LVD
Digital Servo Drive

CANopen Reference Manual

Revision 2.0

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Important Notice

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1 Introduction

Documentation

About This Manual

This manual describes the implementation of CiA 402 and 301 CANopen protocols in the LVD digital servo drive. This manual is not meant to replace the CANopen specifications, or to reproduce them.

This manual is intended for skilled personnel who have been trained to work with the equipment described.

Documentation Set for the LVD

This manual is part of a documentation set. The set consists of the following:

- **LVD User Manual**. Hardware installation, configuration and operation.
- **LVD VarCom Reference Manual**. Parameters and commands used to program the LVD.
- **LVD CANopen Reference Manual**. LVD implementation of CiA 402 and 301 protocols.

2 System Overview

Device Communication Architecture

The communication interface of the LVD follows the CiA CANopen specifications (can-cia.org), as follows:

- DS-301 V4.2: Communication Profile for Industrial Systems
- DSP 402 V3.0: Device Profile for Drives and Motion Control
- DS-306 V1.3: Electronic Data Sheet Specification

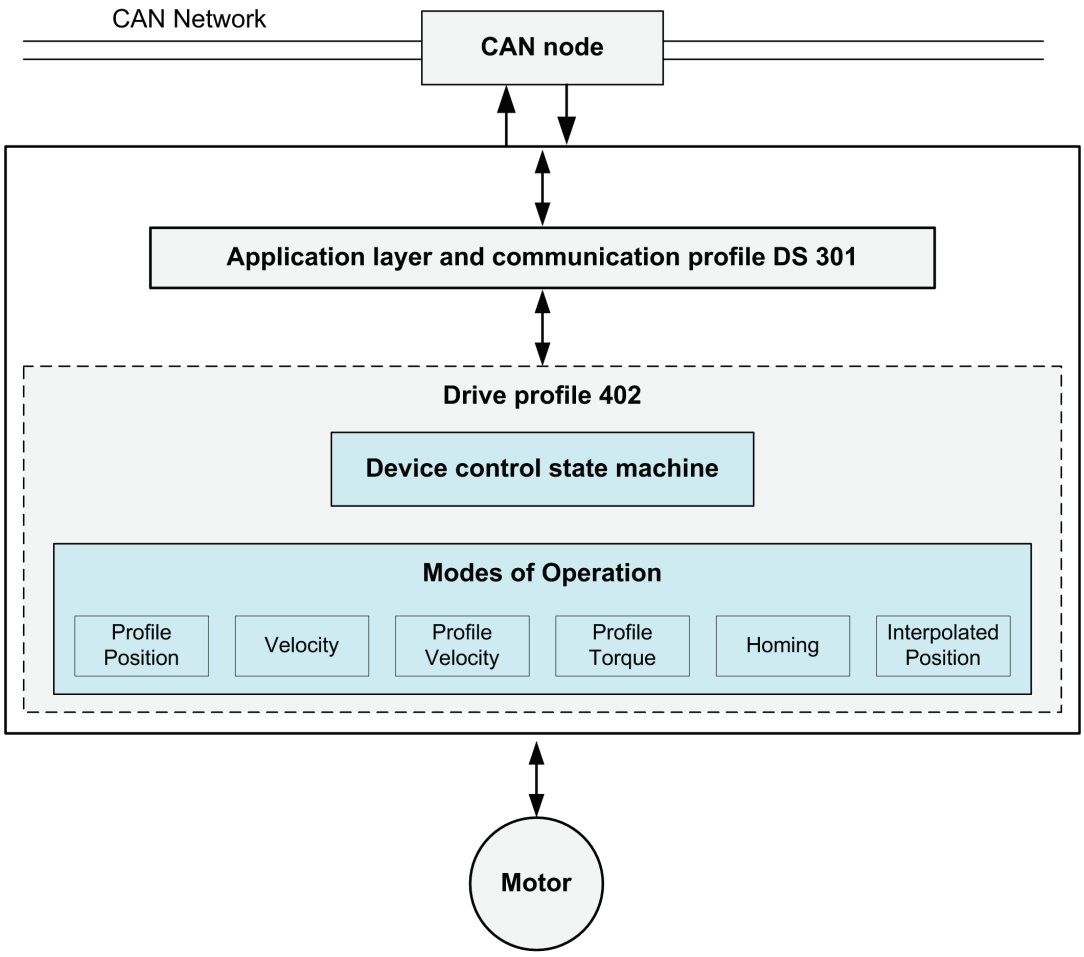

Figure 2-1. Communication Architecture

Device Control	Starting and stopping of the drive and several mode-specific commands are executed by the state machine.
Modes of Operation	The operating mode defines the behavior of the drive.

Communications Objects – PDO and SDO

The **communication** objects are described by the services and protocols. All services are described in a tabular form that contains the parameters of each service primitive that is defined for that service. The primitives that are defined for a particular service determine the service type; for example, confirmed, unconfirmed. All services assume that no failures occur in the data link layer and physical layer of CAN. These failures are resolved by the application.

Process Data Object (PDO)

Real-time data transfer is performed by means of **process data objects** (PDO). The transfer of PDO is performed without any protocol overhead.

The PDO correspond to objects in the object dictionary and provide the interface to the application objects. Data type and mapping of application objects into a PDO is determined by a corresponding default PDO mapping structure within the object dictionary. If variable PDO mapping is supported, the number of PDO and the mapping of application objects into a PDO may be transmitted to a CANopen device during the configuration process, by applying the SDO services to the corresponding objects of the object dictionary.

There are two types of usage for PDO – data transmission and data reception – termed Transmit-PDO (TPDO) and Receive-PDO (RPDO), respectively. CANopen devices supporting TPDO are PDO producers, and CANopen devices supporting RPDO are called PDO consumers. PDO are described by the PDO communication parameter and the PDO mapping parameter. The PDO communication parameter describes the communication capabilities of the PDO. The PDO mapping parameter contains information about the contents of the PDO.

For each PDO, the pair of communication and mapping parameter is mandatory. The objects introduced above are described in *Chapter 4*.

Service Data Object (SDO)

A SDO provides direct access to object entries of a CANopen device object dictionary. As these object entries contain data of arbitrary size and data type, the SDOs are used to transfer multiple data sets (each containing an arbitrary large block of data) from a client to a server and vice versa. The client controls, via a multiplexer (index and sub-index of the object dictionary), which data set is transferred. The content of the data set is defined within the object dictionary.

Basically, an SDO is transferred as a sequence of segments. Prior to transferring the segments there is an initialization phase where client and server prepare themselves for transferring the segments. For SDOs, it is also possible to transfer a data set of up to four bytes during the initialization phase. This mechanism is called SDO expedited transfer.

Always the client initiates an SDO transfer for any type of transfer. The owner of the accessed object dictionary is the server of the SDO. Either the client or the server can take the initiative to abort the transfer of an SDO.

By means of an SDO, a peer-to-peer communication channel between two CANopen devices is established. A CANopen device supports more than one SDO. One supported Server-SDO is the default case (Default SDO).

Device Control and State Machine

Introduction

The power drive system finite-state automaton (PDS FSA) is an abstraction to define the behavior of a black box as a control device experiences the PDS. It defines the application behavior of the PDS. Because a PDS is required to provide local control even when the communication network is not functioning properly, the communication FSA and the PDS FSA are only loosely coupled.

Figure 2-2 shows how the PDS operates locally or via the network remotely. The PDS is operated by the controlword sent by the control device via the network. The state of the PDS is reported by the statusword produced by the drive device. The FSA is also controlled by error detection signals.

The PDS FSA defines the PDS status and the possible control sequence of the PDS. A single state represents a special internal or external behavior. The state of the PDS also determines which commands are accepted. For example, it is only possible to start a point-to-point move when the drive is in the operation enabled state.

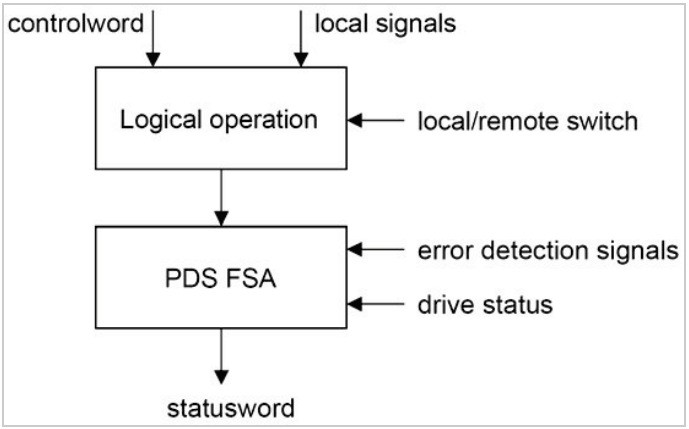

Figure 2-2. Remote and Local Control

Finite State Automaton

Figure 2-3 illustrates the PDS FSA behavior. It takes into consideration the control of the power electronics, with accordance to user commands and internal drive faults.

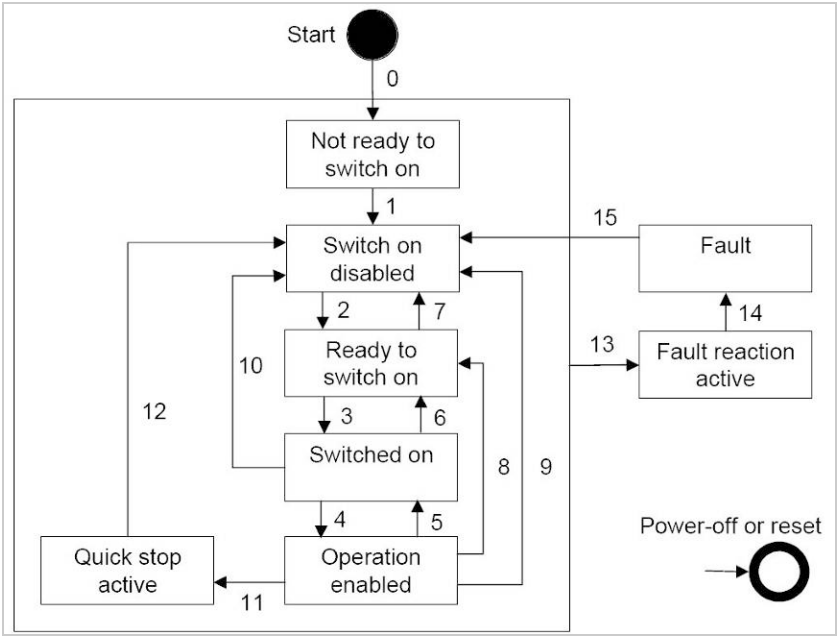

Figure 2-3. Power Drive System Finite State Automaton

The FSA states support the functions as shown in *Table 2-1*. The start state is a pseudo state indicating the start when the FSA is activated, during the start-up sequence of the device drive's application software.

Table 2-1. FSA States and Supported Functions

Function	FSA States							
	Not Ready to Switch On	Switch On Disabled	Ready to Switch On	Switched On	Operation Enabled	Quick Stop Active	Fault Reaction Active	Fault
Brake applied, if present	Yes	Yes	Yes	Yes	Yes/ No	Yes/ No	Yes/ No	Yes
Low-level power applied	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
High-level power applied	Yes/ No	Yes/ No	Yes/ No	Yes/ No	Yes	Yes	Yes	Yes/ No
Drive function enabled	No	No	No	No	Yes	Yes	Yes	No
Configuration allowed	No	Yes	Yes	Yes	Yes/ No	Yes/ No	Yes/ No	Yes

The drive device supports transitions and actions as shown in *Table 2-2*. The events initiate the transition. The transition is terminated after the action has been performed.

Table 2-2. Transition Events and Actions

Transition	Events	Actions
0	Automatic transition after power-on or reset application.	Drive device self-test and/or self initialization is performed.
1	Automatic transition.	Communication is activated.
2	Shutdown command from control device or local signal.	None
3	Switch on command received from control device or local signal.	Power section is switched on, if not already switched on.
4	Enable operation command received from control device or local signal.	Drive function is enabled.
5	Disable operation command received from control device or local signal.	Drive function is disabled.
6	Shutdown command received from control device or local signal.	High-power is switched-off immediately, and the motor is free to rotate if not braked. Additional action depends on the shutdown option code.
7	Quick stop or disable voltage command from control device or local signal.	None
8	Shutdown command from control device or local signal.	High-power is switched-off immediately, if possible. Motor is free to rotate, if not braked.
9	Disable voltage command from control device or local signal.	High-power is switched-off immediately, if possible. Motor is free to rotate, if not braked.
10	Disable voltage or quick stop command from control device or local signal.	High-power is switched-off immediately, if possible. Motor is free to rotate, if not braked.
11	Quick stop command from control device or local signal.	Quick stop function is started.
12	Automatic transition when the quick stop function is completed or disable voltage command received from control device (depends on the quick stop option code).	Power section is switched-off.
13	Fault signal.	Configured fault reaction function is executed.
14	Automatic transition.	Drive function is disabled. High-power is switched-off.

Transition	Events	Actions
15	Fault reset command from control device or local signal.	If the fault condition on the drive device no longer exists, the fault reset bit in the controlword is cleared by the control device.

When a state transition is requested, the related action is processed completely before transitioning to the new state. For example, when a drive device is in Operation Enabled state and receives a disable operation command, the drive device continues in the Operation Enabled state until the disable operation function has completed.

When the drive function is disabled, it implies that no energy is supplied to the motor. Target and set-point values (for example, torque, velocity, position) are not processed.

When the drive function is enabled, it implies that energy is supplied to the motor. Target and set-point values are processed.

When a fault is detected in the drive device, the state changes to the Fault Reaction Active state. In this state, the PDS executes a special fault reaction. After the execution of this fault reaction, the drive device switches automatically to the Fault state. This state can only be changed using the fault reset command and only when the fault is no longer active.

When a fatal error occurs, the drive device is no longer able to control the motor, and an immediate switch-off of the drive device occurs.

Object Units

The physical dimensions for position, velocity and acceleration parameters are constant.

Table 2-3. Default Unit Dimensions

Unit Dimension	Definition
Position units	counts (4 × encoder lines / revolution)
Velocity units	0.01 × rpm (0.01 × revolutions per minute)
Acceleration units	rpm/s (velocity unit/second)
Current units	milliampere (mA)

Object Access Types

Table 2-4. Object Access Types

Unit Dimension	Definition
Read/Write	Read and write access
Read only	Read only
Constant	Read only access, value is constant

CANopen Node Address

Within the CANopen network, a unique node address (identification number) is allocated to each individual CANopen device. The LVD node address is set using hardware switches.

CAN Bitrate

Fixed at 1 Mbps.

3 Error Handling

Emergency Message Frame

Upon detection of device-internal errors, the LVD will transmit emergency message frames over the CANopen network using COB-ID EMCY. An emergency message frame will be transmitted only once per error event and consists of the error code and the actual state of the Error Register object.

Table 3-1. Emergency Message Frame

Byte	0	1	2	3	4	5	6	7
Description	Error code		Error register	Not used (always 0)				

Error Codes

Emergency messages are triggered by internal errors and severe warnings detected within the drive device. The messages contain a 16-bit error code. Error codes from xx00h to xx7Fh are defined in *Table 3-2*. Error codes between xx80h and xxFFh are manufacturer-specific.

Table 3-2. Error Codes

Error Code	Description
0x2130	Over-current fault
0x2310	I2T fault
0x3110	Over-voltage fault
0x3120	Under-voltage fault
0x4310	Over temperature fault
0x5430	EEPROM fault
0x5530	EEPROM checksum fault
0x7122	Commutation fault
0x7305	Encoder line break fault
0x7310	Over-speed fault
0x8400	Maximum velocity error fault
0x8611	Following error window fault
0xF001	Acceleration/deceleration violation fault
0xFF00	Maximum position derivative fault
0xFF02	Illegal Halls fault

Error Code 0x2130: Over-Current

Hardware or software over-current was detected. The maximum current value is set at DiPeak object (0x2430).

Error Code 0x2310: I2T Fault

Energy usage is higher than the I2T limit value (object 0x2481). The value of I2T value (object 0x2480) is greater than the value of I2T limit value (object 0x2481).

Error Code 0x3110: Over-Voltage

Bus voltage exceeds the value that is set at the over-voltage fault level object (0x2488).

Error Code 0x3120: Under-Voltage

Bus voltage is lower than the value that is set at the under-voltage fault level object (0x2489).

Error Code 0x4310: Over-Temperature

The temperature of the drive is higher than 90°C (194°F) or lower than -30°C (-22°F), or the temperature sensor has a malfunction.

Check the drive operation conditions, using drive temperature object (0x2400) to read the measured temperature. Or, reduce the load on the drive.

Error Code 0x5430: EEPROM Fault

The drive's firmware could not access the EEPROM. Reset the drive, and try again. Or, the EEPROM might be damaged and the drive requires service.

Error Code 0x5530: EEPROM Checksum Fault

Checksum error while loading parameters. Use the command object 0x1011 to reload the parameters from the EEPROM. Or, the EEPROM might be damaged and the drive requires service.

Error Code 0x7122: Commutation Fault

A mismatch between the position of the Hall sensors and the encoder. Check encoder resolution value (object 0x2412), encoder direction value (object 0x2413) and the Halls cable. Call the CONFIG function (object 0x2620).

Error Code 0x7305: Encoder Line Break Fault

A disconnection of one of the encoder inputs was detected. Check the encoder cable wiring. If single ended encoder is used, set the value of object (0x2414) to 0.

Error Code 0x7310: Over-Speed Fault

Actual speed exceeds the velocity over speed value (object 0x2423).

Error Code 0x8400: Maximum Velocity Error Fault

The difference between the velocity command and the actual velocity is greater than the value that is set in maximum velocity error (object 0x2421).

Error Code 0x8611: Following Error Window Fault

The difference between the position command and the actual position is greater than the value that is set in the following error window (object 0x6065). Check control loops parameters. Check the demanded velocity, acceleration and deceleration. Alternately, increase the value of the following error window.

Error Code 0xF001: Acceleration/Deceleration Violation Fault

The motor acceleration or deceleration is greater than the value of the maximum acceleration (object 0x60c5). Check control loops parameters. Check the demanded velocity, acceleration and deceleration. Or, increase the value of the maximum acceleration, or set it to 0 to disable this functionality.

Error Code 0xFF00: Maximum Position Derivative Fault

The difference between two sequential position commands is greater than the value of the maximum position derivative (object 0x2470). Check motion controller configuration. Check the demanded velocity, acceleration and deceleration. Or, increase the value of the maximum position derivative, or set it to 0 to disable this functionality.

Note: Interpolated mode only.

Error Code 0xFF02: Illegal Halls Fault

Illegal state for reading the Hall sensors. Check Hall cable wiring. Also, check that Hall sensors are functioning.

4 Object List

Format Overview

The objects are presented in this chapter in hexadecimal order, in the following format.

0x*nnnn Object Name*

Object

Description	Description of the object
Firmware	The earliest version, or specific versions, in which the described functionality is available.
Object code	Variable | Array | Constant
Data type	Unsigned8 | Unsigned16 | Unsigned32 | Integer8 | Integer16 | Integer32 IDENTITY | SDO_PARAMETER | PDO_COMM_PAR | PDO_COMM_PAR | PDO_MAPPING | VISIBLE_STRING

Entry

Sub-index	Identification of the sub-index
Description	Description of the sub-index
Entry category	Optional | Mandatory
Data type	Unsigned8 | Unsigned16 | Unsigned32 | Integer8 | Integer16 | Integer32
Access	Read/Write | Read only | Constant
PDO mapping	Yes | No
Default value	The object's default value.
Range	Discrete values and ranges of values.
Units	When the object value implies units of measure, these units are specified.

Communication Profile Objects

0x1000 Device Type

Object

Description	Specifies the kind of device. The lower 16 bits contain the device profile number; the upper 16 bits contain additional information.
Firmware	3.1.0
Object code	Variable
Data type	Unsigned32
Access	Constant
PDO mapping	No
Default value	0x00020192
Range	0x0 – 0xFFFFFFFF
Units	Not Applicable

0x1001 Error Register

Object

Description	A field of 8 bits, each of which indicates a particular type of error. If an error occurs, the bit must be set. Bit Description 0 = Generic error 1 = Current 2 = Voltage 3 = Temperature 4 = Communication error (overrun, error state) 5 = Device profile specific 6 = Reserved 7 = Manufacturer specific
Firmware	3.1.0
Object code	Variable
Data type	Unsigned8
Access	Read only
PDO mapping	No
Default value	0x0
Range	0x0 – 0xFF
Units	Not Applicable

0x1003 Predefined Error Field

Object

Description	Holds errors that occurred on the device and were signaled via the Emergency object. It is an error history. Writing to sub-index 0 deletes the entire error history.
Firmware	3.1.0
Object code	Array
Data type	Unsigned32

Entry

Sub-index	000	001 – 002 – 003 – 004 – 005 006 – 007 – 008 – 009 – 010
Description	Number of errors	Standard error field
Entry category	Mandatory	Mandatory
Data type		Unsigned32
Access	Read/Write	Read only
PDO mapping	No	No
Default value	0xA	0x0
Range	0x0 – 0xFE	0x0 – 0xFFFFFFFF
Units	Not Applicable	Not Applicable

0x1005 COB-ID SYNC

Object

Description	COB-ID of the Synchronization object. The device generates a Sync message if bit 30 is set. The meaning of other bits is the same as for other communication objects.
Firmware	3.1.0
Object code	Variable
Data type	Unsigned32
Access	Read/Write
PDO mapping	No
Default value	0x80000080
Range	0x1 – 0xFFFFFFFF
Units	Not Applicable

0x1007 Synchronous Window Length

Object

Description	Contains the length of the time window for synchronous messages. It is 0, if not used.
Firmware	3.1.0
Object code	Variable
Data type	Unsigned32
Access	Read/Write
PDO mapping	No
Default value	0x000003E8
Range	0x0 – 0xFFFFFFFF
Units	µs

0x1010 Store Parameter Field

Object

Description	Saves parameters in non-volatile memory. Write the value 0x65766173 (ASCII value of "save") to sub-index 1 to save the drive parameters.
Firmware	3.1.0
Object code	Array
Data type	Unsigned32

Entry

Sub-index	000	001
Description	Number of entries	Save all parameters
Entry category	Optional	Optional
Data type		Unsigned32
Access	Read only	Read/Write
PDO mapping	No	No
Default value	0x1	0x0
Range	0x0 – 0x7F	0x0 – 0xFFFFFFFF
Units	Not Applicable	Not Applicable

0x1011 Restore Default Parameters

Object

Description	Loads all saved parameters from non-volatile memory. Sub-index 1 loads all parameters and manufacturer-defined parameters. Write the value 0x64616F6C (ASCII value of "load") to sub-index 1 to restore the drive parameters.
Firmware	3.1.0
Object code	Array
Data type	Unsigned32

Entry

Sub-index	000	001
Description	Number of entries	Restore all default parameters
Entry category	Optional	Optional
Data type		Unsigned32
Access	Read only	Read/Write
PDO mapping	No	No
Default value	0x1	0x0
Range	0x0 – 0x7F	0x0 – 0xFFFFFFFF
Units	Not Applicable	Not Applicable

0x1014 COB-ID EMCY

Object

Description	COB-ID used for emergency message (Emergency Server).
Firmware	3.1.0
Object code	Variable
Data type	Unsigned32
Access	Read only
PDO mapping	No
Default value	0x80
Range	0x1 – 0xFFFFFFF
Units	Not Applicable

0x1015 Inhibit Time Emergency

Object

Description	Inhibit time used for emergency message (Emergency Server). The time must be a multiple of 100 ms.
Firmware	3.1.0
Object code	Variable
Data type	Unsigned16
Access	Read/Write
PDO mapping	No
Default value	0x0
Range	0x0 – FFFF
Units	Not Applicable

0x1017 Producer Heartbeat Time

Object

Description	Defines the cycle time of the heartbeat. If 0, it is not used. The time must be a multiple of 1 ms.
Firmware	3.1.0
Object code	Variable
Data type	Unsigned16
Access	Read/Write
PDO mapping	No
Default value	0x000000FA
Range	0x0 – FFFF
Units	Not Applicable

0x1018 Identity Object

Object

Description	Contains general information about the device. Sub-index 1 contains a unique value allocated to each manufacturer. Sub-index 2 identifies the manufacturer specific product code (device version). Sub-index 3 contains the revision number. Bit 31-16 is the major revision number and Bit 15-0 the minor revision number. Sub-index 4 identifies a manufacturer specific serial number.
Firmware	3.1.0
Object code	Record
Data type	IDENTITY

Entry

Sub-index	**000**	**001**	**002—003—004**
Description	Number of entries	Vendor ID	002=Product code 003=Revision number 004=Serial number
Entry category	Mandatory	Mandatory	Optional
Data type		Unsigned32	Unsigned32
Access	Read only	Read only	Read only
PDO mapping	No	No	No
Default value	0x4	0x02E1	0x0
Range	0x1 – 0x4	0x0 – 0xFFFFFFFF	0x0 – 0xFFFFFFFF
Units	Not Applicable	Not Applicable	Not Applicable

0x1200 Server SDO Parameter 1

Object

Description	Contains the parameters for the SDOs for which the device is the server.
Firmware	3.1.0
Object code	Record
Data type	SDO_PARAMETER

Entry

Sub-index	000	001	002
Description	Number of entries	COB-ID Client -> Server	COB-ID Client -> Server
Entry category	Optional	Mandatory	Mandatory
Data type		Unsigned32	Unsigned32
Access	Read only	Read only	Read only
PDO mapping	No	No	No
Default value	0x02	0x00000600	0x00000580
Range	0x02	0x00000600 – 0xBFFFFFFF	0x00000580 – 0xBFFFFFFF
Units	Not Applicable	Not Applicable	Not Applicable

0x1400 Receive PDO Communication Parameter 1

Object

Description	Contains the communication parameters of the current PDO the device is able to receive. Sub-index 0 contains the number of PDO-parameters implemented. Sub-index 1 describes the COB-ID. If bit 31 is set, the PDO is disabled. Sub-index 2 defines the transmission type.
Firmware	3.1.0
Object code	Record
Data type	PDO_COMM_PAR

Entry

Sub-index	000	001	002
Description	Number of entries	COB-ID	Transmission type
Entry category	Optional	Optional	Optional
Data type		Unsigned32	Unsigned8
Access	Read only	Read/Write	Read/Write
PDO mapping	No	No	No
Default value	0x02	0x200	0x1
Range	0x02 – 0x05	0x1 – 0xFFFFFFFF	0x0 – 0xFF
Units	Not Applicable	Not Applicable	Not Applicable

0x1401 Receive PDO Communication Parameter 2

Object

Description	Contains the communication parameters of the current PDO the device is able to receive. Sub-index 0 contains the number of PDO-parameters implemented. Sub-index 1 describes the COB-ID. If bit 31 is set, the PDO is disabled. Sub-index 2 defines the transmission type.
Firmware	3.1.0
Object code	Record
Data type	PDO_COMM_PAR

Entry

Sub-index	000	001	002
Description	Number of entries	COB-ID	Transmission type
Entry category	Optional	Optional	Optional
Data type		Unsigned32	Unsigned8
Access	Read only	Read/Write	Read/Write
PDO mapping	No	No	No
Default value	0x02	0x300	0x1
Range	0x2 – 0x5	0x1 – 0xFFFFFFFF	0x0 – 0xFF
Units	Not Applicable	Not Applicable	Not Applicable

0x1402 Receive PDO Communication Parameter 3

Object

Description	Contains the communication parameters of the current PDO the device is able to receive. Sub-index 0 contains the number of PDO-parameters implemented. Sub-index 1 describes the COB-ID. If bit 31 is set, the PDO is disabled. Sub-index 2 defines the transmission type.
Firmware	3.1.0
Object code	Record
Data type	PDO_COMM_PAR

Entry

Sub-index	000	001	002
Description	Number of entries	COB-ID	Transmission type
Entry category	Optional	Optional	Optional
Data type		Unsigned32	Unsigned8
Access	Read only	Read/Write	Read/Write
PDO mapping	No	No	No
Default value	0x02	0x400	0x1
Range	0x2 – 0x5	0x1 – 0xFFFFFFFF	0x0 – 0xFF
Units	Not Applicable	Not Applicable	Not Applicable

0x1600 Receive PDO Mapping Parameter 1

Object

Description	The sub-indices contain the indices, the sub-indices and the lengths of the mapped sub-indices. Their structure is as follows: index (16-bit) sub-index (8-bit) length (8-bit)
Firmware	3.1.0
Object code	Record
Data type	PDO_MAPPING

Entry

Sub-index	000	001	002	003
Description	Number of entries	Mapping entry 1	Mapping entry 2	Mapping entry 3
Entry category	Mandatory	Optional	Optional	Optional
Data type		Unsigned32	Unsigned32	Unsigned32
Access	Read/Write	Read/Write	Read/Write	Read/Write
PDO mapping	No	No	No	No
Default value	0x3	0x60710010	0x25000020	0x60730010
Range	0x0 – 0x40	0x0 – 0xFFFFFFFF	0x0 – 0xFFFFFFFF	0x0 – 0xFFFFFFFF
Units	Not Applicable	Not Applicable	Not Applicable	Not Applicable

0x1601 Receive PDO Mapping Parameter 2

Object

Description	The sub-indices contain the indices, the sub-indices and the lengths of the mapped sub-indices. Their structure is as follows: index (16-bit) sub-index (8-bit) length (8-bit)
Firmware	3.1.0
Object code	Record
Data type	PDO_MAPPING

Entry

Sub-index	000	001	002	003
Description	Number of entries	Mapping entry 1	Mapping entry 2	Mapping entry 3
Entry category	Mandatory	Optional	Optional	Optional
Data type		Unsigned32	Unsigned32	Unsigned32
Access	Read/Write	Read/Write	Read/Write	Read/Write
PDO mapping	No	No	No	No
Default value	0x3	0x60FF0020	0x60710010	0x60730010
Range	0x0 – 0x40	0x0 – 0xFFFFFFFF	0x0 – 0xFFFFFFFF	0x0 – 0xFFFFFFFF
Units	Not Applicable	Not Applicable	Not Applicable	Not Applicable

0x1602 Receive PDO Mapping Parameter 3

Object

Description	The sub-indices contain the indices, the sub-indices and the lengths of the mapped sub-indices. Their structure is as follows: index (16-bit) sub-index (8-bit) length (8-bit)
Firmware	3.1.0
Object code	Record
Data type	PDO_MAPPING

Entry

Sub-index	000	001	002	003
Description	Number of entries	Mapping entry 1	Mapping entry 2	Mapping entry 3
Entry category	Mandatory	Optional	Optional	Optional
Data type		Unsigned32	Unsigned32	Unsigned32
Access	Read/Write	Read/Write	Read/Write	Read/Write
PDO mapping	No	No	No	No
Default value	0x3	0x60730010	0x60FE0120	0x60710010
Range	0x0 – 0x40	0x0 – 0xFFFFFFFF	0x0 – 0xFFFFFFFF	0x0 – 0xFFFFFFFF
Units	Not Applicable	Not Applicable	Not Applicable	Not Applicable

0x1800 Transmit PDO Communication Parameter 1

Object

Description	Contains the communication parameters of the current PDO the device is able to transmit. Sub-index 0 contains the number of PDO-parameters implemented. Sub-index 1 describes the COB-ID. If bit 31 is set, the PDO is disabled. Sub-index 2 defines the transmission type.
Firmware	3.1.0
Object code	Record
Data type	PDO_COMM_PAR

Entry

Sub-index	000	001	002
Description	Number of entries	COB-ID	Transmission type
Entry category	Mandatory	Optional	Optional
Data type		Unsigned32	Unsigned8
Access	Read only	Read/Write	Read/Write
PDO mapping	No	No	No
Default value	0x02	0x180	0x1
Range	0x2 – 0x6	0x1 – 0xFFFFFFFF	0x0 – 0xFF
Units	Not Applicable	Not Applicable	Not Applicable

0x1801 Transmit PDO Communication Parameter 2

Object

Description	Contains the communication parameters of the current PDO the device is able to transmit. Sub-index 0 contains the number of PDO-parameters implemented. Sub-index 1 describes the COB-ID. If bit 31 is set, the PDO is disabled. Sub-index 2 defines the transmission type
Firmware	3.1.0
Object code	Record
Data type	PDO_COMM_PAR

Entry

Sub-index	**000**	**001**	**002**
Description	Number of entries	COB-ID	Transmission type
Entry category	Optional	Optional	Optional
Data type		Unsigned32	Unsigned8
Access	Read only	Read/Write	Read/Write
PDO mapping	No	No	No
Default value	0x02	0x280	0x1
Range	0x2 – 0x6	0x1 – 0xFFFFFFF	0x0 – 0xFF
Units	Not Applicable	Not Applicable	Not Applicable

0x1A00 Transmit PDO Mapping Parameter 1

Object

Description	Contains the mapping for the PDOs the device is able to transmit. The type of the PDO mapping parameter is at index 21h. The sub-index 0 contains the number of valid entries within the mapping record. This number of entries is also the number of the application variables which is transmitted with the corresponding PDO. The sub-indices from 1 to number of entries contain the information about the mapped application variables. These entries describe the PDO contents by their index, sub-index and length. All three values are hexadecimal coded. The length entry contains the length of the object in bits (1..0x40). This parameter can be used to verify the overall mapping length. It is mandatory.
Firmware	3.1.0
Object code	Record
Data type	PDO_MAPPING

Entry

Sub-index	**000**	**001**	**002**	**003**
Description	Number of entries	Mapping entry 1	Mapping entry 2	Mapping entry 3
Entry category	Mandatory	Optional	Optional	Optional
Data type		Unsigned32	Unsigned32	Unsigned32
Access	Read/Write	Read/Write	Read/Write	Read/Write
PDO mapping	No	No	No	No
Default value	0x3	0x60610008	0x24840010	0x606C0020
Range	0x0 – 0xFF	0x0 – 0xFFFFFFFF	0x0 – 0xFFFFFFFF	0x0 – 0xFFFFFFFF
Units	Not Applicable	Not Applicable	Not Applicable	Not Applicable

0x1A01 Transmit PDO Mapping Parameter 2

Object

Description	Contains the mapping for the PDOs the device is able to transmit. The type of the PDO mapping parameter is at index 21h. The sub-index 0 contains the number of valid entries within the mapping record. This number of entries is also the number of the application variables which is transmitted with the corresponding PDO. The sub-indices from 1 to number of entries contain the information about the mapped application variables. These entries describe the PDO contents by their index, sub-index and length. All three values are hexadecimal coded. The length entry contains the length of the object in bits (1..0x40). This parameter can be used to verify the overall mapping length. It is mandatory.
Firmware	3.1.0
Object code	Record
Data type	PDO_MAPPING

Entry

Sub-index	**000**	**001**	**002**	**003**
Description	Number of entries	Mapping entry 1	Mapping entry 2	Mapping entry 3
Entry category	Mandatory	Optional	Optional	Optional
Data type		Unsigned32	Unsigned32	Unsigned32
Access	Read/Write	Read/Write	Read/Write	Read/Write
PDO mapping	No	No	No	No
Default value	0x3	0x60FA0020	0x60710010	0x60730010
Range	0x0 – 0xFF	0x0 – 0xFFFFFFFF	0x0 – 0xFFFFFFFF	0x0 – 0xFFFFFFFF
Units	Not Applicable	Not Applicable	Not Applicable	Not Applicable

Manufacturer-Specific Objects

0x2100 Parameter Help String1

Object

Description	Returns the help string for a requested command (a CANopen object). The help string is divided into 2 strings, which are located in objects 0x2100 (first string) and 0x2101 (second string). Writes the requested command's CANopen index in object 0x2105, and reads the help string in objects 0x2100 and 0x2101.
Firmware	3.1.0
Object code	Variable
Data type	VISIBLE_STRING
Access	Read only
PDO mapping	No
Default value	0x0
Range	Not Applicable
Units	Not Applicable

0x2101 Parameter Help String2

Object

Description	Returns the help string for a requested command (a CANopen object). The help string is divided into 2 strings, which are located in objects 0x2100 (first string) and 0x2101 (second string). Writes the requested command's CANopen index in object 0x2105, and reads the help string in objects 0x2100 and 0x2101.
Firmware	3.1.0
Object code	Variable
Data type	VISIBLE_STRING
Access	Read only
PDO mapping	No
Default value	Not Applicable
Range	Not Applicable
Units	Not Applicable

0x2105 Parameter Help Index

Object

Description	Gets/sets the CANopen index of the command to which a help string is requested. Writes the requested command's CANopen index in object 0x2105 and reads the help string in objects 0x2100 and 0x2101.
Firmware	3.1.0
Object code	Variable
Data type	Unsigned32
Access	Read/Write
PDO mapping	No
Default value	0x0 – 0x0
Range	0xFFFFFFF
Units	Not Applicable

0x2110 Parameter in List

Object

Description	Lists the indexes of all the parameters that are saved in the non-volatile memory (EEPROM). Sets sub-index 1 to 0 to start enumeration. Reads sub-index 2 to retrieve the CANopen index of the EEPROM parameter. On each read the enumerator will automatically advance. Enumeration ends when reading 0xFFFFFFFF.
Firmware	3.1.0
Object code	Array
Data type	Unsigned32

Entry

Sub-index	000	001	002
Description	Number of entries	Parameter in list index	Parameter in list
Entry category	Optional	Optional	Optional
Data type		Unsigned32	Unsigned32
Access	Read only	Read/Write	Read Only
PDO mapping	No	No	No
Default value	0x2	0x0	0x0
Range	0x0 – 0xFFFFFFF	0x0 – 0xFFFFFFF	0x0 – 0xFFFFFFF
Units	Not Applicable	Not Applicable	Not Applicable

0x2120 Load Factory Defaults

Object

Description	Loads the factory default values for all non-volatile parameters.
Firmware	3.1.0
Object code	Variable
Data type	Integer32
Access	Read/Write
PDO mapping	No
Default value	0x0
Range	0x80000000 – 0x7FFFFFF
Units	Not Applicable

0x2200 Firmware Version

Object

Description	Gets the firmware version of the drive.
Firmware	3.1.0
Object code	Variable
Data type	VISIBLE_STRING
Access	Read only
PDO mapping	No
Default value	Not Applicable
Range	Not Applicable
Units	Not Applicable

0x2300 Recorder Channels

Object

Description	Recording channels select the recorded data (the CANopen index of the first channel in sub-index 1, the CANopen index of the second channel in sub-index 2, etc.). Up to 4 channels are available for recording simultaneously. The total length of the recording depends on the number of channels selected. Recording length = 62.5µs × sample period × recording memory size / number of channels
Firmware	3.1.0
Object code	Array
Data type	Unsigned32

Entry

Sub-index	000	001	002–003–004–005
Description	Number of entries	Number of records	002=Channel 1 index 003=Channel 2 index 004=Channel 3 index 005=Channel 4 index
Entry category	Optional	Optional	Optional
Data type		Unsigned32	Unsigned32
Access	Read only	Read/Write	Read/Write
PDO mapping	No	No	No
Default value	0x5	0x0	0x0
Range	0x0 – 0xFFFFFFFF	0x0 – 0x4	0x0 – 0xFFFFFFFF
Units	Not Applicable	Not Applicable	Not Applicable

0x2301 Recorder Sample Cycle

Object

Description	Recorder sample cycle is multiplied by 62.5 µs to produce the recording sample period. For every recorder sample cycle × 62.5 µs, the recorder will add a new sample to its recording buffer.
Firmware	3.1.0
Object code	Variable
Data type	Integer16
Access	Read/Write
PDO mapping	No
Default value	0x1
Range	0x0000 – 0x7FFF
Units	

0x2302 Recorder Trigger

Object

Description	Sets the trigger for the recording process. Sub-index 1 determines whether the recording will start immediately or after a condition is fulfilled (1 for conditional recording). The remaining sub-indexes should be used just in case of a conditional recording. Sub-index 2 gets/sets the CANopen index for the channel. Sub-index 3 gets/sets the value of the condition. Sub-index 4 gets/sets the comparator direction (1 for rising edge, 0 for falling edge). Sub-index 5 gets/sets the location of the condition in the recording buffer.
Firmware	3.1.0
Object code	Array
Data type	Integer32

Entry

Sub-index	000	001	002
Description	Number of entries	Recorder trigger condition	Recorder condition channel index
Entry category	Optional	Optional	Optional
Data type		Integer32	Integer32
Access	Read only	Read/Write	Read/Write
PDO mapping	No	No	No
Default value	0x5	0x0	0x0
Range	0x80000000 – 0x7FFFFFFF	0x0 – 0x1	0x0 – 0xFFFFFFF
Units	Not Applicable	Not Applicable	Not Applicable

Sub-index	**003**	**004**	**005**
Description	Recorder condition value	Recorder condition comparator	Recorder buffer location
Entry category	Optional	Optional	Optional
Data type	Integer32	Integer32	Integer32
Access	Read/Write	Read/Write	Read/Write
PDO mapping	No	No	No
Default value	0x0	0x0	0x0
Range	0x80000000 – 0x7FFFFFFF	0x0 – 0x1	0x7A120
Units	Not Applicable	Not Applicable	Not Applicable

0x2303 Recorder Total Number of Points

Object

Description	Gets the total number of points available for recording.
Firmware	3.1.0
Object code	Variable
Data type	Unsigned16
Access	Read only
PDO mapping	No
Default value	0x0
Range	0x0 – 0xFFF
Units	Not Applicable

0x2304 Recordable Parameters

Object

Description	Reads the list of parameters available for recording. Sets sub-index 1 to zero to start enumeration. Reads sub-index 2 to retrieve the CANopen index of the recordable parameter. On each read the enumerator will automatically advance. Enumeration ends when reading 0xFFFFFFFF.
Firmware	3.1.0
Object code	Array
Data type	Unsigned32

Entry

Sub-index	000	001	002
Description	Number of entries	Recordable list index	Recordable parameter
Entry category	Optional	Optional	Optional
Data type		Unsigned32	Unsigned32
Access	Read only	Read/Write	Read/Write
PDO mapping	No	No	No
Default value	0x2	0x0	0x0
Range	0x0 – 0xFFFFFFFF	0x0 – 0xFFFFFFFF	0x0 – 0xFFFFFFFF
Units	Not Applicable	Not Applicable	Not Applicable

0x2305 Recorder Number Of Points Per Channel

Object

Description	Number of points per channel to be recorded Set the number of points to be recorded per channel. This value multiplied by the number of recorded channels cannot exceed the total number of points (object 0x2303).
Firmware	3.1.0
Object code	Variable
Data type	Unsigned16
Access	Read/Write
PDO mapping	No
Default value	0x0
Range	0x0000 – 0xFFFF
Units	Not Applicable

0x2309 Recorder Start

Object

Description	Writes 1 to start recording, and 0 to cancel recording if in progress.
Firmware	3.1.0
Object code	Variable
Data type	Unsigned8
Access	Read/Write
PDO mapping	No
Default value	0x0
Range	0x0 – 0x1
Units	Not Applicable

0x2310 Recorder Done

Object

Description	Checks if recording is finished (1 for finished).
Firmware	3.1.0
Object code	Variable
Data type	Unsigned16
Access	Read only
PDO mapping	No
Default value	0x1
Range	0x0 – 0x1
Units	Not Applicable

0x2311 Number of Recorded Points

Object

Description	Gets the number of recorded points for a channel.
Firmware	3.1.0
Object code	Variable
Data type	Unsigned32
Access	Read only
PDO mapping	No
Default value	0x0
Range	0x0 – 0xFFFFFFFF
Units	Not Applicable

0x2312 Recorder Results

Object

Description	Gets the results of the recording. Sets sub-index 1 to zero to start enumeration. Reads sub-index 2 to retrieve the recorded point. On each read the next point will be retrieved. Repeats reading this object according to the value of 0x2303. If more than a single channel was recorded, the recorded points are arranged as follows: <1st channel 1st point> <2nd channel 1st point> <3rd channel 1st point> <1st channel 2nd point> <2nd channel 2nd point> <3rd channel 2nd point> . . . <1st channel last point> <2nd channel last point> <3rd channel last point>
Firmware	3.1.0
Object code	Array
Data type	Integer32

Entry

Sub-index	**000**	**001**	**002**
Description	Number of entries	Reset results Index	Recorder Channel Result
Entry category	Optional	Optional	Optional
Data type		Integer32	Integer32
Access	Read only	Read/Write	Read only
PDO mapping	No	No	No
Default value	0x2	0x0	0x0
Range	0x0 – 0x7FFFFFFF	0x0 –	0x80000000 – 0x7FFFFFFF
Units	Not Applicable	Not Applicable	Not Applicable

0x2400 Drive Temperature

Object

Description	Reads the value of the drive power board temperature, in Celsius degrees. The drive generates a temperature fault when the power board temperature is below 30°C or above 90°C.
Firmware	3.1.0
Object code	Variable
Data type	Integer16
Access	Read only
PDO mapping	No
Default value	0x0000
Range	0x8000 – 0x7FFF
Units	Not Applicable

0x2401 Drive Time

Object

Description	Displays the accumulative time of the drive operation.
Firmware	3.1.0
Object code	Variable
Data type	VISIBLE_STRING
Access	Read only
PDO mapping	No
Default value	Not Applicable
Range	Not Applicable
Units	Not Applicable

0x2402 PWM Frequency

Object

Description	Changes the PWM frequency of the drive. 16 kHz standard 100 kHz for low inductance motors Can be changed only when drive is disabled. **Note**: The drive must be restarted for the change to take effect.
Firmware	3.1.0
Object code	Variable
Data type	Unsigned8
Access	Read/Write
PDO mapping	No
Default value	0x0
Range	0x0 = 16 kHz 0x1 = 100 kHz
Units	Not Applicable

0x2403 Real Time Cycle

Object

Description	Gets the real-time cycle length.
Firmware	3.1.0
Object code	Variable
Data type	Unsigned32
Access	Read only
PDO mapping	No
Default value	0x0
Range	0x0 – 0xFFFFFFFF
Units	Nanoseconds (ns)

0x2405 Drive Enabled Time

Object

Description	Displays the accumulative time of the drive in Enable state.
Firmware	3.1.0
Object code	Variable
Data type	VISIBLE_STRING
Access	Read only
PDO mapping	No
Default value	Not Applicable
Range	Not Applicable
Units	Not Applicable

0x2406 Phase A PWM

Object

Description	Returns the value of Phase A PWM
Firmware	3.1.0
Object code	Variable
Data type	Integer16
Access	Read only
PDO mapping	No
Default value	Not Applicable
Range	0 to MaxS16bit
Units	Not Applicable

0x2407 Phase B PWM

Object

Description	Returns the value of Phase B PWM
Firmware	3.1.0
Object code	Variable
Data type	Integer16
Access	Read only
PDO mapping	No
Default value	Not Applicable
Range	0 to MaxS16bit
Units	Not Applicable

0x2408 Phase C PWM

Object

Description	Returns the value of Phase C PWM
Firmware	3.1.0
Object code	Variable
Data type	Integer16
Access	Read only
PDO mapping	No
Default value	Not Applicable
Range	0 to MaxS16bit
Units	Not Applicable

0x2409 Hardware Version

Object

Description	Returns hardware related data: Sub-index 1: Number of IOs in the format: <Analog inputs><Digital outputs><Digital inputs> Sub-index 2: Burning related data Sub-index 3: Bits field of supported feedback types, where the bits are as follows: Bit 0: 1 if AB Encoder Feedback is supported Bit 1: 1 if Halls feedback are supported Bit 2: 1 if AB and Index Encoder Feedback is supported Bit 3: 1 if AB and Index and Halls Encoder Feedback is supported
Firmware	3.1.0
Object code	Array
Data type	Unsigned32

Entry

Sub-index	000	001	002	003
Description	Number of entries	Number of IOs	Part ID Rev ID	Supported feedback types
Entry category	Optional	Optional	Optional	Optional
Data type		Unsigned32	Unsigned32	Unsigned32
Access	Read only	Read only	Read only	Read only
PDO mapping	No	No	No	No
Default value	0x03	0x6	0x4	0x4
Range	0x0 – 0x4	0x0 – 0xFFFFFFFF	0x0 – 0xFFFFFFFF	0x0 – 0xFFFFFFFF
Units	Not Applicable	Not Applicable	Not Applicable	Not Applicable

0x2411 Feedback Type

Object

Description	Selects motor encoder type: 0x0 = AB Encoder + Halls 0x1 = ABI Encoder + Halls
Firmware	3.1.0
Object code	Variable
Data type	Unsigned8
Access	Read/Write
PDO mapping	No
Default value	0x0
Range	0x0 – 0x1
Units	Not Applicable

0x2412 Encoder Resolution

Object

Description	Gets/sets the resolution of the motor encoder, in number of lines per revolution of the motor. The number of encoder counts per revolution is obtained by multiplying the value by 4. When the value of this object is changed, calling the CONFIG function (object 0x2620) is required. When linear motor is used (refer to object 0x2440), the value of this object is read-only, and its value is the number of encoder lines per pitch.
Firmware	3.1.0
Object code	Variable
Data type	Unsigned32
Access	Read/Write
PDO mapping	No
Default value	0x800
Range	0x4 – 0x2625A0
Units	Not Applicable

0x2413 Encoder Direction

Object

Description	Gets/sets motor encoder direction of count. This is the same as swapping A and B signals.
Firmware	3.1.0
Object code	Variable
Data type	Integer8
Access	Read/Write
PDO mapping	No
Default value	0x0
Range	0x0 – Swapped 0x1 – Not swapped
Units	Not Applicable

0x2414 Differential or Single Ended Encoder

Object

Description	Gets/sets the encoder type: 0x0 = Single Ended Encoder 0x1 = Differential Encoder
Firmware	3.1.0
Object code	Variable
Data type	Integer16
Access	Read/Write
PDO mapping	No
Default value	0x0
Range	0x0 – 0x1
Units	Not Applicable

0x2415 Linear Encoder Resolution

Object

Description	Sets the resolution of the linear encoder. The number of encoder counts per millimeter is obtained by multiplying this object by 4. The number of encoder lines per pitch can be read in object 0x2412 (Encoder Resolution).
Firmware	3.1.0
Object code	Variable
Data type	Unsigned32
Access	Read/Write
PDO mapping	No
Default value	0x800
Range	0x4 – 0x2625A0
Units	lines/mm

0x2416 Pitch Length

Object

Description	Sets/gets the linear motor pitch length in mm/100.
Firmware	3.1.0
Object code	Variable
Data type	Unsigned32
Access	Read/Write
PDO mapping	No
Default value	0x800
Range	0x4 – 0x2625A0
Units	mm/100

0x2420 Velocity Limit

Object

Description	Gets/sets the soft velocity limit.
Firmware	3.1.0
Object code	Variable
Data type	Integer32
Access	Read/Write
PDO mapping	No
Default value	0x186A0
Range	0x0 – 0x7FFFFFFF
Units	rpm/100

0x2421 Maximum Velocity Error

Object

Description	Gets/sets the maximum allowed value for the velocity error. Setting a value of 0x0 disables velocity error monitoring.
Firmware	3.1.0
Object code	Variable
Data type	Integer32
Access	Read/Write
PDO mapping	No
Default value	0x0
Range	0x80000000 – 0x7FFFFFFF
Units	rpm/100

0x2422 Velocity Loop Out

Object

Description	Returns the value of the velocity loop output (control effort). This value is the input of the current loop in all operation modes except Torque mode (operation mode 4).
Firmware	3.1.0
Object code	Variable
Data type	Integer16
Access	Read only
PDO mapping	No
Default value	0x0000
Range	0x8000 – 0x7FFF
Units	mA

0x2423 Velocity Over Speed

Object

Description	Gets/sets the velocity value that triggers the over-speed protection fault.
Firmware	3.1.0
Object code	Variable
Data type	Integer32
Access	Read/Write
PDO mapping	No
Default value	0x1E8480
Range	0x0 – 0x7FFFFFFF
Units	rpm/100

0x2430 DiPeak

Object

Description	Gets/sets the value of the maximum peak current for the drive. If the motor current exceeds 120% of the value of this object, the drive will issue a fault.
Firmware	3.1.0
Object code	Variable
Data type	Unsigned16
Access	Read/Write
PDO mapping	No
Default value	0x1770
Range	0x0 – 0x4666
Units	mA

0x2440 Motor Type

Object

Description	Selects the motor type: 0 = Brushless DC motor 1 = DC motor 2 = Linear motor
Firmware	3.1.0
Object code	Variable
Data type	Unsigned16
Access	Read/Write
PDO mapping	No
Default value	0x0
Range	0x0 – 0x1
Units	Not Applicable

0x2441 Motor Phase

Object

Description	Gets/sets the motor phase offset. The value can be obtained from motor data sheet. In the case of Halls-only commutation, the electrical rotor position is divided into 6 sectors; thus changing the 0x2441 within a sector will not have any effect. Not used in DC motor (0x2440 = 1).
Firmware	3.1.0
Object code	Variable
Data type	Unsigned16
Access	Read/Write
PDO mapping	No
Default value	0x0
Range	0x0 – 0x168
Units	Electrical degrees

0x2442 Motor Poles

Object

Description	Gets/sets the number of motor poles (individual poles, not pole pairs) for brushless DC motor (0x2440 = 0) and encoder feedback types. Not used in DC motor (0x2440 = 1).
Firmware	3.1.0
Object code	Variable
Data type	Integer16
Access	Read/Write
PDO mapping	No
Default value	0x0002
Range	0x0002 – 0x0190; must be an even number
Units	Not Applicable

0x2443 Mechanical Position of Rotor

Object

Description	Gets the position (angle) of the motor shaft within one mechanical motor revolution. This object increments from 0 to 65535 in the course of one mechanical motor shaft revolution (360 degrees). The range of this object does not change. Its resolution is dependent upon the feedback device resolution. (Mechanical position of rotor)/65535 × 360 = Angle
Firmware	3.1.0
Object code	Variable
Data type	Unsigned16
Access	Read only
PDO mapping	Yes
Default value	Not Applicable
Range	0x0 – 0xFFFF
Units	1/182°

0x2450 Home Status

Object

Description	Returns the state of homing for the drive.
Firmware	3.1.0
Object code	Variable
Data type	Integer16
Access	Read only
PDO mapping	No
Default value	0x0000
Range	0x0 = Not homed 0x1 = Homed 0x2 = Homing failed
Units	Not Applicable

0x2456 Digital Inputs Functionality

Object

Description	Selects the functionality of digital inputs 1 to 6 (sub-index 1 for digital input 1 state, sub-index 2 for digital input 2 state, etc.). Available functionalities: 0 = Disabled 1 = General 2 = Homing 3 = Positive Limit Switch 4 = Negative Limit Switch 5 = Remote Enable (controls Enable Operation /Disable Operation states)
Firmware	3.1.0
Object code	Array
Data type	Unsigned16

Entry

Sub-index	**000**	**001—002—003—004—005—006**
Description	Number of entries	001=Functionality of Input 1 002=Functionality of Input 2 003=Functionality of Input 3 004=Functionality of Input 4 005=Functionality of Input 5 006=Functionality of Input 6
Entry category	Optional	Optional
Data type		Unsigned16
Access	Read only	Read/Write
PDO mapping	No	No
Default value	0x6	0x0
Range	0x0 – 0x6	0x0 – 0x6
Units	Not Applicable	Not Applicable

0x2457 Digital Inputs Polarity

Object

Description	Inverts the polarity of digital inputs 1 to ~~6~~ (sub-index 1 for digital input 1 state, sub-index 2 for digital input 2 state, etc.). 0 = Polarity inverted 1 = Polarity not inverted
Firmware	3.1.0
Object code	Array
Data type	Unsigned16

Entry

Sub-index	**000**	**001—002—003—004—005—006**
Description	Number of entries	001=Polarity of Input 1 002=Polarity of Input 2 003=Polarity of Input 3 004=Polarity of Input 4 005=Polarity of Input 5 006=Polarity of Input 6
Entry category	Optional	Optional
Data type		Unsigned16
Access	Read only	Read/Write
PDO mapping	No	No
Default value	0x6	0x1
Range	0x0 – 0x6	0x0 – 0x1
Units	Not Applicable	Not Applicable

0x2458 Digital Outputs Functionality

Object

Description	Gets/sets the functionality of digital outputs (sub-index 1 for digital output 1, sub-index 2 for digital output 2, etc.). Output functionality: 0 = The digital output is always low. 1 = If the velocity value is greater than Digital Outputs Low Window, the output is set to high. 2 = If the current value is greater than Digital Outputs Low Window, the output is set to high. 3 = Reserved 4 = If the velocity value is less than Digital Outputs High Window (object 0x2459) and greater than Digital Outputs Low Window (object 0x245a), the output is set to high. 5 = Reserved 6 = Motion Completed. Set according to bit 10 (target reached) of the status word (object 0x6041). 7 = In Position. Set when the position error value is smaller than the value of position window (object 0x6067). 8 = Zero Speed. If the velocity absolute value is less than or equal to Digital Outputs Low Window (object 0x245a), the output is set to high. 9 = Soft Position Limit. If the position value is less than the value of Digital Outputs High Window (object 0x2459) and greater than Digital Outputs Low Window (object 0x245a), the output is set to high. 10 = Active. Set when the drive is enabled. 11 = Reserved. 12 = Reserved 13 = Set according to the value set in the digital output (object 0x60fe).
Firmware	3.1.0
Object code	Array
Data type	Unsigned16

Entry

Sub-index	000	001	002
Description	Number of entries	Functionality of Output 1	Functionality of Output 2
Entry category	Optional	Optional	Optional
Data type		Unsigned16	Unsigned16
Access	Read only	Read/Write	Read/Write
PDO mapping	No	No	No
Default value	0x2	0x0	0x0
Range	0x0 – 0x2	0x0 – 0xD	0x0 – 0xD
Units	Not Applicable	Not Applicable	Not Applicable

0x2459 Digital Outputs High Window

Object

Description	Gets/sets the value for the upper limit of digital outputs. This value is used by the Digital Outputs Functionality object (sub-index 1 for digital output 1, sub-index 2 for digital output 2, etc.).
Firmware	3.1.0
Object code	Array
Data type	Integer32

Entry

Sub-index	000	001	002
Description	Number of entries	High Window of Output 1	High Window of Output 2
Entry category	Optional	Optional	Optional
Data type		Integer32	Integer32
Access	Read only	Read/Write	Read/Write
PDO mapping	No	No	No
Default value	0x2	0x0	0x0
Range	0x0 – 0x2	0x80000000 – 0x7FFFFFFF	0x80000000 – 0x7FFFFFFF
Units			

0x245A Digital Outputs Low Window

Object

Description	Gets/sets the value for the lower limit of the digital outputs. This value is used by the Digital Outputs Functionality object (sub-index 1 for digital output 1, sub-index 2 for digital output 2, etc.).
Firmware	3.1.0
Object code	Array
Data type	Integer32

Entry

Sub-index	000	001	002
Description	Number of entries	Low Window of Output 1	Low Window of Output 2
Entry category	Optional	Optional	Optional
Data type		Integer32	Integer32
Access	Read only	Read/Write	Read/Write
PDO mapping	No	No	No
Default value	0x2	0x0	0x0
Range	0x0 – 0x2	0x80000000 – 0x7FFFFFFF	0x80000000 – 0x7FFFFFFF
Units	Not Applicable	Not Applicable	Not Applicable

0x245B Digital Outputs Polarity

Object

Description	Inverts the polarity of digital output 1-2 (sub-index 1 for digital input 1 state, sub-index 2 for digital input 2 state, etc.). 0 = Polarity inverted 1 = Polarity not inverted
Firmware	3.1.0
Object code	Array
Data type	Unsigned16

Entry

Sub-index	000	001	002
Description	Number of entries	Polarity of Output 1	Polarity of Output 2
Entry category	Optional	Optional	Optional
Data type		Unsigned16	Unsigned16
Access	Read only	Read/Write	Read/Write
PDO mapping	No	No	No
Default value	0x2	0x1	0x1
Range	0x0 – 0x2	0x0 – 0x1	0x0 – 0x1
Units	Not Applicable	Not Applicable	Not Applicable

0x245C Remote

Object

Description	Returns the summary of all external enable / disables signals. 0 = Remote enable input is off 1 = Remote enable input is on
Firmware	3.1.0
Object code	Variable
Data type	Integer16
Access	Read only
PDO mapping	No
Default value	Not Applicable
Range	0x0000 – 0x0001
Units	Not Applicable

0x2460 Analog Inputs

Object

Description	Returns the analog inputs values. Sub-index 1 will return the value of analog input 1, and sub-index 2 will return the value of analog input 2. This input can be used as analog command for torque or velocity.
Firmware	3.1.0
Object code	Array
Data type	Integer16

Entry

Sub-index	000	001	002
Description	Number of entries	Analog Input 1	Analog Input 2
Entry category	Optional	Optional	Optional
Data type		Integer16	Integer16
Access	Read only	Read only	Read only
PDO mapping	No	Yes	Yes
Default value	0x0002	Not Applicable	Not Applicable
Range	0x8000 – 0x7FFF	0xB1E0 – 0x4E20	0xB1E0 – 0x4E20
Units	Not Applicable	Not Applicable	Not Applicable

0x2461 Analog Inputs Offset

Object

Description	Gets/sets a value that is added to the analog inputs to the drive, to compensate for offset in the analog input signal. Sub-index 1 will return the value of analog input offset 1, sub-index 2 will return the value of analog input offset 2. The analog input offset can be automatically set to the current analog input value by calling the analog zero function (object 0x2462).
Firmware	3.1.0
Object code	Array
Data type	Integer16

Entry

Sub-index	000	001	002
Description	Number of entries	Analog Input Offset 1	Analog Input Offset 2
Entry category	Optional	Optional	Optional
Data type		Integer16	Integer16
Access	Read only	Read/Write	Read/Write
PDO mapping	No	No	No
Default value	0x0002	0x0000	0x0000
Range	0x8000 – 0x7FFF	0x8000 – 0x7FFF	0x8000 – 0x7FFF
Units	Not Applicable	Not Applicable	Not Applicable

0x2462 Analog Inputs Zero

Object

Description	Sets the value of the analog input offset (object 0x2461) so that the current analog input value reading will return zero. The offset value is calculated by an average of 64 samples of the drive analog input command. To perform the zero action, the object must be written with the value of the analog input number; for example, writing 1 to the object will zero analog offset 1.
Firmware	3.1.0
Object code	Variable
Data type	Integer16
Access	Read/Write
PDO mapping	No
Default value	Not Applicable
Range	Not Applicable
Units	Not Applicable

0x2470 Maximum Position Derivative

Object

Description	Gets/sets the value of the maximum position derivative for the position command that is received from the CANopen master in Interpolated Position mode (operation mode 7). Setting a value of 0 disables this functionality.
Firmware	3.1.0
Object code	Variable
Data type	Unsigned32
Access	Read/Write
PDO mapping	No
Default value	0x0
Range	0x0 – 0x7FFFFFFF
Units	Encoder counts per communication cycle time

0x2471 Position Stop Mode

Object

Description	Defines how the drive reacts to the software position limits. 0 = Position limited to ±MaxS32bit 1 = Position limited to software position limits 2 = Not supported
Firmware	3.1.0
Object code	Variable
Data type	Integer16
Access	Read/Write
PDO mapping	No
Default value	0x0000
Range	0x0000 – 0x0002
Units	Not Applicable

0x2472 State of PTP Generator

Object

Description	Returns the state of the profiled position (also known as point-to-point) generator.
Firmware	3.1.0
Object code	Variable
Data type	Integer16
Access	Read only
PDO mapping	Yes
Default value	Not Applicable
Range	0x0 = Idle 0x1 = Acceleration 0x2 = Cruise 0x3 = Deceleration
Units	Not Applicable

0x2480 I2T Value

Object

Description	Returns the value of the I^2T integrator. The drive will generate a fault when this value exceeds the value set in I2T limit (object 0x2481). The I^2T integrator is calculated as shown in the equation below. It functions continuously from the time the drive is powered up. It limits the energy delivered to the motor to the continuous current rating of the drive. $I2T = \int (I - I_{cont})^2 dt$
Firmware	3.1.0
Object code	Variable
Data type	Integer32
Access	Read only
PDO mapping	Yes
Default value	Not Applicable
Range	0x0 – 0x7FFFFFFF
Units	$A^2 \cdot ms$

0x2481 I2T Limit

Object

Description	Gets/sets I^2T integrator limit value. The drive generates a fault if this value is exceeded by the I^2T integrator. Setting the I2T limit to 0 disables this feature.
Firmware	3.1.0
Object code	Variable
Data type	Integer32
Access	Read/Write
PDO mapping	No
Default value	0x0
Range	0x0 – 0x7FFFFFFF
Units	$A^2 \cdot ms$

0x2482 Phase A Current

Object

Description	Returns the total current flowing through phase A of the motor. Sampled at a rate of 16 kHz.
Firmware	3.1.0
Object code	Variable
Data type	Integer16
Access	Read only
PDO mapping	Yes
Default value	Not Applicable
Range	0x8000 – 0x7FFF
Units	mA

0x2483 Phase B Current

Object

Description	Returns the total current flowing through phase B of the motor. Sampled at a rate of 16 kHz.
Firmware	3.1.0
Object code	Variable
Data type	Integer16
Access	Read only
PDO mapping	Yes
Default value	0x0000
Range	0x8000 – 0x7FFF
Units	mA

0x2484 Phase C Current

Object

Description	Returns the total current flowing through phase C of the motor. Sampled at a rate of 16 kHz.
Firmware	3.1.0
Object code	Variable
Data type	Integer16
Access	Read only
PDO mapping	Yes
Default value	Not Applicable
Range	0x8000 – 0x7FFF
Units	mA

0x2485 Phase A Current Offset

Object

Description	Returns the offset value of phase A. This offset is automatically calculated during the startup of the drive.
Firmware	3.1.0
Object code	Variable
Data type	Integer16
Access	Read only
PDO mapping	Yes
Default value	Not Applicable
Range	0x8000 – 0x7FFF
Units	mA

0x2486 Phase B Current Offset

Object

Description	Returns the offset value of phase B. This offset is automatically calculated during the startup of the drive.
Firmware	3.1.0
Object code	Variable
Data type	Integer16
Access	Read only
PDO mapping	Yes
Default value	0x0000
Range	0x8000 – 0x7FFF
Units	mA

0x2487 Phase C Current Offset

Object

Description	Returns the offset value of phase C. This offset is automatically calculated during the startup of the drive.
Firmware	3.1.0
Object code	Variable
Data type	Integer16
Access	Read only
PDO mapping	Yes
Default value	0x0000
Range	0x8000 – 0x7FFF
Units	mA

0x2488 Over Voltage Fault Level

Object

Description	Gets/sets the over-voltage fault limit for the bus voltage. Must be higher than 0x2489 (under-voltage fault level).
Firmware	3.1.0
Object code	Variable
Data type	Unsigned16
Access	Read/Write
PDO mapping	No
Default value	0xEA60
Range	0x2CEC – 0xEA60
Units	mV

0x2489 Under Voltage Fault Level

Object

Description	Gets/sets the under-voltage fault limit for the bus voltage. Must be less than 0x2488 (over-voltage fault level).
Firmware	3.1.0
Object code	Variable
Data type	Unsigned16
Access	Read/Write
PDO mapping	No
Default value	0x2CEC
Range	0x2CEC – 0xEA60
Units	mV

0x2500 Current Loop Proportional Gain

Object

Description	Gets/sets the proportional gain for the current controller.
Firmware	3.1.0
Object code	Variable
Data type	Integer32
Access	Read/Write
PDO mapping	Yes
Default value	0x3E8
Range	0x0 – 0x7FFFFFFF
Units	PWM duty cycle/mA

0x2505 Current Loop Integral Gain

Object

Description	Gets/sets the integral gain for the current controller.
Firmware	3.1.0
Object code	Variable
Data type	Integer32
Access	Read/Write
PDO mapping	Yes
Default value	0x3E8
Range	0x0 – 0x7FFFFFFF
Units	

0x2510 Current Loop Derivative Gain

Object

Description	Gets/sets the derivative gain for the current controller.
Firmware	3.1.0
Object code	Variable
Data type	Integer32
Access	Read/Write
PDO mapping	Yes
Default value	0x0
Range	0x0 – 0x7FFFFFFF
Units	PWM duty cycle/mA/62.5μs/2^{16}

0x2515 Current Loop Pole Placement

Object

Description	Gets/sets the separation term for the gain paths of the current controller.
Firmware	3.1.0
Object code	Variable
Data type	Integer32
Access	Read/Write
PDO mapping	No
Default value	0xFFFF
Range	0x0 – 0xFFFF
Units	Not Applicable

0x2520 Velocity Loop Command Proportional Gain

Object

Description	Gets/sets the command proportional gain for the velocity loop.
Firmware	3.1.0
Object code	Variable
Data type	Integer32
Access	Read/Write
PDO mapping	No
Default value	0x3E8
Range	0x0 – 0x1000000
Units	$mA/(rpm/100)/2^{16}$

0x2525 Velocity Loop Feedback Proportional Gain

Object

Description	Gets/sets the feedback proportional gain of the velocity loop.
Firmware	3.1.0
Object code	Variable
Data type	Integer32
Access	Read/Write
PDO mapping	No
Default value	0x3E8
Range	0x0 – 0x1000000
Units	$mA/(rpm/100)/2^{16}$

0x2530 Velocity Loop Integral Gain

Object

Description	Gets/sets the integral gain for the velocity loop.
Firmware	3.1.0
Object code	Variable
Data type	Integer32
Access	Read/Write
PDO mapping	No
Default value	0x64
Range	0x0 – 0x1000000
Units	Not Applicable

0x2535 Velocity Loop Command Derivative Gain

Object

Description	Gets/sets the command derivative gain of the velocity loop.
Firmware	3.1.0
Object code	Variable
Data type	Integer32
Access	Read/Write
PDO mapping	No
Default value	0x3E8
Range	0x0 – 0x1000000
Units	mA/rpm/100/125μs/2^{16}

0x2540 Velocity Loop Feedback Derivative Gain

Object

Description	Gets/sets the feedback derivative gain of the velocity loop.
Firmware	3.1.0
Object code	Variable
Data type	Integer32
Access	Read/Write
PDO mapping	No
Default value	0x3E8
Range	0x0 – 0x1000000
Units	Not Applicable

0x2545 Velocity Loop LPF

Object

Description	Gets/sets the low pass filter cutoff frequency for the velocity loop.
Firmware	3.1.0
Object code	Variable
Data type	Unsigned16
Access	Read/Write
PDO mapping	No
Default value	0x1C2
Range	0x1 – 0x7530
Units	Hz

0x2550 Position Loop Proportional Gain

Object

Description	Gets/sets the proportional gain for the position control loop.
Firmware	3.1.0
Object code	Variable
Data type	Integer32
Access	Read/Write
PDO mapping	No
Default value	0x3E8
Range	0x0 – 0x7FFFFFFF
Units	(rpm/100)/counts/2^8

0x2555 Position Loop Integral Gain

Object

Description	Gets/sets the integral gain for the position control loop.
Firmware	3.1.0
Object code	Variable
Data type	Integer32
Access	Read/Write
PDO mapping	No
Default value	0xA
Range	0x0 – 0x7FFFFFFF
Units	Not Applicable

0x2560 Position Loop Derivative Gain

Object

Description	Gets/sets the derivative gain for the position control loop.
Firmware	3.1.0
Object code	Variable
Data type	Integer32
Access	Read/Write
PDO mapping	No
Default value	0x0
Range	0x0 – 0x7FFFFFFF
Units	(rpm/100)/counts/250μs/2^8

0x2565 Position Loop Feed Forward Velocity Term Gain

Object

Description	Gets/sets feed-forward velocity term gain of the position control loop.
Firmware	3.1.0
Object code	Variable
Data type	Integer32
Access	Read/Write
PDO mapping	No
Default value	0x0
Range	0x0 – 0x7FFFFFFF
Units	Counts/250μs/2^8

0x2570 Position Loop Feed Forward Acceleration Term Gain

Object

Description	Gets/sets the feed-forward acceleration term gain of the position control loop.
Firmware	3.1.0
Object code	Variable
Data type	Integer32
Access	Read/Write
PDO mapping	No
Default value	0x0
Range	0x0 – 0x7FFFFFFF
Units	Counts/$(250\mu s)^2/2^8$

0x2575 Position Loop Integrator Input Saturation

Object

Description	Gets/sets the input saturation level for the position loop integrator increment.
Firmware	3.1.0
Object code	Variable
Data type	Integer32
Access	Read/Write
PDO mapping	No
Default value	0x186A0
Range	0x0 – 0x7FFFFFFF
Units	Counts

0x2600 Halls

Object

Description	Returns the current state of the Hall sensors.
Firmware	3.1.0
Object code	Variable
Data type	Unsigned16
Access	Read only
PDO mapping	No
Default value	Not Applicable
Range	0x0000 – 0x00FF
Units	Not Applicable

0x2610 Analog Position Command Gain

Object

Description	An analog position scale factor that scales the analog input to Position Demand Value (object 0x6062). Limited to Analog Position mode (operation mode -3).
Firmware	3.1.0
Object code	Variable
Data type	Integer32
Access	Read/Write
PDO mapping	No
Default value	0x0
Range	0x0 – 0x7FFFFFFF
Units	Counts/mV

0x2611 Analog Velocity Command Gain

Object

Description	An analog velocity scale factor that scales the analog input to velocity demand value (object 0x606B). Limited to Analog Velocity mode (operation mode -4).
Firmware	3.1.0
Object code	Variable
Data type	Integer32
Access	Read/Write
PDO mapping	No
Default value	0x0
Range	0x0 – 0x7FFFFFFF
Units	Not Applicable

0x2612 Analog Current Command Gain

Object

Description	An analog current scale factor that scales the analog input to torque demand value (object 0x6074). Limited to Analog Torque mode (operation mode -5).
Firmware	3.1.0
Object code	Variable
Data type	Integer32
Access	Read/Write
PDO mapping	No
Default value	0x0
Range	0x0 – 0x7FFFFFFF
Units	mA/V

0x2620 Config

Object

Description	Configures the values of units scaling according to MENCRES and HALLS sensors. Write the value 0x666E6F63 (ASCII value of "conf") to sub-index 0 to initiate the configuration process.
Firmware	3.1.0
Object code	Variable
Data type	Integer32
Access	Read/Write
PDO mapping	No
Default value	Not Applicable
Range	0x80000000 – 0x7FFFFFFF
Units	Not Applicable

DS402 Profile Objects

0x6007 Abort Connection Option Code

Object

Description	Gets/sets the action to be performed when one of the following events occurs: ■ CAN bus-off ■ Heartbeat lost ■ Node Guarding lost ■ NMT stopped; i.e., stop remote node indication activated ■ Reset communication; i.e., reset communication indication activated ■ Reset application; i.e., reset node indication activated The following values are valid: 0 = No action 1 = Fault signal 2 = Disable voltage command 3 = Quick stop command -x = Manufacturer-specific
Firmware	3.1.0
Object code	Variable
Data type	Integer16
Access	Read/Write
PDO mapping	No
Default value	0x0001
Range	0x8000 – 0x0003
Units	Not Applicable

0x603F Error Code

Object

Description	Provides the error code of the last error that occurred in the drive device.
Firmware	3.1.0
Object code	Variable
Data type	Unsigned16
Access	Read only
PDO mapping	No
Default value	0x0
Range	0x0
Units	0xFFFF

0x6040 Controlword

Object

Description	Used to control the CiA-402 FSA, CiA-402 modes and manufacturer-specific entities. This object is organized bit-wise. Bit Description 0 = Switch on 1 = Enable voltage 2 = Quick stop 3 = Enable operation 4-6 = Mode-specific 7 = Fault reset 8 = Halt 9 = Mode-specific 10 = Reserved 11-15 = Manufacturer-specific
Firmware	3.1.0
Object code	Variable
Data type	Unsigned16
Access	Read/Write
PDO mapping	Yes
Default value	0x0000
Range	0x0000
Units	0xFFFF

0x6041 Statusword

Object

Description	Used to indicate the current state of the FSA, the operation mode and manufacturer-specific entities. This object is organized bit-wise. Bit Description 0 = Ready to switch on 1 = Switched on 2 = Operation enabled 3 = Fault 4 = Voltage enabled 5 = Quick stop 6 = Switch on disabled 7 = Warning 8 = Manufacturer-specific 9 = Remote 10 = Target reached 11 = Internal limit active 12-13 = Mode-specific 14-15 = Manufacturer-specific
Firmware	3.1.0
Object code	Variable
Data type	Unsigned16
Access	Read only
PDO mapping	Yes
Default value	0x0000
Range	0x0000
Units	0xFFFF

0x6060 Modes of Operation

Object

Description	Gets/sets the requested operation mode of the drive as in CANopen DS-402 standard. 0 = No mode change/no mode assigned 1 = Profile Position mode 2 = Velocity mode 3 = Profile Velocity mode 4 = Torque Profile mode 5 = Reserved 6 = Homing mode 7 = Interpolated Position mode 8 = Cyclic Synchronous Position mode – not supported 9 = Cyclic Synchronous Velocity mode – not supported 10 = Cyclic Synchronous Torque mode – not supported -1 = Jog In Position mode -2 = Burn-in – manufacturer specific -3 = Reserved -4 = Analog Velocity -5 = Analog Torque This object shows only the value of the requested operation mode; the actual operation mode of the drive is reflected in object 0x6061 (Modes of Operation Display).
Firmware	3.1.0
Object code	Variable
Data type	Integer8
Access	Read/Write
PDO mapping	Yes
Default value	0x04
Range	0x07-0xFB
Units	Not Applicable

0x6061 Modes of Operation Display

Object

Description	Displays the operation mode of the drive: 0 = No mode change/no mode assigned 1 = Profile Position mode 2 = Velocity mode 3 = Profile Velocity mode 4 = Torque Profile mode 5 = Reserved 6 = Homing mode 7 = Interpolated Position mode 8 = Cyclic Synchronous Position mode – not supported 9 = Cyclic Synchronous Velocity mode – not supported 10 = Cyclic Synchronous Torque mode – not supported -1 = Jog In Position mode -2 = Burn-in – manufacturer specific -3 = Reserved -4 = Analog Velocity -5 = Analog Torque
Firmware	3.1.0
Object code	Variable
Data type	Integer8
Access	Read only
PDO mapping	Yes
Default value	0x00
Range	0x07-0xFB
Units	Not Applicable

0x6062 Position Demand Value

Object

Description	Returns the position command generated by the position profile generator for the position loop. This parameter is used in Profile Position mode and Interpolated Position mode (operation modes 1 and 7, respectively).
Firmware	3.1.0
Object code	Variable
Data type	Integer32
Access	Read only
PDO mapping	Yes
Default value	0x0
Range	0x80000000 – 0x7FFFFFFF
Units	Feedback counts

0x6063 Position Actual Internal Value

Object

Description	Returns the motor position from the feedback device. (Currently return the same value as object 0x6064).
Firmware	3.1.0
Object code	Variable
Data type	Integer32
Access	Read only
PDO mapping	Yes
Default value	0x0
Range	0x80000000 – 0x7FFFFFFF
Units	Feedback counts

0x6064 Position Actual Value

Object

Description	Returns the motor position from the feedback device.
Firmware	3.1.0
Object code	Variable
Data type	Integer32
Access	Read/Write
PDO mapping	Yes
Default value	0x0
Range	0x80000000 – 0x7FFFFFFF
Units	Feedback counts

0x6065 Following Error Window

Object

Description	Indicates the symmetrical range of tolerated positions relative to Position Demand. If the actual value of the position encoder is outside the following error window, a following error occurs. A following error may occur when a drive is blocked,or an unreachable profile velocity occurs, or at wrong closed-loop coefficients. If the value of the following error window is FFFF FFFFh, the following control is switched off. Gets/sets the maximum allowed value for the position error. This parameter is used in Profile Position, Interpolated Position and Jog In Position operation modes (operation modes 1, 7 and -1, respectively).
Firmware	3.1.0
Object code	Variable
Data type	Unsigned32
Access	Read/Write
PDO mapping	No
Default value	0x64
Range	0x0 – 0x7FFFFFFF
Units	User-defined position

0x6067 Position Window

Object

Description	Indicates the symmetrical range of accepted positions relative to Target Position. If the actual value of the position encoder is within Position Window, this target position is regarded as reached. If the value of the Position Window is FFFF FFFFh, Position Window control is switched off. Gets/sets the value for the error that will set the target-reached bit. This parameter is used in Profile Position, Interpolated Position and Jog In Position operation modes (operation modes 1, 7 and -1, respectively).
Firmware	3.1.0
Object code	Variable
Data type	Unsigned32
Access	Read/Write
PDO mapping	No
Default value	0x64
Range	0x0 – 0x7FFFFFFF
Units	User-defined position

0x606B Velocity Demand Value

Object

Description	Sets the velocity command for the motor in Velocity mode (operation mode 2). Gets the velocity command applied to the velocity controller. This value is equivalent to the analog input (object 0x2460) in operation mode -4, to the jog profiler output in operation mode 3, and the output of the position controller in operation modes 1, 6 and 7.
Firmware	3.1.0
Object code	Variable
Data type	Integer32
Access	Read only
PDO mapping	Yes
Default value	0x0
Range	0x80000000 – 0x7FFFFFFF
Units	rpm/100

0x606C Velocity Actual Value

Object

Description	Returns the velocity of the motor as calculated from the motor feedback.
Firmware	3.1.0
Object code	Variable
Data type	Integer32
Access	Read only
PDO mapping	Yes
Default value	0x0
Range	0x80000000 – 0x7FFFFFFF
Units	rpm/100

0x606D Velocity Window

Object

Description	Will be supported in a future version
Firmware	Not Applicable
Object code	Variable
Data type	Unsigned16
Access	Read/Write
PDO mapping	No
Default value	Not Applicable
Range	Not Applicable
Units	User-defined velocity

0x606F Velocity Threshold

Object

Description	Will be supported in a future version
Firmware	Not Applicable
Object code	Variable
Data type	Unsigned16
Access	Read/Write
PDO mapping	No
Default value	Not Applicable
Range	Not Applicable
Units	User-defined velocity

0x6070 Velocity Threshold Time

Object

Description	Will be supported in a future version
Firmware	Not Applicable
Object code	Variable
Data type	Unsigned16
Access	Read/Write
PDO mapping	No
Default value	Not Applicable
Range	Not Applicable
Units	ms

0x6071 Target Torque

Object

Description	Gets/sets the value of the torque command. Used to set commanded current in Torque mode (operation mode 4). This command is subject to current limits and digital filtering. Target Torque is set to 0 whenever the Drive Enable state changes
Firmware	3.1.0
Object code	Variable
Data type	Integer16
Access	Read/Write
PDO mapping	Yes
Default value	0x0000
Range	0x8AD0 – 0x7530
Units	mA

0x6073 Max Current

Object

Description	Gets/sets current saturation value. If the current command is higher than Max Current, the resulting current command will not exceed the Max Current value. In this case, a fault will not be issued.
Firmware	3.1.0
Object code	Variable
Data type	Unsigned16
Access	Read/Write
PDO mapping	Yes
Default value	0xFA0
Range	0x0 – 0x4666
Units	mA

0x6074 Torque Demand Value

Object

Description	Returns the current (torque) command to the current controller. Torque Demand Value is equivalent to: ■ The analog input command (object 0x2460) in operation mode 3 ■ The torque command in operation mode 2 ■ The output of the velocity controller in operation mode 0 or 1.
Firmware	3.1.0
Object code	Variable
Data type	Integer16
Access	Read only
PDO mapping	Yes
Default value	0x0000
Range	0x8000 – 0x7FFF
Units	mA

0x6075 Motor Rated Current

Object

Description	Gets/sets the value of the maximum continuous current for the motor. The maximum continuous energy limit is calculated according to Motor Rated Current.
Firmware	3.1.0
Object code	Variable
Data type	Unsigned16
Access	Read/Write
PDO mapping	No
Default value	0x1388
Range	0x0 – 0x4666
Units	mA

0x6078 Current Actual Value

Object

Description	Returns the total current flowing through the motor. The phase currents (IA, IB, IC) are sampled at a rate of 16 kHz, and the total current is calculated at a rate of 4 kHz.
Firmware	3.1.0
Object code	Variable
Data type	Integer16
Access	Read only
PDO mapping	Yes
Default value	0x0000
Range	0x8000 – 0x7FFF
Units	mA

0x6079 DC Link Circuit Voltage

Object

Description	Provides the instantaneous DC link current voltage at the drive device, measured by the drive.
Firmware	3.1.0
Object code	Variable
Data type	Unsigned32
Access	Read only
PDO mapping	No
Default value	0x0
Range	0x0 – 0xFFFFFFFF
Units	mV

0x607A Target Position

Object

Description	Indicates the commanded position that the drive must move to in Position Profile mode. The value of this object can be interpreted as absolute or relative depending on bit 6 of the controlword.
Firmware	3.1.0
Object code	Variable
Data type	Integer32
Access	Read/Write
PDO mapping	Yes
Default value	0x0
Range	0x80000000 – 0x7FFFFFFF
Units	Counts

0x607B Position Range Limit

Object

Description	Indicates the maximum and minimum position range limits. It limits the numerical range of the input value. On reaching or exceeding these limits, the input value wraps automatically to the other end of the range. Wrap-around of the input value may be prevented by setting software position limits as defined in Software Position Limit. Sub-index 1 holds the minimum limit; sub-index 2 holds the maximum limit. The values are constant, they cannot be modified or set to MaxS32bit (maximum) and -MaxS32bit (minimum).
Firmware	3.1.0
Object code	Array
Data type	Integer32

Entry

Sub-index	000	001	002
Description	Highest sub-index supported	Minimum Position Range Limit	Maximum Position Range Limit
Entry category	Optional	Optional	Optional
Data type		Integer32	Integer32
Access	Read only	Read/Write	Read/Write
PDO mapping	No	No	No
Default value	0x2	0x80000000	0x7FFFFFFF
Range	0x2 – 0x2	0x80000000 – 0x80000000	0x7FFFFFFF – 0x7FFFFFFF
Units	Not Applicable	User-defined position	User-defined position

0x607C Home Offset

Object

Description	Sets the value that will be applied to Position Actual Value (0x6064) at the end of the homing process. All subsequent absolute moves are performed relative to this new zero position.
Firmware	3.1.0
Object code	Variable
Data type	Integer32
Access	Read/Write
PDO mapping	No
Default value	0x0
Range	0x80000000 – 0x7FFFFFFF
Units	Counts

0x607D Software Position Limit

Object

Description	Sub-index 1 gets/sets the minimum allowed positive position limit for motion. The drive will not accept move commands beyond this position; upon reaching the position limit the drive will execute a stop command. Sub-index 2 gets/sets the maximum allowed positive position limit for motion. The drive will not accept move commands beyond this position; upon reaching the position limit the drive will execute a stop command.
Firmware	3.1.0
Object code	Array
Data type	Integer32

Entry

Sub-index	000	001	002
Description	Highest sub-index supported	Minimum Software Position Limit	Maximum Software Position Limit
Entry category	Optional	Optional	Optional
Data type		Integer32	Integer32
Access	Read only	Read/Write	Read/Write
PDO mapping	No	No	No
Default value	0x2	0x80000000	0x7FFFFFFF
Range	0x2 – 0x2	0x80000000 – 0x7FFFFFFF	0x80000000 – 0x7FFFFFFF
Units	Not Applicable	Counts	Counts

0x6081 Profile Velocity in Point-to-Point Mode

Object

Description	Gets/sets the cruise velocity in Profile Position mode (operation mode 1).
Firmware	3.1.0
Object code	Variable
Data type	Unsigned32
Access	Read/Write
PDO mapping	Yes
Default value	0x3E8
Range	0x0 – 0x7FFFFFFF
Units	rpm/100

0x6082 End Velocity

Object

Description	Not supported yet
Firmware	Not Applicable
Object code	Variable
Data type	Unsigned32
Access	Read/Write
PDO mapping	No
Default value	Not Applicable
Range	Not Applicable
Units	User-defined velocity

0x6083 Profile Acceleration

Object

Description	Gets/sets the acceleration value for the point-to-point generator. The minimum acceleration value is 814/ (encoder resolution) [rpm/sec], due to quantization and sample time limitations. If a value less than 814/(encoder resolution)is set, the effective acceleration will be 814/(encoder resolution).
Firmware	3.1.0
Object code	Variable
Data type	Unsigned32
Access	Read/Write
PDO mapping	Yes
Default value	0x3E8
Range	0x1 – 0x1FBD0
Units	RPM/sec

0x6084 Profile Deceleration

Object

Desription	Gets/sets the deceleration value for the point-to-point generator. The minimum deceleration value is 814/ (encoder resolution) [rpm/sec], due to quantization and sample time limitations. If a value less than 814/(encoder resolution)is set, the effective deceleration will be 814/(encoder resolution).
Firmware	3.1.0
Object code	Variable
Data type	Unsigned32
Access	Read/Write
PDO mapping	Yes
Default value	0x3E8
Range	0x1 – 0x1FBDc0
Units	RPM/sec

0x6085 Quick Stop Deceleration

Object

Description	Indicates the deceleration used to stop the motor when the quick stop function is activated. The minimum deceleration value is 814/(encoder resolution) [rpm/s], due to quantization and sample time limitations. **Note**: In Torque mode, the torque command is set to 0; this parameter is not used.
Firmware	3.1.0
Object code	Variable
Data type	Unsigned32
Access	Read/Write
PDO mapping	No
Default value	0x2710
Range	0x0 – 0x13D620
Units	RPM/sec

0x6086 Motion Profile Type

Object

Description	Indicates the type of motion profile used to perform a profiled motion. Only value 0 is supported. 0 = linear ramp; i.e., trapezoidal profile
Firmware	3.1.0
Object code	Variable
Data type	Integer16
Access	Read/Write
PDO mapping	No
Default value	0x0000
Range	0x8000 – 0x0003
Units	Not Applicable

0x6089 Position Notation Index

Object

Description	Position Notation Index.
Firmware	3.1.0
Object code	Variable
Data type	Integer8
Access	Read/Write
PDO mapping	No
Default value	0x0
Range	0x0 – 0x0
Units	Not Applicable

0x608A Position Dimension Index

Object

Description	Position Dimension Index
Firmware	3.1.0
Object code	Variable
Data type	Unsigned8
Access	Read/Write
PDO mapping	No
Default value	0xAC
Range	0xAC – 0xAC
Units	Not Applicable

0x608B Velocity Notation Index

Object

Description	Velocity Notation Index
Firmware	3.1.0
Object code	Variable
Data type	Integer8
Access	Read/Write
PDO mapping	No
Default value	0xFE
Range	0xFE – 0xFE
Units	Not Applicable

0x608C Velocity Dimension Index

Object

Description	Velocity Dimension Index
Firmware	3.1.0
Object code	Variable
Data type	Unsigned8
Access	Read/Write
PDO mapping	No
Default value	0xA4
Range	0xA4 – 0xA4
Units	Not Applicable

0x608D Acceleration Notation Index

Object

Description	Acceleration Notation Index
Firmware	3.1.0
Object code	Variable
Data type	Integer8
Access	Read/Write
PDO mapping	No
Default value	0xFE
Range	0xFE – 0xFE
Units	Not Applicable

0x608E Acceleration Dimension Index

Object

Description	Acceleration Dimension Index
Firmware	3.1.0
Object code	Variable
Data type	Unsigned8
Access	Read/Write
PDO mapping	No
Default value	0xA4
Range	0xA4 – 0xA4
Units	Not Applicable

0x608F Position Encoder Resolution

Object

Description	Indicates the configured encoder increments and number of motor revolutions. Position Encoder Resolution is calculated as follows: encoder increments/motor revolutions When the value of encoder resolution is changed, Config (object 0x2620) is required.
Firmware	3.1.0
Object code	Array
Data type	Unsigned32

Entry

Sub-index	000	001	002
Description	Highest sub-index supported	Encoder increments	Motor revolutions
Entry category	Optional	Optional	Optional
Data type		Unsigned32	Unsigned32
Access	Read only	Read/Write	Read/Write
PDO mapping	No	No	No
Default value	0x2	0x1	0x1
Range	0x2 – 0x2	0x1 – 0xFFFFFFFF	0x1 – 0xFFFFFFFF
Units	Not Applicable	Not Applicable	Not Applicable

0x6098 Homing Method

Object

Description	Sets the homing method. The following value definition is valid: 0 = No homing method assigned 1 = Homing method 1 is used . . 36 = Homing method 36 is used -x = Manufacturer-specific Refer to the CiA-402 standard for the detailed description of each homing method.
Firmware	3.1.0
Object code	Variable
Data type	Integer8
Access	Read/Write
PDO mapping	No
Default value	0x01
Range	0x01 – 0x23
Units	Not Applicable

0x6099 Homing Speeds

Object

Description	Indicates the commanded speeds used during homing procedure. Sets the homing velocity for searching the home switch (sub-index 1) and the homing velocity for searching the index signal (sub-index 2).
Firmware	3.1.0
Object code	Array
Data type	Unsigned32

Entry

Sub-index	000	001	002
Description	Highest sub-index supported	Fast homing speed	Slow homing speed
Entry category	Optional	Optional	Optional
Data type		Unsigned32	Unsigned32
Access	Read only	Read/Write	Read/Write
PDO mapping	No	Yes	Yes
Default value	0x2	0x3E8	0x3E8
Range	0x2 – 0x2	0x0 – 0x7FFFFFFF	0x0 – 0x7FFFFFFF
Units	Not Applicable	RPM/100	RPM/100

0x609A Homing Acceleration

Object

Description	Gets/sets the value of acceleration and deceleration for the homing process. The minimum acceleration value is 814/(encoder resolution) [rpm/s], due to quantization and sample time limitations. If a value less than 814/(encoder resolution)is set, the effective acceleration will be 814/(encoder resolution).
Firmware	3.1.0
Object code	Variable
Data type	Unsigned32
Access	Read/Write
PDO mapping	Yes
Default value	0x3E8
Range	0x0 – 0x1FBD0
Units	RPM/sec

0x60A3 Profile Jerk Use

Object

Description	Not supported yet
Firmware	Not Applicable
Object code	Variable
Data type	Unsigned8
Access	Read/Write
PDO mapping	No
Default value	Not Applicable
Range	Not Applicable
Units	Not Applicable

0x60A4 Profile Jerk

Object

Description	Not supported yet
Firmware	Not Applicable
Object code	Array
Data type	Unsigned32

0x60B8 Touch Probe Function

Object

Description	Indicates the configured function of the touch probe. This object is bit-structured. Bit Value: Description 0 = 0: switch off touch probe 1 1: enable touch probe 1 1 = 0: trigger first event 1: continuous 2 = 0: trigger touch probe 1 input 1: trigger with zero pulse signal or position encoder 3 = Reserved 4 = 0: switch off sampling at positive edge of touch probe 1 1: enable sampling at positive edge of touch probe 5 = 0: switch off sampling at negative edge of touch probe 1 1: enable sampling at negative edge of touch probe 1 6,7 = User-defined (e.g., for testing)
Firmware	3.1.0
Object code	Variable
Data type	Unsigned16
Access	Read/Write
PDO mapping	No
Default value	0x00
Range	0x0000 – 0xFFFF
Units	Not Applicable

0x60B9 Touch Probe Status

Object

Description	Provides the status of the touch probe. This object is bit-structured. The following value definition is valid: Bit Value: Description 0 = 0: touch probe 1 is switched off 1: touch probe 1 is enabled 1 = 0: touch probe 1 no positive edge value stored 1: touch probe 1 negative edge position stored 2 = 0: touch probe 1 no negative edge value stored 1: touch probe 1 positive edge position stored 3-5= Reserved 6,7= User-defined (e.g., for testing)
Firmware	3.1.0
Object code	Variable
Data type	Unsigned16
Access	Read only
PDO mapping	No
Default value	0x00
Range	0x0000 – 0xFFFF
Units	Not Applicable

0x60BA Touch Probe 1 Position Positive Value

Object

Description	Provides the position value of the feedback as latched by touch probe 1 at positive edge.
Firmware	3.1.0
Object code	Variable
Data type	Integer32
Access	Read only
PDO mapping	No
Default value	0x00
Range	0x80000000 – 0x7FFFFFFF
Units	User-defined position

0x60BB Touch Probe 1 Position Negative Value

Object

Description	Provides the position value of the feedback as latched by the touch probe 1 at negative edge.
Firmware	3.1.0
Object code	Variable
Data type	Integer32
Access	Read only
PDO mapping	No
Default value	0x00
Range	0x80000000 – 0x7FFFFFFF
Units	User-defined position

0x60C1 Interpolation Data Record

Object

Description	In Interpolated mode (operation mode 7), this object holds in sub-index 1 the delta position to be moved by the drive in this cycle.
Firmware	3.1.0
Object code	Array
Data type	Integer32

Entry

Sub-index	000	001
Description	Highest sub-index supported	Interpolation data record
Entry category	Optional	Optional
Data type		Integer32
Access	Constant	Read/Write
PDO mapping	Yes	Yes
Default value	0x1	0x0
Range	0x0 – 0xFE	0x80000000 – 0x7FFFFFFF
Units	Not Applicable	Not Applicable

0x60C2 Interpolation Time Period

Object

Description	In Interpolated mode (operation mode 7), this object holds in sub-index 1 the time of one cycle.
Firmware	3.1.0
Object code	Record
Data type	P402_IP_PERIOD_T

Entry

Sub-index	000	001	002
Description	Number of entries	Time units	Time index
Entry category	Optional	Optional	Optional
Data type		Unsigned8	Integer8
Access	Read/Write	Read/Write	Read/Write
PDO mapping	No	No	No
Default value	0x2	0x4	0xFD
Range	0x0 – 0xFF	0x1 – 0x10	0xFD – 0xFD
Units	Not Applicable	Not Applicable	Not Applicable

0x60C5 Maximum Acceleration

Object

Description	Gets/sets the maximum allowed acceleration value. Upon detecting acceleration or deceleration higher than the set value, the drive will generate a fault. Setting Maximum Acceleration to 0 disables this functionality.
Firmware	3.1.0
Object code	Variable
Data type	Unsigned32
Access	Read/Write
PDO mapping	No
Default value	0x0
Range	0x0 – 0x1FBD0
Units	RPM/sec

0x60C6 Maximum Deceleration

Object

Description	The value of object 0x60C5 is used to set the maximum allowed deceleration value.
Firmware	3.1.0
Object code	Variable
Data type	Unsigned32
Access	Read/Write
PDO mapping	No
Default value	0x0
Range	Not Applicable
Units	User-defined acceleration

0x60F2 Positioning Option Code

Object

Description	Will be supported in a future version.
Firmware	Not Applicable
Object code	Not Applicable
Data type	Not Applicable
Access	Not Applicable
PDO mapping	Not Applicable
Default value	Not Applicable
Range	Not Applicable
Units	Not Applicable

0x60F4 Actual Following Error

Object

Description	Returns the Following error of the position loop. This parameter is used in profile position and interpolated position modes (operation mode 1 and 7, respectively). If the value of Following Error is greater than Following Error Window, the drive is disabled and a fault is generated.
Firmware	3.1.0
Object code	Variable
Data type	Integer32
Access	Read only
PDO mapping	Yes
Default value	0x0
Range	0x80000000 – 0x7FFFFFFF
Units	Counts

0x60FA Control Effort

Object

Description	Provides the control effort as the output of the position control loop. Returns the value of the position loop output (control effort).
Firmware	3.1.0
Object code	Variable
Data type	Integer32
Access	Read only
PDO mapping	Yes
Default value	0x00000000
Range	0x80000000 – 0x7FFFFFFF
Units	User-defined velocity

0x60FD Digital Inputs

Object

Description	Returns the state of all digital inputs. Bit 0 = Negative limit switch Bit 1 = Positive limit switch Bit 2 = Home switch Bit 16 = Remote Enable Each input that was defined as General is mapped to bit: 17 + input number
Firmware	3.1.0
Object code	Variable
Data type	Unsigned32
Access	Read only
PDO mapping	Yes
Default value	0x0
Range	0x0 – 0xFFFFFFFF
Units	

0x60FE Digital Outputs

Object

Description	Gets/sets the current value of the appropriate digital output. The outputs are mapped to bits 16 through 19. Bit value 1 = Input is on Bit value 0 = Input is off Sub-index 2 is digital output mask bits Bit value 1 = Disable output Bit value 0 = Enable output
Firmware	3.1.0
Object code	Array
Data type	Unsigned32

Entry

Sub-index	000	001	002
Description	Highest sub-index supported	Physical outputs	Output mask
Entry category	Optional	Optional	Optional
Data type		Unsigned32	Unsigned32
Access	Read only	Read/Write	Read/Write
PDO mapping	Yes	Yes	No
Default value	0x2	0x0	0x0
Range	0x1 – 0x2	0x0 – 0xFFFFFFFF	0x0 – 0xFFFFFFFF
Units	Not Applicable	Not Applicable	Not Applicable

0x60FF Target Velocity

Object

Description	Indicates the configured target velocity, and is used as input for the trajectory generator. Sets the requested speed for the Velocity Profile operation mode. Limited to the Velocity Profile operation mode.
Firmware	3.1.0
Object code	Variable
Data type	Integer32
Access	Read/Write
PDO mapping	Yes
Default value	0x0
Range	0x80000000 – 0x7FFFFFFF
Units	User-defined velocity

0x6402 Motor Type

Object

Description	Will be supported in a future version. Use object 0x2440 to configure the motor type.
Firmware	Not Applicable
Object code	Not Applicable
Data type	Not Applicable
Access	Not Applicable
PDO mapping	Not Applicable
Default value	Not Applicable
Range	Not Applicable
Units	Not Applicable

0x6502 Supported Drive Modes

Object

Description	Provides information on the supported drive modes. This object is organized bit-wise. The bits have the following meaning: Bit Description 0 Profile Position mode 1 Velocity mode 2 Profile Velocity mode 3 Profile Torque mode 4 Reserved 5 Homing mode 6 Interpolated Position mode 7 Cyclic Synchronous Position mode 8 Cyclic Synchronous Velocity mode 9 Cyclic Synchronous Torque mode 10-15 Reserved 16-31 Manufacturer-specific The bit values indicate the following: 0 = Mode is not supported 1 = Mode is supported
Firmware	3.1.0
Object code	Variable
Data type	Unsigned32
Access	Read only
PDO mapping	No
Default value	0x6F
Range	0x0 – 0xFFFFFFFF
Units	Not Applicable

0x67FF Single Device Type

Object

Description	This object defines the type of the specific drive within a multi-device module. This object has the same structure as Device Type (object 0x1000). This object is organized bit-wise.
Firmware	3.1.0
Object code	Variable
Data type	Unsigned32
Access	Read only
PDO mapping	No
Default value	0x00000192
Range	0x0 – 0xFFFFFFF
Units	Not Applicable