
741	Position Demanded
736	Reference Position
350	Master Position
881	Touch Probe 1 Recorded Position
882	Touch Probe 1 Counter
894	Touch Probe 2 Recorded Position
895	Touch Probe 2 Counter
896	Touch Probe Distance
897	Distance Measurement Counter
9013	Superimposed Actual Distance

P 8.3.2.4 Readout Field 2.4

Description: Select the parameter for readout field (screen 2 field 4).

Default Value: 0 [None]	**Parameter Type:** Selection	**Parameter Number:** 313
Unit: -	**Data Type:** UDINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	None
9011	Motor Speed
9000	Motor Current
9010	Motor Shaft Speed
9009	Motor Torque
1708	Relative Motor Torque
9005	Motor Voltage
9008	Motor Shaft Power
674	Load Drooping Speed
666	Estimated Inertia

Selection number	Selection name
1718	Speed Reference
6151	Final Speed Reference
6153	Control Panel Speed Reference
6155	Local Torque Reference
9007	Feedback Speed
9044	DC-link Voltage
9041	Grid Frequency
9040	Line-To-Line Voltage (RMS)
9048	L1-L2 Line Voltage (RMS)
9049	L2-L3 Line Voltage (RMS)
9050	L3-L1 Line Voltage (RMS)
9047	Grid Voltage Imbalance
729	Actual Position
737	Actual Position Error
741	Position Demanded
736	Reference Position
350	Master Position
881	Touch Probe 1 Recorded Position
882	Touch Probe 1 Counter
894	Touch Probe 2 Recorded Position
895	Touch Probe 2 Counter
896	Touch Probe Distance
897	Distance Measurement Counter
9013	Superimposed Actual Distance

P 8.3.2.5 Readout Field 2.5

Description: Select the parameter for readout field (screen 2 field 5).

Default Value: 0 [None]	**Parameter Type:** Selection	**Parameter Number:** 314
Unit: -	**Data Type:** UDINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	None
9011	Motor Speed
9000	Motor Current

Selection number	Selection name
9010	Motor Shaft Speed
9009	Motor Torque
1708	Relative Motor Torque
9005	Motor Voltage
9008	Motor Shaft Power
674	Load Drooping Speed
666	Estimated Inertia
1718	Speed Reference
6151	Final Speed Reference
6153	Control Panel Speed Reference
6155	Local Torque Reference
9007	Feedback Speed
9044	DC-link Voltage
9041	Grid Frequency
9040	Line-To-Line Voltage (RMS)
9048	L1-L2 Line Voltage (RMS)
9049	L2-L3 Line Voltage (RMS)
9050	L3-L1 Line Voltage (RMS)
9047	Grid Voltage Imbalance
729	Actual Position
737	Actual Position Error
741	Position Demanded
736	Reference Position
350	Master Position
881	Touch Probe 1 Recorded Position
882	Touch Probe 1 Counter
894	Touch Probe 2 Recorded Position
895	Touch Probe 2 Counter
896	Touch Probe Distance
897	Distance Measurement Counter
9013	Superimposed Actual Distance

6.10 I/O (Menu Index 9)

6.10.1 I/O Overview

Parameter group 9 contains the parameters for the hardware configuration of the I/Os such as terminal modes, filtering of the electrical signals and signal ranges.

This Application Guide contains only the parameter descriptions for the Basic I/O. The parameter information for option boards such as the Encoder/Resolver Option OC7M can be found in the iC7 Functional Extensions Operating Guide.

6.10.2 Basic I/O (Menu Index)

6.10.2.1 I/O Status (Menu Index 9.3)

P 9.3.1 Digital Input Status

Description: Displays the digital I/O word

Default Value: NA	**Parameter Type:** Range (0 - 65535)	**Parameter Number:** 1614
Unit: -	**Data Type:** WORD	**Access Type:** Read Only

The following table lists the meaning of the bits:

Bit	Description
00	DigIn13
01	DigIn14
02	DigIn15
03	DigIn16
04	DigIn17
05	DigIn18
06-15	Not used

P 9.3.2 Digital Output Status

Description: Displays the digital I/O word

Default Value: NA	**Parameter Type:** Range (0 - 65535)	**Parameter Number:** 1615
Unit: -	**Data Type:** WORD	**Access Type:** Read Only

The following table lists the meaning of the bits:

Bit	Description
00-01	Not used
02	DigOut15
03	DigOut16
04-11	Not used
12	Relay02
13	Relay05
14-15	Not used

P 9.3.3 T31 Analog Output Value

Description: Shows the measured analog value of terminal 31

Default Value: NA	**Parameter Type:** Range (0 - 20)	**Parameter Number:** 1613
Unit: -	**Data Type:** REAL	**Access Type:** Read Only

P 9.3.4 T33 Analog Input Value
Description: Shows the measured analog value of terminal 33

Default Value: NA	**Parameter Type:** Range (-20 - 20)	**Parameter Number:** 1611
Unit: -	**Data Type:** REAL	**Access Type:** Read Only

P 9.3.5 T34 Analog Input Value
Description: Shows the measured analog value of terminal 34

Default Value: NA	**Parameter Type:** Range (-20 - 20)	**Parameter Number:** 1612
Unit: -	**Data Type:** REAL	**Access Type:** Read Only

6.10.2.2 Digital Inputs/Outputs (Menu Index 9.4)

These parameters allow the setting of digital inputs and outputs on the Basic I/O board.

6.10.2.2.1 General Settings (Menu Index 9.4.1)

P 9.4.1.1 Digital Input Type
Description: Sets the digital I/O mode for all digital inputs

Default Value: 1 [NPN Mode]	**Parameter Type:** Selection	**Parameter Number:** 2261
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter

Selection number	Selection name
1	NPN Mode
2	PNP Mode

6.10.2.2.2 Input T13 (Menu Index 9.4.2)

P 9.4.2.1 T13 Terminal Mode
Description: Mode selector for terminal 13

Default Value: 0 [Inactive]	**Parameter Type:** Selection	**Parameter Number:** 2015
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter

Selection number	Selection name
0	Inactive
3	Digital Input
4	Pulse Input

P 9.4.2.2 T13 Signal Inversion
Description: Inverts the signal of terminal 13

Default Value: 0 [Non-Inverted]	**Parameter Type:** Selection	**Parameter Number:** 2291
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter

Selection number	Selection name
0	Non-Inverted
1	Inverted

P 9.4.2.3 T13 Fast Debounce Filtering Time
Description: Sets the fast debounce filtering time for terminal 13

Default Value: 0	**Parameter Type:** Range (0 - 0.0000635)	**Parameter Number:** 2285
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 9.4.2.4 T13 Standard Debounce Filtering Time
Description: Sets the standard debounce filtering time for terminal 13

Default Value: 0	**Parameter Type:** Range (0 - 0.127)	**Parameter Number:** 2024
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 9.4.2.5 T13 Reaction Time Mode Selection
Description: Reaction time (debounce filtering) mode selection

Default Value: 0 [Standard reaction time (1ms tick)]	**Parameter Type:** Selection	**Parameter Number:** 2025
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter

Selection number	Selection name
0	Standard reaction time (1ms tick)
1	Fast reaction time (0.5µs tick)

P 9.4.2.6 T13 Trigger mode
Description: Select trigger mode for digital input events

Default Value: 0 [None]	**Parameter Type:** Selection	**Parameter Number:** 2026
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter

Selection number	Selection name
0	None
1	Rising Edge
2	Falling Edge
3	Both Edges

P 9.4.2.7 T13 Pulse Min Frequency
Description: The frequency that will yield 0.0 as the analog input value

Default Value: 0	**Parameter Type:** Range (0 - 100000)	**Parameter Number:** 2027
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

P 9.4.2.8 T13 Pulse Max Frequency
Description: The frequency that will yield 1.0 as the analog input value

Default Value: 100000	**Parameter Type:** Range (0 - 100000)	**Parameter Number:** 2028
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

6.10.2.2.3 Input T14 (Menu Index 9.4.3)

P 9.4.3.1 T14 Terminal Mode

Description: Mode selector for terminal 14

Default Value: 0 [Inactive]	**Parameter Type:** Selection	**Parameter Number:** 2016
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter

Selection number	Selection name
0	Inactive
3	Digital Input
4	Pulse Input

P 9.4.3.2 T14 Signal Inversion

Description: Inverts the signal of terminal 14

Default Value: 0 [Non-Inverted]	**Parameter Type:** Selection	**Parameter Number:** 2292
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter

Selection number	Selection name
0	Non-Inverted
1	Inverted

P 9.4.3.3 T14 Fast Debounce Filtering Time

Description: Sets the fast debounce filtering time for terminal 14

Default Value: 0	**Parameter Type:** Range (0 - 0.0000635)	**Parameter Number:** 2286
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 9.4.3.4 T14 Standard Debounce Filtering Time

Description: Sets the standard debounce filtering time for terminal 14

Default Value: 0	**Parameter Type:** Range (0 - 0.127)	**Parameter Number:** 2029
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 9.4.3.5 T14 Reaction Time Mode Selection

Description: Reaction time (debounce filtering) mode selection

Default Value: 0 [Standard reaction time (1ms tick)]	**Parameter Type:** Selection	**Parameter Number:** 2030
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter

Selection number	Selection name
0	Standard reaction time (1ms tick)
1	Fast reaction time (0.5µs tick)

P 9.4.3.6 T14 Trigger mode
Description: Select trigger mode for digital input events

Default Value: 0 [None]	**Parameter Type:** Selection	**Parameter Number:** 2031
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter

Selection number	Selection name
0	None
1	Rising Edge
2	Falling Edge
3	Both Edges

P 9.4.3.7 T14 Pulse Min Frequency
Description: The frequency that will yield 0.0 as the analog input value

Default Value: 0	**Parameter Type:** Range (0 - 100000)	**Parameter Number:** 2032
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

P 9.4.3.8 T14 Pulse Max Frequency
Description: The frequency that will yield 1.0 as the analog input value

Default Value: 100000	**Parameter Type:** Range (0 - 100000)	**Parameter Number:** 2033
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

6.10.2.2.4 Input/Output T15 (Menu Index 9.4.4)

P 9.4.4.1 T15 Terminal Mode
Description: Mode selector for terminal 15

Default Value: 0 [Inactive]	**Parameter Type:** Selection	**Parameter Number:** 2022
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter

Selection number	Selection name
0	Inactive
1	Digital Output
2	Pulse (Frequency) Output
3	Digital Input
4	Pulse Input

P 9.4.4.2 T15 Signal Inversion
Description: Inverts the signal of terminal 15

Default Value: 0 [Non-Inverted]	**Parameter Type:** Selection	**Parameter Number:** 2295
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter

Selection number	Selection name
0	Non-Inverted
1	Inverted

P 9.4.4.3 T15 Fast Debounce Filtering Time
Description: Sets the fast debounce filtering time for terminal 15

Default Value: 0	**Parameter Type:** Range (0 - 0.0000635)	**Parameter Number:** 2289
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 9.4.4.4 T15 Standard Debounce Filtering Time
Description: Sets the standard debounce filtering time for terminal 15

Default Value: 0	**Parameter Type:** Range (0 - 0.127)	**Parameter Number:** 2297
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 9.4.4.5 T15 Reaction Time Mode Selection
Description: Reaction time (debounce filtering) mode selection

Default Value: 0 [Standard reaction time (1ms tick)]	**Parameter Type:** Selection	**Parameter Number:** 2299
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter

Selection number	Selection name
0	Standard reaction time (1ms tick)
1	Fast reaction time (0.5µs tick)

P 9.4.4.6 T15 Trigger mode
Description: Select trigger mode for digital input events

Default Value: 0 [None]	**Parameter Type:** Selection	**Parameter Number:** 2044
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter

Selection number	Selection name
0	None
1	Rising Edge
2	Falling Edge
3	Both Edges

P 9.4.4.7 T15 Pulse Min Frequency
Description: The frequency that will yield 0.0 as the analog input value

Default Value: 0	**Parameter Type:** Range (0 - 100000)	**Parameter Number:** 2045
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

P 9.4.4.8 T15 Pulse Max Frequency
Description: The frequency that will yield 1.0 as the analog input value

Default Value: 100000	**Parameter Type:** Range (0 - 100000)	**Parameter Number:** 2046
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

P 9.4.4.9 T15 Digital Output Type
Description: Sets the type of Digital Output

Default Value: 0 [Tri state]	**Parameter Type:** Selection	**Parameter Number:** 2047
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter

Selection number	Selection name
0	Tri state
1	Open collector sink (NPN)
2	Open collector source (PNP)
3	Push pull

P 9.4.4.10 T15 Pulse Out Min Frequency
Description: Pulse frequency to be output at the unit-scaled value 0.0

Default Value: 0	**Parameter Type:** Range (0 - 100000)	**Parameter Number:** 2048
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

P 9.4.4.11 T15 Pulse Out Max Frequency
Description: Pulse frequency to be output at the unit-scaled value 1.0

Default Value: 100000	**Parameter Type:** Range (0 - 100000)	**Parameter Number:** 2049
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

6.10.2.2.5 Input/Output T16 (Menu Index 9.4.5)

P 9.4.5.1 T16 Terminal Mode
Description: Mode selector for terminal 16

Default Value: 0 [Inactive]	**Parameter Type:** Selection	**Parameter Number:** 2298
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter

Selection number	Selection name
0	Inactive
1	Digital Output

Selection number	Selection name
2	Pulse (Frequency) Output
3	Digital Input
4	Pulse Input

P 9.4.5.2 T16 Signal Inversion
Description: Inverts the signal of terminal 16

Default Value: 0 [Non-Inverted]	**Parameter Type:** Selection	**Parameter Number:** 2296
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter

Selection number	Selection name
0	Non-Inverted
1	Inverted

P 9.4.5.3 T16 Fast Debounce Filtering Time
Description: Sets the fast debounce filtering time for terminal 16

Default Value: 0	**Parameter Type:** Range (0 - 0.0000635)	**Parameter Number:** 2290
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 9.4.5.4 T16 Standard Debounce Filtering Time
Description: Sets the standard debounce filtering time for terminal 16

Default Value: 0	**Parameter Type:** Range (0 - 0.127)	**Parameter Number:** 2260
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 9.4.5.5 T16 Reaction Time Mode Selection
Description: Reaction time (debounce filtering) mode selection

Default Value: 0 [Standard reaction time (1ms tick)]	**Parameter Type:** Selection	**Parameter Number:** 2052
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter

Selection number	Selection name
0	Standard reaction time (1ms tick)
1	Fast reaction time (0.5µs tick)

P 9.4.5.6 T16 Trigger mode
Description: Select trigger mode for digital input events

Default Value: 0 [None]	**Parameter Type:** Selection	**Parameter Number:** 2053
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter

Selection number	Selection name
0	None
1	Rising Edge
2	Falling Edge
3	Both Edges

P 9.4.5.7 T16 Pulse Min Frequency
Description: The frequency that will yield 0.0 as the analog input value

Default Value: 0	**Parameter Type:** Range (0 - 100000)	**Parameter Number:** 2054
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

P 9.4.5.8 T16 Pulse Max Frequency
Description: The frequency that will yield 1.0 as the analog input value

Default Value: 100000	**Parameter Type:** Range (0 - 100000)	**Parameter Number:** 2055
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

P 9.4.5.9 T16 Digital Output Type
Description: Sets the type of Digital Output

Default Value: 0 [Tri state]	**Parameter Type:** Selection	**Parameter Number:** 2056
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter

Selection number	Selection name
0	Tri state
1	Open collector sink (NPN)
2	Open collector source (PNP)
3	Push pull

P 9.4.5.10 T16 Pulse Out Min Frequency
Description: Pulse frequency to be output at the unit-scaled value 0.0

Default Value: 0	**Parameter Type:** Range (0 - 100000)	**Parameter Number:** 2051
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

P 9.4.5.11 T16 Pulse Out Max Frequency
Description: Pulse frequency to be output at the unit-scaled value 1.0

Default Value: 100000	**Parameter Type:** Range (0 - 100000)	**Parameter Number:** 2050
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

6.10.2.2.6 Input T17 (Menu Index 9.4.6)

P 9.4.6.1 T17 Terminal Mode
Description: Mode selector for terminal 17

Default Value: 0 [Inactive]	**Parameter Type:** Selection	**Parameter Number:** 2017
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter

Selection number	Selection name
0	Inactive
3	Digital Input
4	Pulse Input

P 9.4.6.2 T17 Signal Inversion
Description: Inverts the signal of terminal 17

Default Value: 0 [Non-Inverted]	**Parameter Type:** Selection	**Parameter Number:** 2293
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter

Selection number	Selection name
0	Non-Inverted
1	Inverted

P 9.4.6.3 T17 Fast Debounce Filtering Time
Description: Sets the fast debounce filtering time for terminal 17

Default Value: 0	**Parameter Type:** Range (0 - 0.0000635)	**Parameter Number:** 2287
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 9.4.6.4 T17 Standard Debounce Filtering Time
Description: Sets the standard debounce filtering time for terminal 17

Default Value: 0	**Parameter Type:** Range (0 - 0.127)	**Parameter Number:** 2034
Unit: s	**Data Type:** UINT	**Access Type:** Read/Write

P 9.4.6.5 T17 Reaction Time Mode Selection
Description: Reaction time (debounce filtering) mode selection

Default Value: 0 [Standard reaction time (1ms tick)]	**Parameter Type:** Selection	**Parameter Number:** 2035
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter

Selection number	Selection name
0	Standard reaction time (1ms tick)
1	Fast reaction time (0.5µs tick)

P 9.4.6.6 T17 Trigger mode
Description: Select trigger mode for digital input events

Default Value: 0 [None]	**Parameter Type:** Selection	**Parameter Number:** 2036
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter

Selection number	Selection name
0	None
1	Rising Edge
2	Falling Edge
3	Both Edges

P 9.4.6.7 T17 Pulse Min Frequency
Description: The frequency that will yield 0.0 as the analog input value

Default Value: 0	**Parameter Type:** Range (0 - 100000)	**Parameter Number:** 2037
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

P 9.4.6.8 T17 Pulse Max Frequency
Description: The frequency that will yield 1.0 as the analog input value

Default Value: 100000	**Parameter Type:** Range (0 - 100000)	**Parameter Number:** 2038
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

6.10.2.2.7 Input T18 (Menu Index 9.4.7)

P 9.4.7.1 T18 Terminal Mode
Description: Mode selector for terminal 18

Default Value: 0 [Inactive]	**Parameter Type:** Selection	**Parameter Number:** 2018
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter

Selection number	Selection name
0	Inactive
3	Digital Input
4	Pulse Input

P 9.4.7.2 T18 Signal Inversion
Description: Inverts the signal of terminal 18

Default Value: 0 [Non-Inverted]	**Parameter Type:** Selection	**Parameter Number:** 2294
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter

Selection number	Selection name
0	Non-Inverted
1	Inverted

P 9.4.7.3 T18 Fast Debounce Filtering Time
Description: Sets the fast debounce filtering time for terminal 18

Default Value: 0	**Parameter Type:** Range (0 - 0.0000635)	**Parameter Number:** 2288
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 9.4.7.4 T18 Standard Debounce Filtering Time
Description: Sets the standard debounce filtering time for terminal 18

Default Value: 0	**Parameter Type:** Range (0 - 0.127)	**Parameter Number:** 2039
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 9.4.7.5 T18 Reaction Time Mode Selection
Description: Reaction time (debounce filtering) mode selection

Default Value: 0 [Standard reaction time (1ms tick)]	**Parameter Type:** Selection	**Parameter Number:** 2040
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter

Selection number	Selection name
0	Standard reaction time (1ms tick)
1	Fast reaction time (0.5µs tick)

P 9.4.7.6 T18 Trigger mode
Description: Select trigger mode for digital input events

Default Value: 0 [None]	**Parameter Type:** Selection	**Parameter Number:** 2041
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter

Selection number	Selection name
0	None
1	Rising Edge
2	Falling Edge
3	Both Edges

P 9.4.7.7 T18 Pulse Min Frequency
Description: The frequency that will yield 0.0 as the analog input value

Default Value: 0	**Parameter Type:** Range (0 - 100000)	**Parameter Number:** 2042
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

P 9.4.7.8 T18 Pulse Max Frequency
Description: The frequency that will yield 1.0 as the analog input value

Default Value: 100000	**Parameter Type:** Range (0 - 100000)	**Parameter Number:** 2043
Unit: Hz	**Data Type:** REAL	**Access Type:** Read/Write

6.10.2.3 Analog Inputs/Outputs (Menu Index 9.5)

These parameters allow the setting of analog inputs and outputs on the Basic I/O board.

6.10.2.3.1 Output Terminal 31 (Menu Index 9.5.1)

P 9.5.1.1 T31 Terminal Mode
Description: Mode selector for this terminal 31

Default Value: 0 [Inactive]	**Parameter Type:** Selection	**Parameter Number:** 2019
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter

Selection number	Selection name
0	Inactive
5	Analog Output

P 9.5.1.2 T31 Terminal Type
Description: Configures the terminal 31 for voltage/current mode

Default Value: 0 [Off]	**Parameter Type:** Selection	**Parameter Number:** 2284
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter

Selection number	Selection name
0	Off
1	Voltage
2	Current

P 9.5.1.3 T31 Minimum Value
Description: Voltage or current to be output at the unit-scaled value 0.0

Default Value: 0.0	**Parameter Type:** Range (0 - 20.0)	**Parameter Number:** 2283
Unit:	**Data Type:** REAL	**Access Type:** Read/Write

P 9.5.1.4 T31 Maximum Value
Description: Voltage or current to be output at the unit-scaled value 1.0

Default Value: 10.0	**Parameter Type:** Range (0 - 20.0)	**Parameter Number:** 2282
Unit: -	**Data Type:** REAL	**Access Type:** Read/Write

6.10.2.3.2 Input Terminal 33 (Menu Index 9.5.2)

P 9.5.2.1 T33 Terminal Mode
Description: Mode selector for this terminal 33

Default Value: 0 [Inactive]	**Parameter Type:** Selection	**Parameter Number:** 2020
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter

Selection number	Selection name
0	Inactive
6	Analog Input

P 9.5.2.2 T33 Terminal Type
Description: Configures the terminal 33 for voltage/current mode

Default Value: 1 [Voltage]	**Parameter Type:** Selection	**Parameter Number:** 2273
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter

Selection number	Selection name
1	Voltage
2	Current

P 9.5.2.3 T33 Minimum Value
Description: Voltage or current to be output at the unit-scaled value 0.0

Default Value: 0	**Parameter Type:** Range (-20 - 20)	**Parameter Number:** 2272
Unit:	**Data Type:** REAL	**Access Type:** Read/Write

P 9.5.2.4 T33 Maximum Value
Description: Voltage or current to be output at the unit-scaled value 1.0

Default Value: 10	**Parameter Type:** Range (-20 - 20)	**Parameter Number:** 2271
Unit:	**Data Type:** REAL	**Access Type:** Read/Write

P 9.5.2.5 T33 Filter Time
Description: Sets the filter time for terminal 33

Default Value: 0.0	**Parameter Type:** Range (0.0 - 60.0)	**Parameter Number:** 2270
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 9.5.2.6 T33 Live Zero Threshold Value
Description: Sets the live zero threshold value for terminal 33

Default Value: -10	**Parameter Type:** Range (-20 - 20)	**Parameter Number:** 2274
Unit: -	**Data Type:** REAL	**Access Type:** Read/Write

P 9.5.2.7 T33 Live Zero Timeout Value
Description: Sets the live zero timeout value for terminal 33

Default Value: 0.0	**Parameter Type:** Range (0.0 - 60.0)	**Parameter Number:** 2275
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

6.10.2.3.3 Input Terminal 34 (Menu Index 9.5.3)

P 9.5.3.1 T34 Terminal Mode
Description: Mode selector for this terminal 34

Default Value: 0 [Inactive]	**Parameter Type:** Selection	**Parameter Number:** 2021
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter

Selection number	Selection name
0	Inactive
6	Analog Input

P 9.5.3.2 T34 Terminal Type
Description: Configures the terminal 34 for voltage/current mode

Default Value: 1 [Voltage]	**Parameter Type:** Selection	**Parameter Number:** 2279
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter

Selection number	Selection name
1	Voltage
2	Current

P 9.5.3.3 T34 Minimum Value
Description: Voltage or current to be output at the unit-scaled value 0.0

Default Value: 0	**Parameter Type:** Range (-20 - 20)	**Parameter Number:** 2278
Unit:	**Data Type:** REAL	**Access Type:** Read/Write

P 9.5.3.4 T34 Maximum Value
Description: Voltage or current to be output at the unit-scaled value 1.0

Default Value: 10	**Parameter Type:** Range (-20 - 20)	**Parameter Number:** 2277
Unit:	**Data Type:** REAL	**Access Type:** Read/Write

P 9.5.3.5 T34 Filter Time
Description: Sets the filter time for terminal 34

Default Value: 0.0	**Parameter Type:** Range (0.0 - 60.0)	**Parameter Number:** 2276
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 9.5.3.6 T34 Live Zero Threshold Value
Description: Sets the live zero threshold value for terminal 34

Default Value: -10	**Parameter Type:** Range (-20 - 20)	**Parameter Number:** 2280
Unit: -	**Data Type:** REAL	**Access Type:** Read/Write

P 9.5.3.7 T34 Live Zero Timeout Value
Description: Sets the live zero timeout value for terminal 34

Default Value: 0.0	**Parameter Type:** Range (0.0 - 60.0)	**Parameter Number:** 2281
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

6.11 Connectivity (Menu Index 10)

6.11.1 Communication interfaces (Menu Index 10.2)

6.11.1.1 Host Settings (Menu Index 10.2.1)

P 10.2.1.1 Fully Qualified Domain Name
Description: Fully Qualified Domain Name. Consists of a host name label and at least 1 higher-level domain separated by the symbol "." with up to 240 characters in total. Each label contains upto 63 characters and starts with a lowercase letter and ends with alphanumeric lowercase character and have as interior characters only alphanumeric lowercase characters and '-'.

Default Value: *	**Parameter Type:** Range (* — *)	**Parameter Number:** 7036
Unit: -	**Data Type:** STRING	**Access Type:** Read/Write

6.11.1.2 Ethernet Interface X0 (Menu Index 10.2.2)

S 10.2.2.1 IPv4 Settings
Description:
S 10.2.2.2 IPv4 Status
Description:

6.11.1.3 Ethernet Interface X1/X2 Settings (Menu Index 10.2.3)

S 10.2.3.1 IPv4 Settings
Description:
S 10.2.3.2 IPv4 Status
Description:

6.11.1.4 Ethernet port X0 (Menu Index 10.2.4)

6.11.1.4.1 X0 Settings (Menu Index 10.2.4.2)

P 10.2.4.2.5 Link configuration X0
Description: Select the configuration of the Ethernet link parameters.

Default Value: 0 [Auto negotiation]	**Parameter Type:** Selection	**Parameter Number:** 7047
Unit: -	**Data Type:** USINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Auto negotiation
1	10 Mbps full duplex
2	10 Mbps half duplex
3	100 Mbps full duplex
4	100 Mbps half duplex

6.11.1.5 Ethernet port X1 (Menu Index 10.2.5)

6.11.1.5.1 X1 Settings (Menu Index 10.2.5.2)

P 10.2.5.2.5 Link Configuration X1
Description: Select the configuration of the Ethernet link parameters.

Default Value: 0 [Auto negotiation]	**Parameter Type:** Selection	**Parameter Number:** 7048
Unit: -	**Data Type:** USINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Auto negotiation
1	10 Mbps full duplex
2	10 Mbps half duplex
3	100 Mbps full duplex
4	100 Mbps half duplex

6.11.1.6 Ethernet port X2 (Menu Index 10.2.6)

6.11.1.6.1 X2 Settings (Menu Index 10.2.6.2)

P 10.2.6.2.5 Link Configuration X2

Description: Select the configuration of the Ethernet link parameters.

Default Value: 0 [Auto negotiation]	**Parameter Type:** Selection	**Parameter Number:** 7049
Unit: -	**Data Type:** USINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Auto negotiation
1	10 Mbps full duplex
2	10 Mbps half duplex
3	100 Mbps full duplex
4	100 Mbps half duplex

6.11.2 Protocols (Menu Index 10.3)

6.11.2.1 General Settings (Menu Index 10.3.1)

P 10.3.1.2 Fieldbus Profile

Description: Select the fieldbus profile. The selection affects the interpretation of the control word and status word.

Default Value: 101 [iC Speed Profile]	**Parameter Type:** Selection	**Parameter Number:** 1301
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
101	iC Speed Profile
201	PROFIdrive Standard Telegram 1

P 10.3.1.3 Fieldbus Fault Response

Description: Select the behavior when a fieldbus fault occurs.

Default Value: 1 [Info]	**Parameter Type:** Selection	**Parameter Number:** 1303
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
1	Info
3	Warning
9	Fault, ramp to coast
10	Fault

P 10.3.1.4 No Fieldbus Connection Response

Description: Select the response in case there is no fieldbus connection.

Default Value: 1 [Info]	**Parameter Type:** Selection	**Parameter Number:** 1327
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
1	Info
3	Warning
9	Fault, ramp to coast
10	Fault

P 10.3.1.6 Process Data Timeout Time

Description: Set the timeout time. If process data is not received within the time set, a process data timeout is triggered.

Default Value: 1	**Parameter Type:** Range (0 — 18000)	**Parameter Number:** 1340
Unit: s	**Data Type:** REAL	**Access Type:** Read/Write

P 10.3.1.12 Process Data Timeout Response

Description: Select the response to a process data timeout.

Default Value: 10 [Fault]	**Parameter Type:** Selection	**Parameter Number:** 1341
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
1	Info
3	Warning
5	Warning - Change Control Place
6	Warning - Change Control Place - Persistent
9	Fault, ramp to coast
10	Fault

P 10.3.1.13 Process Data Timeout Control Place

Description: Select the alternate control place to be used in case of filedbus timeout. This is only valid in case of timeout warning or info.

Default Value: 1 [Local control]	**Parameter Type:** Selection	**Parameter Number:** 112
Unit: -	**Data Type:** UINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
1	Local control
2	Fieldbus control
3	I/O control
4	Advanced control

6.11.2.2 PROFINET (Menu Index 10.3.2)

6.11.2.2.1 Configuration (Menu Index 10.3.2.2)

P 10.3.2.2.1 Name of Station
Description: Set the name of station. The PROFINET device is identified by its name of station. Each name must be unique in the network.

Default Value:	**Parameter Type:** Range (* — *)	**Parameter Number:** 7080
Unit: -	**Data Type:** STRING	**Access Type:** Read/Write

6.11.2.2.2 Diagnosis (Menu Index 10.3.2.3)

P 10.3.2.3.1 Diagnostic Fault
Description: Enables diagnostic fault. When disabled the device will not send any PROFINET diagnosis message with severity "Fault" when a fault is present on device.

Default Value: 1 [Enabled]	**Parameter Type:** Selection	**Parameter Number:** 7081
Unit: -	**Data Type:** BOOL	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Disabled
1	Enabled

P 10.3.2.3.2 Diagnostic Warning
Description: Enables diagnostic warning. When disabled the device will not send any PROFINET diagnosis message with severity "Maintenance required" when a warning is present on device.

Default Value: 1 [Enabled]	**Parameter Type:** Selection	**Parameter Number:** 7083
Unit: -	**Data Type:** BOOL	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Disabled
1	Enabled

6.11.2.3 Modbus TCP (Menu Index 10.3.3)

6.11.2.3.1 Configuration (Menu Index 10.3.3.2)

P 10.3.3.2.1 Persistent Storage
Description: Select if persistent storage is active for Modbus writes.

Default Value: 0 [Disabled]	**Parameter Type:** Selection	**Parameter Number:** 7061
Unit: -	**Data Type:** BOOL	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Disabled
1	Enabled

P 10.3.3.2.3 Byte Order
Description: Select the byte order.

Default Value: 0 [Big Endian]	**Parameter Type:** Selection	**Parameter Number:** 7062
Unit: -	**Data Type:** USINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Big Endian
1	Little Endian

P 10.3.3.2.4 Word Order
Description: Select the word order.

Default Value: 1 [Little Endian]	**Parameter Type:** Selection	**Parameter Number:** 7063
Unit: -	**Data Type:** USINT	**Access Type:** Read/Write

The following are the selections for the parameter.

Selection number	Selection name
0	Big Endian
1	Little Endian

7 Troubleshooting

7.1 Accessing Warnings Using the Control Panel

When a warning occurs in the drive, the drive status indicators (halo and *WARN*) show a yellow color. The drive remains operational and when the trigger for the warning is removed, the status indicators disappear.

When a warning occurs in the drive, the details of the event, is shown in *parameter group 6.4.1 Active Events*.

To view the history of events that has occurred in the drive, go to *parameter group 6.4.2 Event History*.

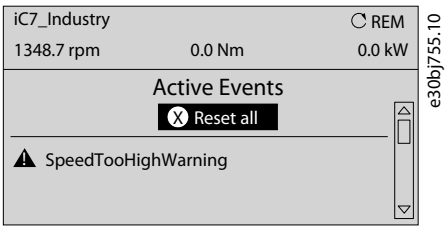


Illustration 59: Warnings

7.2 Accessing and Resetting Faults Using the Control Panel

When a fault occurs in the drive, the drive status indicators (halo and *FAULT*) show a red color. The control panel display screen shows the name of the fault and allows a direct reset.

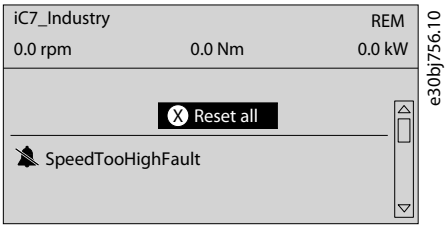


Illustration 60: Faults

To reset the faults, perform the following:

- 1. Make sure that all triggers causing the fault are removed in the drive.
- 2. Select *Reset all* and press *[OK]*.
- 3. To view more details about the fault, go to the required fault in the list shown on the control panel, and click *[OK]*.

  Note: If the control panel display has changed, press the left and right arrow of the control panel simultaneously as a shortcut to access the *parameter group 6.4.1 Active Events*.

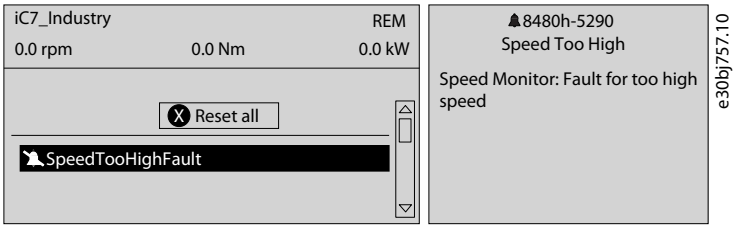


Illustration 61: Viewing Active Events

7.3 Reading the Event Summary Table

Group Number and Number (columns 1-2)

Events in iC7 drives are characterized by two different identifiers: Group numbers and Individual numbers.

The group numbers for iC7 drives 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 Drive Profile. The list of standardized error codes can be found in IEC 61800-7-201.

Unlike individual numbers, the group numbers are not unique since multiple errors might be related to each other. An example is different earth faults which share the Group Number 0x2330.

Display Name and Description (columns 3-4)

The columns are showing the name and a short description of the events. Few display names are marked with a *, which indicates that the event can be configured via a parameter.

Type of Event (columns 5-8)

The event summary table shows column names where I – Info, W – Warning, F – Fault, and PF – Protected Fault.

The following are the descriptions of these events:

- **Info:** The notification provides information to the user.
- **Warning:** The notification provides information to the user that an undesired event is happening. The drive can continue operation, but it might be with reduced performance and/or the drive might trip.
- **Fault (Trip):** An error notification is provided to the user, informing that an undesired high-severity event occurred. The motor coasts without control from the drive. The error message and the error can be reset without power cycling the drive.
- **Protected Fault (Trip Lock):** An error notification is provided to the user, informing that an undesired high-severity event happened. The motor coasts without control from the drive. The error message and the error can be reset after power cycling the drive

Action of Inverter and Brake Chopper (columns 9-10)

The columns are showing the possible action of the inverter (output of the drive) and the brake chopper, where C – Coast and RC – Ramp to Coast.

- **Inverter:**
  - RC: Output ramps to 0 before coasting.
  - C: Output coasts immediately.
- **Brake Chopper:**
  - C: Output of the brake coasts immediately.

7.4 Events Summary for Motion Application Software

The following is the list of events that can occur in the Motion application software.

Table 18: Summary Table

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
0x21FF	4372	Current Injection Limit	The time limit for the short term current injection has been exceeded.		X	X		C	
0x2212	4374	DC-link Resonance	A resonance on the DC link with excessive RMS current values has been detected.		X	X		C	
0x2221	4384	Thermal Overload Rectifier	The rectifier is thermally overloaded. Mission profile is too demanding.		X	X		C	
0x2222	4373	DC-link Overcurrent	An overcurrent on the main DC-link capacitors has been detected.		X	X		C	
0x2310	5170	Current Limit Timeout	The drive has exceeded the allowed time in current limit.			X		C	
0x2311	4097	Inverter Overload	Thermal overload is detected in the inverter of the drive. Reduce the output load.		X	X		C	
0x2311	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		X	X		C	

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
			motor data is correct. Check that the motor shaft can be turned.						
0x2311	4369	Output Current High 1	The output current of the drive has exceeded its normal range. Shock load or too fast acceleration with high-inertia loads can cause this fault. Check that the motor size matches the drive and the motor data is correct. Check that the motor shaft can be turned.		X	X		C	
0x2311	4375	Excessive Current Limiting	The output current of the drive has exceeded the current limit multiple times. Check that the motor size matches the drive and the motor data is correct. Check that the motor shaft can be turned.		X	X		C	
0x2311	4377	Smart Derating Fault	A Smart Derating fault is detected. The load is too demanding for the current derating level. Lower the switching frequency if possible.		X	X		C	
0x2311	4380	Current Limit Setting Fault	The actual current limit setting is too high relative to the selected constant control frequency level. Reduce the control frequency setting or reduce the current limit setting.			X		C	C
0x2330	4352	Ground Fault 0	A high-impedance ground fault is detected on the output. Check the insulation of motor cable and motor.		X	X		C	
0x2330	4353	Ground Fault 1	A high-impedance ground fault is detected on the output. Check the insulation of motor cable and motor.		X	X		C	
0x2330	4354	Ground Fault 2	A low-impedance ground fault is detected on the output. Check the insulation of motor cable and motor.		X		X	C	
0x2330	4355	Ground Fault 21	A high or low-impedance ground fault is detected on the output. Check the insulation of motor cable and motor.		X		X	C	
0x2340	4356	Inverter Short Circuit	A short circuit at the inverter output is detected. Check the motor and motor cable.		X		X	C	
0x2340	4370	Output Current High 2	A critical output overcurrent has been detected. Check for short circuits on the output.		X		X	C	
0x2340	4649	Desat Gate Driver	The gate driver has detected desaturation condition.			X		C	C
0x23FD	4182	Motor Sync Loss	Motor Loss of Synchronization.		X				
0x23FE	4371	Current Imbalance	A current imbalance between paralleled power units has been detected.		X				
0x23FF	4175	Motor Disconnected	The motor is disconnected.		X	X		C	

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
0x23FF	4176	Missing Motor Phase	A missing motor phase is detected. Check motor, motor cables, and connections.		X	X		C	
0x3110	4164	Grid Voltage High	Grid voltage (RMS) above the normal operating range is detected.		X	X		C	C
0x3120	4165	Grid Voltage Low	A grid voltage (RMS) below the normal operating range is detected.		X	X		C	
0x3130	4160	Missing Grid Phase	A missing phase is detected on the grid side. Check the grid supply, cables, connections, and fuses.		X	X		C	
0x3140	4161	Grid Frequency Out of Range	A grid frequency outside the normal operating range is detected.		X	X		C	
0x31FD	4162	Grid Voltage Spikes	Excessive spikes on the grid voltage have been detected.		X	X		C	
0x31FE	4163	Grid Imbalance	A large imbalance of the grid voltages is detected. Check for uneven loads on the grid.		X	X		C	
0x31FF	4166	Grid Synchronization Error	The drive is unable to maintain the synchronization to the grid voltage.		X	X		C	
0x3211	4144	DC-link Voltage High 2	The voltage of the DC link is above the normal operating range. Can be caused by too fast motor braking or grid transients. Increase deceleration time, enable the overvoltage controller, use AC brake, or use a brake resistor while braking.		X	X		C	C
0x3212	4145	DC-link Voltage High 1	The voltage of the DC link is above the normal operating range and has reached a critical level. Can be caused by too fast motor braking or grid transients. Increase deceleration time, enable the overvoltage controller, use AC brake, or use a brake resistor while braking.		X	X		C	
0x3221	4146	DC-link Voltage Low	The DC-link voltage is below the normal operating range. Try to enable undervoltage protection to keep the drive running as long as possible.		X	X		C	C
0x32FE	4148	DC-link Imbalance	An imbalance across the DC-link capacitors is detected. The imbalance can be caused by a component fault of the DC link. If the fault remains after resetting the drive, service is required.		X	X		C	
0x32FE	4149	DC-link Short Circuit	An internal short circuit is detected in the DC link. Service is required.				X	C	C
0x32FE	4150	DC Capacitor Short Circuit	A short circuit in a DC-link capacitor is detected. Service is required.			X		C	C
0x32FE	4151	DC-link Short Circuit 2	A short circuit in the DC-link capacitor is detected. Service is required.	X			X	C	

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
0x32FF	4147	DC-link Voltage Ripple	Excessive voltage ripple has been detected on the main DC-link capacitors. This can be caused by an imbalance of the grid. Reduce the output power.		X	X		C	
0x4110	4099	Ambient Temp. High	The ambient temperature is too high. Check the temperature and cooling conditions. Lower the temperature or improve the cooling conditions.		X				
0x4210	4103	Inverter Temp. Limit	The temperature of the inverter heat sink is at the upper limit of the normal temperature range. Check cooling and heat sink conditions. Reduce the output current or ambient temperature. The drive may derate if the temperature is not lowered.		X				
0x4210	4104	Inverter Temp. High 1	The temperature of the inverter heat sink has exceeded the normal temperature level. Check cooling and heat sink conditions. Reduce the output current or ambient temperature.		X	X		C	C
0x4210	4105	Inverter Temp. High 2	The temperature of the inverter heat sink has reached a critical level. Check cooling and heat sink conditions. Reduce the output current to avoid a protected fault.		X	X		C	C
0x4210	4107	Brake Chopper Temp. Limit	The temperatute of the brake chopper heat sink is at the upper limit of the normal temperature range. Check cooling and heat sink conditions. Reduce the generated regenerative power.		X				
0x4210	4108	Brake Chopper Temp. High 1	The temperature of the brake chopper heat sink has exceeded the normal temperature range. Check cooling and heat sink conditions. Reduce the generated regenerative power.		X	X		C	C
0x4210	4109	Brake Chopper Temp. High 2	The temperature of the brake chopper heat sink has reached a critical level. Check cooling and heat sink conditions. Reduce the generated regenerative power.		X	X		C	C
0x4210	4110	IGBT Temp. High	An inverter IGBT overtemperature has been detected. Reduce the ambient temperature, the output current and/or the switching frequency. Check the cooling and the condition of the heat sink.			X		C	C
0x4210	4113	Rectifier Temp. Limit	The temperature of the rectifier heat sink is at the upper limit of the normal temperature range. Check cooling and heat sink conditions. Reduce the output power (torque, speed) or the ambient temperature.		X				
0x4210	4114	Rectifier Temp. High 1	The temperature of the rectifier heat sink has exceeded the normal temperature range. Check cooling and heat sink conditions. Reduce the output power (torque, speed) or the ambient temperature.		X	X		C	C

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
0x4210	4115	Rectifier Temp. High 2	The temperature of the rectifier heat sink has reached a critical level. Check cooling and heat sink conditions. Reduce the output power (torque, speed) or the ambient temperature.		X	X		C	C
0x4210	4125	IGBT Temp. High	An inverter IGBT temperature has reached a critical value. Reduce the drive's output current if possible to avoid a protected fault.			X		C	C
0x4210	4200	Power Option Temp. High 1	The temperature of a power option has exceeded the normal temperature range. Check the cooling conditions. Reduce the load or the ambient temperature.		X	X		RC	C
0x4210	4201	Power Option Temp. High 2	The temperature of a power option has reached a critical level. Check the cooling conditions. Reduce the load or the ambient temperature.		X	X		RC	C
0x4210	4203	Power Option Temp. Limit	The temperature of a power option component is at the upper limit of the normal temperature. Check the cooling conditions. Reduce the load or the ambient temperature.		X				
0x4220	4102	Ambient Temp. Low	The drive is operated at a too low ambient temperature. Check the ambient temperature. Increase the ambient temperature or consider an external heater to increase the temperature around the drive.		X	X		C	C
0x4220	4106	Brake Chopper Temp. Low	The temperature of the brake chopper heat sink is too low. Check the ambient temperature. Increase the ambient temperature or consider an external heater to increase the temperature around the drive.		X	X		C	C
0x4220	4112	Rectifier Temp. Low	The temperature of the rectifier heat sink is too low. Check the ambient temperature. Increase the ambient temperature or consider an external heater to increase the temperature around the drive.		X	X		C	C
0x4220	4202	Power Option Temp. Low	The temperature of a power option component is to low. Check the ambient temperature. Increase the ambient temperature or consider an external heater to increase the temperature around the power option.		X	X		RC	C
0x4280	5132	Temp. Protection 1	Temperature protection 1 is triggered. The temperature has exceeded the configured value.		X	X		RC	
0x4280	5133	Temp. Protection 2	Temperature protection 2 is triggered. The temperature has exceeded the configured value.		X	X		RC	
0x4280	5134	Temp. Protection 3	Temperature protection 3 is triggered. The temperature has exceeded the configured value.		X	X		RC	
0x4280	5135	Temp. Protection 4	Temperature protection 4 is triggered. The temperature has exceeded the configured value.		X	X		RC	

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
0x4280	5136	Temp. Protection 5	Temperature protection 5 is triggered. The temperature has exceeded the configured value.		X	X		RC	
0x4280	5137	Temp. Protection 6	Temperature protection 6 is triggered. The temperature has exceeded the configured value.		X	X		RC	
0x4310	4117	Power Unit Temp. Limit	The internal air temperature of the drive is at the upper limit of the normal temperature range. Check cooling and heat sink conditions. Reduce the output power (torque, speed) or the ambient temperature.		X				
0x4310	4118	Power Unit Temp. High 1	The internal air temperature of the drive has exceeded its normal temperature range. Check cooling and heat sink conditions. Reduce the output power (torque, speed) or the ambient temperature.		X	X		C	C
0x4310	4119	Power Unit Temp. High 2	The internal air temperature of the drive has reached a critical value. Check cooling and heat sink conditions. Reduce the output power (torque, speed) or the ambient temperature.		X	X		C	C
0x4310	4121	Control Board Temp. Limit	The temperature of the control board is at the upper limit of the normal temperature range. Check cooling conditions and load of the control board. Reduce the load on the control board or the ambient temperature.		X				
0x4310	4122	Control Board Temp. High 1	The temperature of the control board has exceeded its normal temperature range. Check cooling conditions and load of the control board. Reduce the load on the control board or the ambient temperature.		X	X		C	C
0x4310	4123	Control Board Temp. High 2	The temperature of the control board has reached a critical level. Check cooling conditions and load of the control board. Reduce the load on the control board or the ambient temperature.		X	X		C	C
0x4320	4116	Power Unit Temp. Low	The internal air temperature of the drive is below the normal operating range. The drive is operated at a too low ambient temperature. Consider an external heater to avoid this warning or fault.		X	X		C	C
0x4320	4120	Control Board Temp. Low	The temperature of the control board is below the normal temperature range. The drive is operated at a too low ambient temperature. Check the ambient temperature. Increase the ambient temperature or consider an external heater to increase the temperature at the drive.		X	X		C	C
0x4380	5240	Cooling Monitor	The cooling signal is missing.		X	X		C	C
0x43FF	4124	Break Chopper Temperature Imbalance	There is a temperature imbalance between 1 or more brake chopper IGBT's.		X				

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
0x43FF	4126	IGBT Temperature Imbalance	There is a temperature imbalance between 1 or more IGBT's.		X				
0x43FF	4127	IGBT Temperature Imbalance	An excessive thermal imbalance between the IGBT modules has been detected. Check the condition of IGBT modules their connections the cooling and the driver boards.		X				
0x43FF	4131	Temperature Imbalance Brake IGBT	There is a temperature imbalance between 1 or more brake chopper IGBT's.		X	X		C	C
0x43FF	4132	IGBT temperature delta	There is a temperature imbalance between 1 or more IGBT's.		X	X		C	C
0x43FF	4204	Power Option Temp. Imbal. 1	The thermal imbalance between the power option components exceeds the normal operating range.		X	X		RC	C
0x43FF	4205	Power Option Temp. Imbal. 2	An excessive thermal imbalance between power option components has been detected.		X	X		RC	C
0x43FF	4206	Power Option Temp. Imbal. Limit	The thermal imbalance between the power option components is at the upper limit of the normal operating range.		X				
0x4480	5400	AHF High Temp. Derate	A too high temperature is detected in the connected AHF (Advanced Harmonic Filter). Output has been derated to 50%.			X			
0x4480	5401	AHF High Temp. Stop	A too high temperature has been detected in the connected AHF (Advanced Harmonic Filter). Operation of the drive has been stopped.			X		RC	
0x5112	4640	24V Supply Fault	The 24V supply is outside its normal operating range.				X	C	C
0x5114	4642	3.3V Supply Low	The voltage of the internal 3.3V supply is below its normal operating range.			X		C	C
0x5115	4643	28V Supply Low	The voltage of the internal 28V supply is below its normal operating range.			X		C	C
0x51FE	4644	Gate Driver Voltage Fault	The gate driver supply voltage is outside its normal operating range.				X	C	C
0x51FE	4653	Gate Driver Fault	A gate driver fault is detected or a link to the gate driver is broken.			X		C	C
0x51FF	4645	Power Board Supply Fault	A power supply fault on the power board has been detected.				X	C	C
0x51FF	4646	Power Supply Voltage	A power supply voltage is outside its normal operating range.				X	C	C

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
0x5210	4378	Current Sensor Fault	A defective current sensor or an error in the calibration of the current sensors has been detected.			X		C	C
0x5400	5173	Power Limit Timeout Regenerative	The drive has exceeded the allowed time in power limit			X		C	
0x5400	5174	Power Limit Timeout Motoring	The drive has exceeded the allowed time in power limit			X		C	
0x54EB	4641	24V Backup Mode	The drive is in 24V backup mode. The control section (including parameter configurations) and installed options are kept operational.	X					
0x54EC	4647	Function Disabled	The protection logic keeps the trip active until the configuration of the power unit protection levels is ready.			X		C	C
0x54ED	4128	Control Fan Failure	The control board cooling fan is not running at the commanded speed.		X				
0x54EE	4129	Main Fan Failure	The main cooling fan is not following its reference speed. Check the fan's wiring and whether its blocked or polluted. Replace the fan if necessary.		X				
0x54EE	4133	LCL Fan Speed Fault	LCL cooling fan not tracking commanded output.			X		C	C
0x54EF	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.		X				
0x54F0	4628	STO Activated	The Safe Torque-Off (STO) is activated and an unintended restart is prevented until the STO-request has been reset.		X			C	
0x54F0	4629	STO Fault Ch. A	The Safe Torque-Off (STO) is activated due to a discrepancy fault: Channel A is not activated, while channel B is activated.			X		C	C
0x54F0	4630	STO Fault Ch. B	The Safe Torque-Off (STO) is activated due to a discrepancy fault: Channel B is not activated, while channel A is activated.			X		C	C
0x5530	4790	Control Data Error	A data error is detected in the control data database EEPROM.	X					
0x5530	4791	Invalid PUD	A data error has been detected in the power unit database EEPROM.			X		C	
0x6100	6000	Motion Internal Fb Error	Motion command is not executed due to Internal Error.			X		C	C

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
0x6100	6001	Drive Disabled Error	Motion command is rejected when drive is disabled. Please Start the Drive.		X				
0x6100	6007	Motion License Missing	Motion License for the feature is not present				X	C	C
0x6180	5260	Event Simulation	The event with the number 5260 is simulated.		X	X		C	C
0x6180	5264	Event Simulation SS2 Inst 1	Event simulation SS2 Instance 1.		X			C	C
0x6180	5265	Event Simulation SS2 Inst 2	Event simulation SS2 Instance 2.		X			C	C
0x6181	4980	A Digital Input terminal is unknown by system	A digital input terminal has been selected that is unknown by system. Maybe an option has been moved or removed.		X				
0x6181	4981	A Digital Output terminal is unknown by system	A digital output terminal has been selected that is unknown by system. Maybe an option has been moved or removed.		X				
0x6181	4982	An Analog Input terminal is unknown by system	An analog input terminal has been selected that is unknown by system. Maybe an option has been moved or removed.		X				
0x6181	4983	An Analog Output terminal is unknown by system	An analog output terminal has been selected that is unknown by system. Maybe an option has been moved or removed.		X				
0x6181	4984	A Digital Output occupied	A digital output is in use by an other function or fieldbus. If a Fieldbus has taken control over a terminal, it has priority over parameter selection		X				
0x6181	4985	An Analog Output occupied	An analog output is in use by an other function or fieldbus. If a Fieldbus has taken control over a terminal, it has priority over parameter selection		X				
0x61F4	4853	StartupOccurrence	This occurrence masks over various occurrences that might be active during startup, that we dont want to show the end user	X					
0x61F5	4854	Reset By Demand	Drive reset is requested by user, and will be performed shortly.	X				C	
0x61F6	4638	Drive to Drive Connection Lost	Drive to drive connection is lost.		X	X		C	C

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
0x61F7	4800	Low Storage Space	The available storage space for the file system is low.	X					
0x61F7	4801	Data Logger Storage	Volume restriction limits are preventing additional data logger capture files from being stored.		X				
0x61F7	4802	Event Logger Storage	Volume restriction limits are preventing additional event log capture files from being stored.		X				
0x61F8	4832	Node Discovery	Node discovery and configuration are in progress. The modulation is inhibited.	X				RC	C
0x61F8	4833	Node Commissioning	Nodes are being commissioned.		X			C	C
0x61F8	4834	Node Missing	A previously commissioned node is no longer available. The drive is waiting for the node to be available. If the node has been removed, recommission the drive.	X					
0x61F9	4855	Internal Fault	An internal fault has been detected. Cycle power, check the wiring if applicable, contact the service provider if the fault persists. Note the occurrence number for further troubleshooting directions.			X		RC	C
0x61F9	4856	Internal Fault	An internal fault has been detected (connection from controller). Cycle power, check the internal wiring, contact the service provider if the fault persists. Note the occurrence number for further troubleshooting directions.			X		C	C
0x61FA	4816	PLC Task Overrun	The high CPU load is inhibiting normal operation of the application (PLC task overrun).		X				
0x61FA	4817	PLC Runtime Error	The PLC runtime has stopped responding. The application has been halted.			X		C	C
0x61FB	4600	Option Communication Fault	A fault of the communication with an option has been detected. Cycle power, check that the option is properly installed, contact the Danfoss supplier or the service department if the fault persists. Note the occurrence number for further troubleshooting directions.			X		RC	C
0x61FB	4601	Internal Communication Fault	An internal communication fault has been detected. Cycle power, check the wiring if applicable, contact the service provider if the fault persists. Note the occurrence number for further troubleshooting directions.		X				
0x61FB	4602	Option Communication Fault	A fault of the communication with an option has been detected. Cycle power, check that the option is properly installed, contact the Danfoss supplier or the service department if the fault persists. Note the oc-			X		C	C

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
			currence number for further troubleshooting directions.						
0x61FB	4607	Internal Communication Fault	An internal communication fault has been detected. Cycle power, check the wiring if applicable, contact the Danfoss supplier or the service department if the fault persists. Note the occurrence number for further troubleshooting directions.			X		C	C
0x61FB	4631	Internal Communication Fault	An internal communication fault has been detected. Cycle power, check the wiring if applicable, contact the Danfoss supplier or the service department if the fault persists. Note the occurrence number for further troubleshooting directions.			X		RC	C
0x61FB	4632	Internal Communication Fault	An internal communication fault has been detected. Cycle power, check the wiring if applicable, contact the service provider if the fault persists. Note the occurrence number for further troubleshooting directions.		X				
0x61FC	4605	Internal Communication Fault	An internal communication fault has been detected. Cycle power, check the wiring if applicable, contact the service provider if the fault persists. Note the occurrence number for further troubleshooting directions.			X		C	C
0x61FC	4606	Internal Communication Fault	An internal communication fault has been detected. Cycle power, check the wiring if applicable, contact the Danfoss supplier or the service department if the fault persists. Note the occurrence number for further troubleshooting directions.			X		C	C
0x61FC	4639	High Speed Bus Sync Error	Internal error detected with high-speed bus connection to parallel control unit			X		C	C
0x61FC	4648	High Speed Bus Error	Internal error detected with high-speed bus connection to parallel control unit			X		C	C
0x61FC	4858	Internal Fault	An internal fault has been detected. The power system has not received the required reference for modulation. Cycle power, check the wiring if applicable, contact the Danfoss supplier or the service department if the fault persists. Note the occurrence number for further troubleshooting directions.		X	X		C	
0x61FC	4859	Internal Fault	An internal fault (connection from power system) has been detected. Cycle power, check the internal wiring, contact the service provider if the fault persists. Note the occurrence number for further troubleshooting directions.		X	X		C	
0x61FC	4860	Unexpected Time Adjust	An internal fault (unexpected time adjustment) has been detected. Cycle power, check the internal wiring, contact the service provider if the fault persists.			X		C	C

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
			Note the occurrence number for further troubleshooting directions.						
0x61FC	4861	Synchronization Fault	An internal fault (time synchronization error between controller and power system) has been detected. Cycle power, check the internal wiring, contact the service provider if the fault persists. Note the occurrence number for further troubleshooting directions.			X		C	C
0x61FC	4862	PDS	Internal error detected with high-speed bus connection from controller.			X		C	C
0x61FC	4863	Internal Fault	An internal fault (connection with power system) has been detected. Cycle power, check the internal wiring, contact the service provider if the fault persists. Note the occurrence number for further troubleshooting directions.			X		C	C
0x61FD	4857	Software Update	The drive is currently performing an update of the software.	X					
0x61FF	4567	Restore Status	Provides information about the restore operation of a setting.	X					
0x6320	5301	Invalid Control Config.	An invalid control configuration is preventing operation.		X	X		C	
0x6320	5302	Start Blocked	Start of the motor is blocked. Check the Motor Ctrl. Ready Status Word for the cause.		X	X		C	
0x6320	6002	Invalid State Error	Motion command cannot be started due to current state.		X				
0x6320	6003	Invalid Input Error	Motion command cannot be executed because atleast 1 of the parameter is out of range.		X				
0x7080	5220	Brake Feedback Wrong State	Mechanical brake feedback is in a wrong state. Feedback state should reflect state of brake, except during opening or closing phases.		X				
0x7080	5221	Brake Priming Timeout	Brake priming has timed out. The drive could not produce the configured priming torque to open the brake safely.		X				
0x7080	5222	Brake Feedback Timeout	Brake feedback has timed out. The feedback signal is indicating that the mechanical brake has not opened or closeed within the configured time.		X				
0x7110	5204	Brake Resistor Test Active	The Brake Resistor Test is active. Normal run of the drive is not possible.		X				
0x7110	5205	Brake Resistor Test Failed	The Brake Resistor Test was unsuccessful. Check the brake resistor and its connections.			X		C	C
0x7110	5206	Brake Resistor Test Successful	The test of the brake resistor is performed successfully.	X					

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
0x7111	4403	Brake Ch. Switch Shorted	A short circuit of the brake chopper switch has been detected, which can be dangerous. Disconnect power. Service is required.		X	X		C	
0x7113	4400	Brake Chopper Overload	A brake chopper overcurrent has been detected. Reduce the brake voltage level and check the rating of the brake resistor.		X		X	C	C
0x7113	4401	Brake Resistor Temp. High	The brake resistor temperature is too high. Check the rating of the brake resistor and cooling conditions. Reduce the generated regenerative power.		X	X		C	C
0x7113	4402	Brake Resistor Missing	The brake resistor or its connection is missing.		X	X		C	
0x7113	4404	Brake Failure	A brake failure is detected, further testing will clarify the failure source. Coast first to run the test.		X			C	
0x7120	4177	Motor Thermal Overload	A thermal overload of the motor has been detected. Check if the shaft torque is too high.		X	X		C	
0x7120	4178	Motor Speed High	The motor speed is above the normal operating range.		X	X		C	
0x7120	5200	AMA Active	The AMA (Automatic Motor Adaptation) is active. Normal run of the motor is not possible. Apply a start signal to run the AMA.		X				
0x7120	5201	AMA Motor Data	The motor data measurement of the AMA (Automatic Motor Adaptation) was unsuccessful.			X		C	C
0x7120	5202	AMA Motor Type	The motor type detection of the AMA (Automatic Motor Adaptation) was unsuccessful.			X		C	C
0x7120	5203	AMA Successful	The AMA (Automatic Motor Adaptation) has been performed successfully.	X					
0x7120	5300	Invalid Motor Data	Invalid motor data is preventing operation. Check the motor data settings.		X	X		C	
0x71FC	4179	AMA Current Low	The nominal current of the motor is too low for accurate results of automatic motor adaptation (AMA).		X				
0x71FD	4181	Low Motor Saliency For High Frequency Injection Mode	Motor saliency is too low for HF injection mode.		X	X		C	
0x71FE	4180	Rotor Angle Detection Error	Rotor angle detection has failed. This might be as the motor is not suited to the drive or the motor is missing.		X	X		C	
0x71FF	4379	CM Current High	An excessive common mode current has been detected in the LCL-filter.		X	X		C	

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
0x72FE	4417	Feedback Option Fault	The Feedback Option is indicating a fault condition.			X		C	C
0x7310	4418	Bad Speed Feedback	Speed Feedback value is not reliable.			X		C	
0x7380	5500	Touch Probe not configured	Touch Probe Positioning ist not started due to missing configuration.		X				
0x7380	5501	Touch Probe invalid mode	Operation mode is not valid to start Touch Probe Positioning.		X				
0x7380	6006	Touch Probe Timeout Error	No touch probe event is detected during the set time limit.			X		C	C
0x7580	5141	Control Panel Connection Lost	The connection to the control panel is lost. Control via control panel is released.						
0x7580	5142	PC Connection Lost	The connection to the PC tool is lost. PC control is released.						
0x75FC	4256	Address Conflict	The fieldbus has identified an Address Conflict on the network which made the device back off.		X				
0x75FC	4257	Ethernet Cable Fault	At link down a measurement is done to measure the distance to the far end of the cable, indicating where the fault has occurred. This warning occurs at distances > 4 m and Link State Change Down. Actual distance shown in detailed info.		X				
0x75FC	4258	Invalid Fieldbus Configuration	An issue due to an invalid configuration of the fieldbus connection has been detected. Features not supported by the device, mismatch between configured and actually available features or modules not available in the device. See additional detail info.	X					
0x75FC	4260	Redundant Controller Missing	One or more of the expected fieldbus controllers are missing.		X				
0x75FC	4261	Fieldbus Topology Mismatch	The current fieldbus topology does not match the topology provided at commissioning time.		X				
0x75FC	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.	X					
0x75FC	4265	Ethernet Redundancy Error	Primary or backup physical paths has been detected missing.		X				
0x75FC	4266	X1 Cable Redundancy	Indicates that physical path from X1 interface to the controller is missing or wrongly configured.		X				

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
0x75FC	4267	X2 Cable Redundancy	Indicates that physical path from X2 interface to the controller is missing or wrongly configured.		X				
0x75FC	4268			X					
0x75FC	4269	Network Time Protocol	Information of Network Time Protocol server. See detailed info.	X					
0x75FC	4280	Controller Not in Run	Controller not in RUN state.	X					
0x75FC	4281	Interface Configuration Change	Interface configuration changed. See detailed info.	X					
0x75FD	4270			X					
0x75FD	4271			X					
0x75FD	4272			X					
0x75FD	4273	No EtherCAT Connection	No EtherCAT communication is currently established. Will happen during start-up until first connection is established. Or if all connections has stopped (gracefully or disruptive)	X					
0x75FD	4282	No Modbus TCP Connection	No Modbus RTU communication is currently established. Occurs during start-up until first connection is established, or if all connections has stopped (gracefully or disruptive).	X					
0x75FE	4274				X				
0x75FE	4275				X				
0x75FE	4276				X				
0x75FE	4277	Loss of EtherCAT Connection	One or more of the fieldbus I/O connections has failed. This can happen when an established fieldbus I/O Connection has been disrupted by e.g cable break or powercut of PLC or other infrastructure components		X				
0x75FE	4283	Loss of Modbus RTU Connection	One or more of the fieldbus I/O connections has failed. This can happen when an established fieldbus I/O connection has been disrupted by for example cable break or powercut of PLC or other infrastructure components.		X				
0x75FF	4278	Primary Process Data Timeout	The fieldbus I/O data has not been updating any of the process data monitored by the primary process data monitor (Watchdog1). This can happen when the fieldbus has lost control or the current transferred I/O data is not valid.			X		C	C

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
0x75FF	4279	Secondary Process Data Timeout	The fieldbus I/O Data has not been updating any of the process data monitored by the secondary process data monitor (Watchdog2). This can happen when the fieldbus has lost control or the current transferred I/O data is not valid.			X		C	C
0x8100	5162	Alternate Control Place due to Fieldbus Timeout	Fieldbus process data timeout changed to alternate control place		X				
0x8331	5171	Torque Limit Timeout Motoring	The drive has exceeded the allowed time in torque limit.			X		C	
0x8331	5172	Torque Limit Timeout Regenerative	The drive has exceeded the allowed time in torque limit.			X		C	
0x8400	5210	Below Min. Speed	The Speed Monitor has detected that the speed is below the configured minimum speed.			X		C	C
0x8400	5211	Below Min. Speed	The Speed Monitor has detected that the speed is below the configured minimum speed.		X				
0x8400	5290	Speed Too High	The speed monitor has detected that the speed is above the configured maximum.			X		C	C
0x8400	5291	Speed Too High	The speed monitor has detected that the speed is above the configured maximum.		X				
0x8400	5292	Start Below Min. Speed	The start took too long. The speed has not reached the minimum speed within the time frame configured.			X		C	C
0x8611	4192	Position Following Error	The actual position is outside the allowed range of the position error window around a position demand value for longer than the position error delay.		X				
0x8612	4193	Position Limit	Motor position is outside the allowed range [PositionMin, PositionMax].		X	X		C	C
0x8612	4194	Position Command Rejected	Position command was rejected because of position software end limit.		X				
0x8612	4195	Hardware End Limit	The positioning controller detected that the drive is exceeding the hardware end Limits.		X	X		C	C
0x8613	6004	Homing Error	Homing could not be completed due to an error during the execution of the homing procedure.			X		C	C
0x8700	6005	Superimposed Error	Drive signaled a superimposed error during the run.			X		C	C

Group Number (Hex)	Number (Decimal)	Display Name	Description	Type of Event				Inverter and Brake Chopper Action	
				I	W	F	PF	Inverter	Brake
0x9080	5230	Lost Load Detected	Drive is not detecting any load on the motor shaft.						
0xF004	5270	Inertia Estimation Active	The drive is ready for performing the Inertia Estimation. A start command is required.		X				
0xF004	5271	Inertia Estimation Failed	The Inertia Estimation failed.			X		C	C
0xF004	5272	Inertia Estimation Successful	Inertia Estimation has been performed successfully.	X					
0xFF01	5123	External Exception 1	External Exception 1.			X		C	
0xFF01	5124	External Exception 2	External Exception 2.			X		C	
0xFFFE	4304	License Missing	A required license is missing.		X				
0xFFFF	4349	Authenticity Error	Files authenticity verification error occurred.			X		RC	C
0xFFFF	4350	Configuration Error	An invalid system configuration has been detected.		X	X		C	C
0xFFFF	4351	System Fault	A system fault has been detected. See additional information for details.			X		C	C
0xFFFF	4357	Firmware Crash	A firmware crash occurred and detailed information is provided.			X		C	C

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