EtherCAT and CANopen Reference Manual

CDHD Servo Drive

AF | EC | EB Models

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1 Introduction

1.1 About This Manual

Drive functionality is configured using various commands and variables, which are communicated over the serial port or over a fieldbus.

This manual describes the implementation of CANopen and CANopen over EtherCAT (CoE) communication in the CDHD servo drives.

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.

1.2 Manual Format – Object Dictionary

The CAN objects are presented and described in the following format:

*nnnn*h – Object Name

Object Description

Index	*nnnn*
Description	Description of the object
Object Code	Variable | Array | Record
Data Type	Integer8 | Integer16 | Integer32 Unsigned8 | Unsigned16 | Unsigned32 Real32 | Visible_String
Category	Optional | Mandatory
VarCom	VarCom equivalent

Entry Description for Variable and Record Objects

Access	Read/Write Read and write access Read Only Read only Constant Read only access, value is constant
PDO Mapping	Yes | No
Value Range	Discrete values and ranges of values.
Default Value	The object's default value.
Units	When the object value implies units of measure, these units are specified.

Entry Description for Array Objects

Sub-Index	*nnn*
Description	Description of the sub-index
Object Code	Variable | Array | Record
Data Type	Integer8 | Integer16 | Integer32 Unsigned8 | Unsigned16 Unsigned32 | Real32 | Visible_String
Category	Optional | Mandatory
Access	Read/Write Read and write access Read Only Read only Constant Read only access, value is constant
PDO Mapping	Yes | No
Value Range	Discrete values and ranges of values.
Default Value	The object's default value.
Units	When the object value implies units of measure, these units are specified.

2 Fieldbus Wiring and Setup

2.1 Fieldbus Wiring (Examples)

CDHD – CAN Configuration – softMC 7 Controller – Example

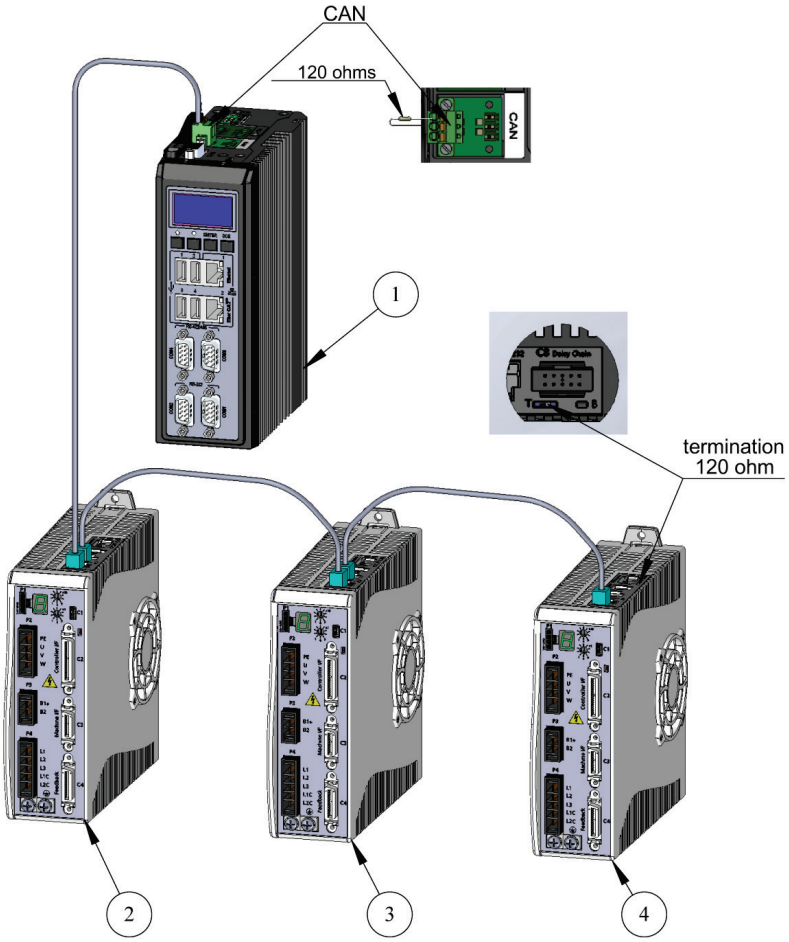


Figure 2-1. CDHD – CAN Configuration – softMC 7 Controller – Example

1	softMC 7 Controller
2, 3, 4	CDHD

CDHD – CAN Configuration – Horner Controller – Example

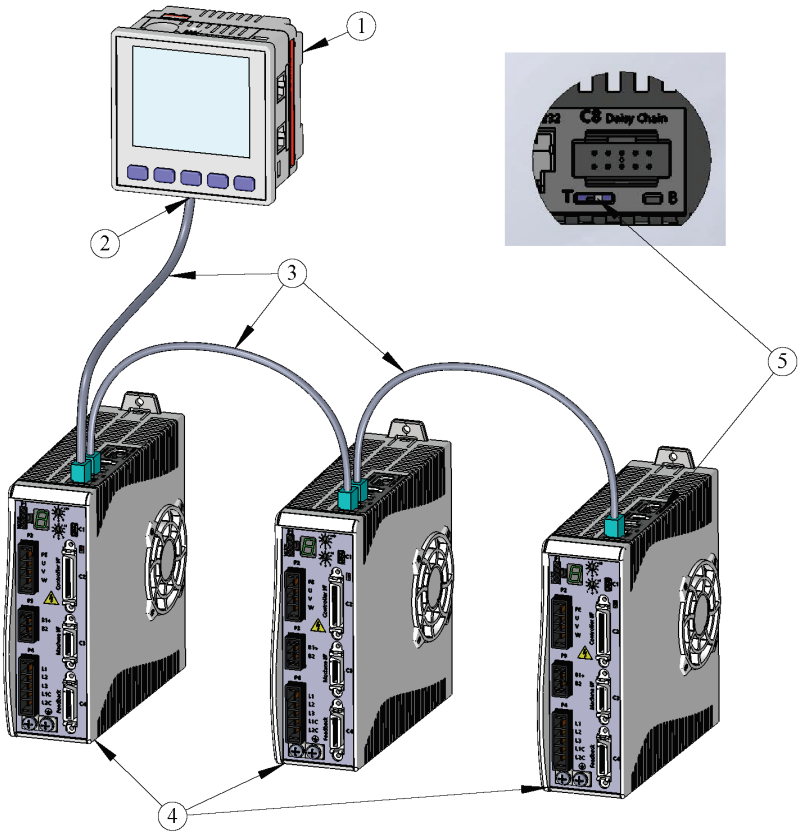
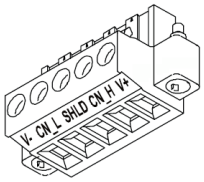


Figure 2-2. CDHD–CAN Configuration – Horner Controller – Example

1	Horner controller
2	CAN bus connector* with following pin assignments



Function	CDHD RJ45 Pin	Horner Connector Pin
CAN High	1	4
CAN Low	2	2
Functional Ground	3	1
CAN Shield	4	3
Functional Ground	5	1

3	RJ45 cables
4	CDHD with internal termination set to 0Ω (towards T)
5	Last CDHD, with internal terminator set to 120Ω (away from T)

* A 120Ω termination resistor is required at the beginning of the chain.

Note: Communication between the Horner controller and the PC can be RS232, Ethernet or USB; serial RS232 is most commonly used.

CDHD – CAN Configuration – Beckhoff Controller – Example

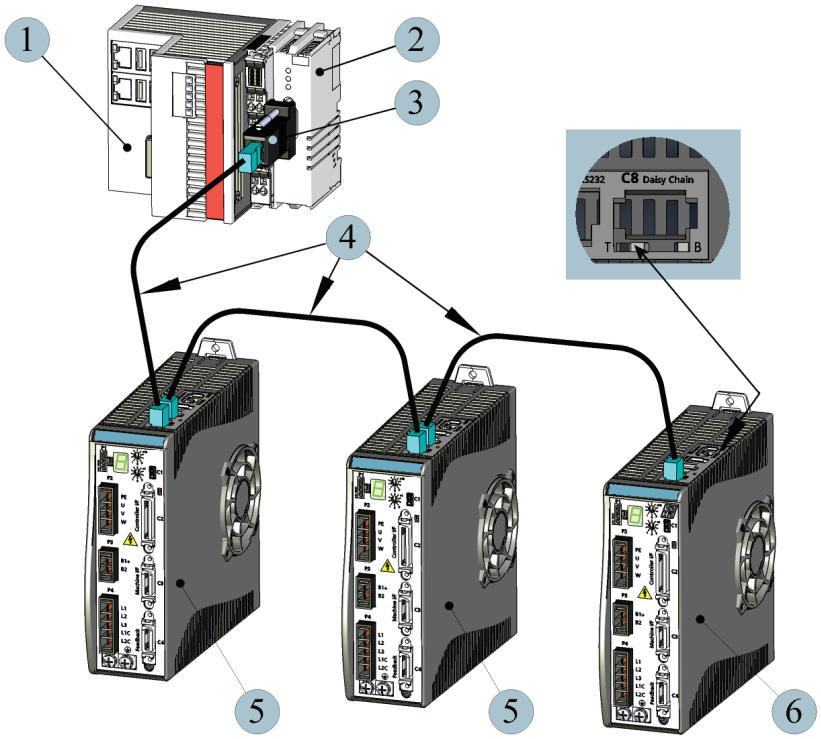


Figure 2-3. CDHD – CAN Configuration – Beckhoff Controller – Example

1	PLC or embedded PC
2	CAN bus module*
3	D9 to RJ45 adapter*, with following pin assignments

Function	CDHD RJ45 Pin	D9 Connector Pin
CAN High	1	7
CAN Low	2	2
Functional Ground	3	3
CAN Shield	4	5
Functional Ground	5	6

4	RJ45 cables
5	CDHD with internal termination set to 0Ω (towards T)
6	Last CDHD, with internal terminator set to 120Ω (away from T)

* A 120Ω termination resistor is required at the beginning of the chain.

CDHD – EtherCAT Configuration – softMC 7 Controller – Example

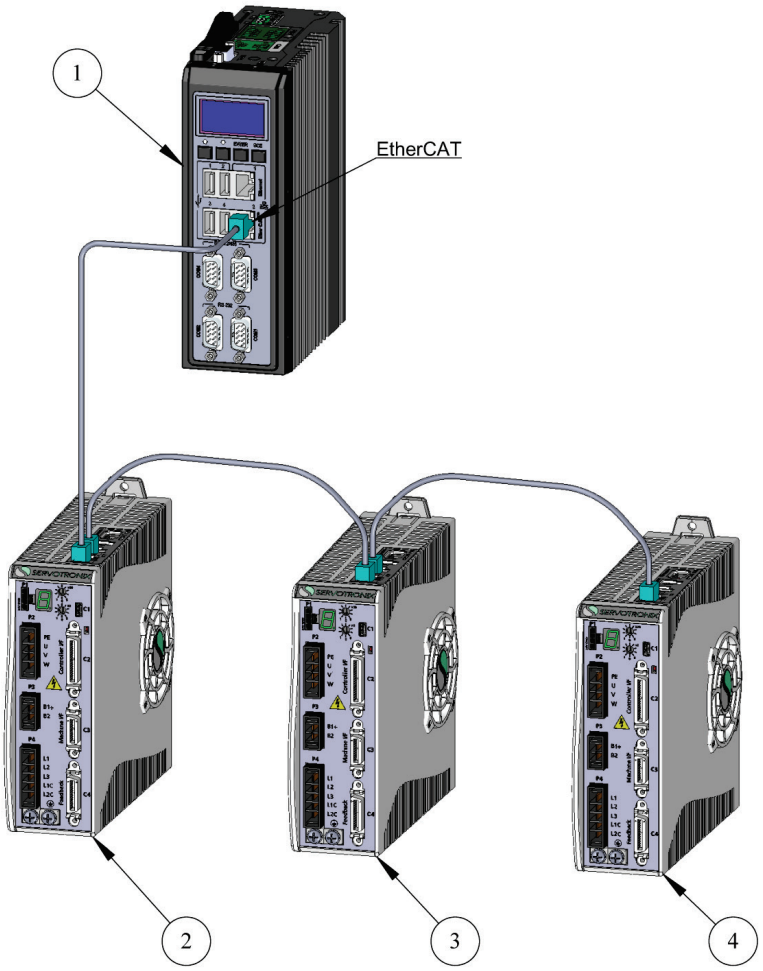


Figure 2-4. CDHD – EtherCAT Configuration – softMC 7 Controller – Example

1	softMC 7 Controller
2, 3, 4	CDHD

CDHD – EtherCAT Configuration – Beckhoff Controller – Example

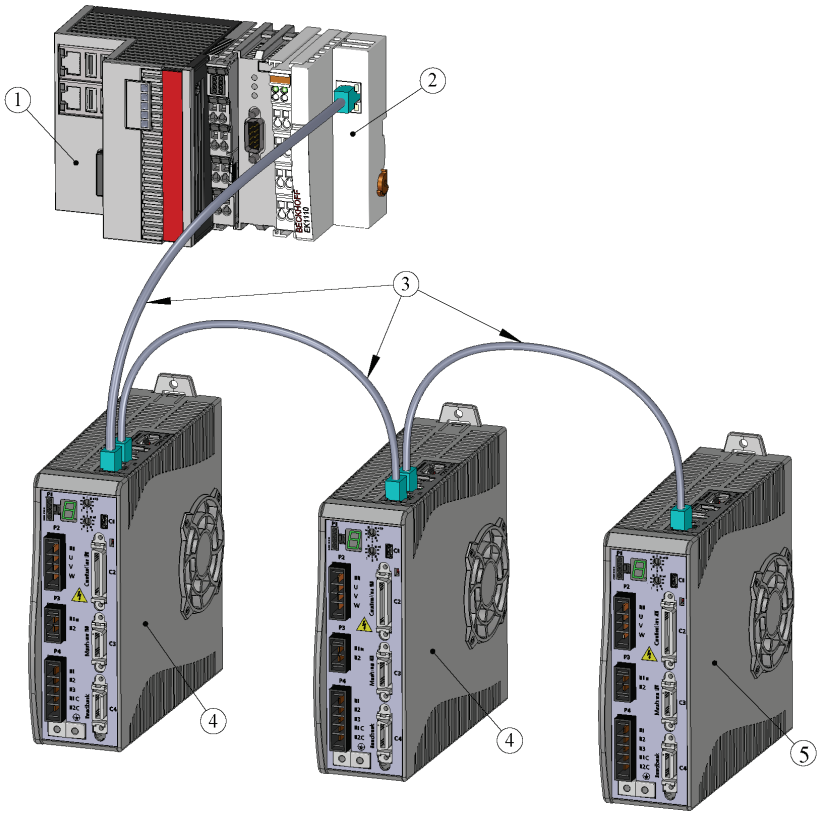


Figure 2-5. CDHD – EtherCAT Configuration – Beckhoff Controller – Example

1	PLC or embedded PC
2	EtherCAT module
3	RJ45 cables
4 / 5	CDHD

2.2 Node Address

Node Address in CANopen Network

Within a CANopen network, a unique node address (identification number) must be allocated to each individual CANopen device.

Two drives in the same CANopen network cannot have the same address.

If two or more drives are connected to the network, address 0 cannot be used. Only a singular drive may have the address 0.

The CDHD node address is set using two 10-position rotary switches located on the front panel.

Figure 2-6. Rotary address switches

Each switch has 10 positions:

- The upper switch positions are set as tens: 10, 20, 30 … 90
- The lower switch positions are set as ones: 0, 1, 2 … 9

Node Address in EtherCAT Network

Within an EtherCAT network, a physical node address (identification number) does not have to be specifically allocated to a device; the EtherCAT controller will assign the address.

Two or more drives connected in the EtherCAT network can be set at the same physical address; the EtherCAT controller will automatically set the slave IDs.

2.3 Termination Resistor Switch

Termination Resistor Switch in CANopen Network

The CDHD has a Termination Resistor switch located on the top of the drive next to the daisy chain connector (C8).

Using a small screwdriver or similar tool, set the switch to the correct position:

- **Towards T** (default): 120Ω termination resistor not in use.
- **Away from T**: Used when the drive is the last drive in a chain. The drive provides the 120Ω termination resistor between CAN high and CAN low.

Note: A 120Ω termination resistor is also required at the beginning of the chain, on either the CAN bus module, or the D9 to RJ45 adapter.

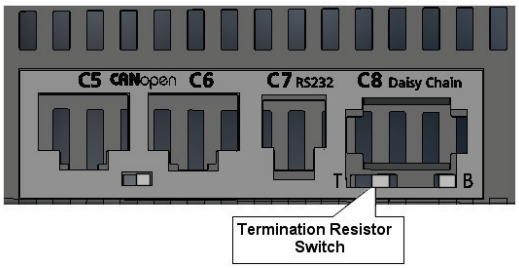


Figure 2-7. CDHD Termination resistor switch

Termination Resistor Switch in EtherCAT Network

The terminator resistor switch is not required for EtherCAT drives.

2.4 Command Interface Mode

Certain parameters, such as the command interface mode, are factory-defined in the drive's firmware, and can only be modified by means of the ServoStudio software. Note that ServoStudio requires a serial (USB or RS232) connection between the host computer and the drive.

The drive is factory-configured for the fieldbus (CANopen/Ethernet) command interface, which is defined by the drive parameter COMMODE=1.

If necessary, you can enable the CANopen/EtherCAT command interface mode through the ServoStudio **Terminal** screen. Enter the command **COMMODE 1** and then issue the serial command **SAVE**.

Alternately, you can easily select the **Interface Mode** in the ServoStudio **Drive Information** screen.

EtherCAT/CANopen	SERVO ON (ACTIVE) and motion commands are transmitted via an EtherCAT/CANopen interface.	COMMODE 1
Serial/Pulse/Analog	SERVO ON (ACTIVE) and motion commands are transmitted via a serial, pulse or analog interface. Not applicable for CDHD AP and DDHD AP models.	COMMODE 0

Communication in CANopen Network

When using **CANopen** communication, be sure the required **EDS file** is installed in the PLC controller or host computer. You can download the file from the Servotronix website or contact Technical Support.

Using any RJ45 cables:

- Connect the host to the drive on interface **C5**.
- Connect the next node to interface **C6**.

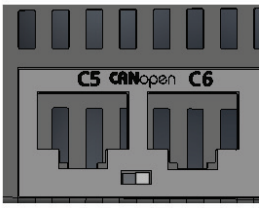


Figure 2-8. CDHD CANopen ports

Interfaces C5 and C6 (on **AF** model) share a LED that indicates the fieldbus status when communicating on a CANopen network:

- **Green**:
  - **Steadily lit** – Operational (OP) state
  - **Fast flashing** – Pre-Operational (PREOP) state
  - **Slow flashing** – Stopped state
- **Red**:
  - **Flashing** – Error
  - Green:
- **Not lit**: Drive is not set to EtherCAT/CANopen command interface mode. (Refer to *Command Interface* Mode.)

Communication in EtherCAT Network

When using **EtherCAT** communication, be sure the required **XML file** is installed in the PLC controller or host computer. You can download the file from the Servotronix website or contact Technical Support.

Using any RJ45 cables:

- Connect the host to the drive on interface **C5**.
- Connect the next node to interface **C6**.

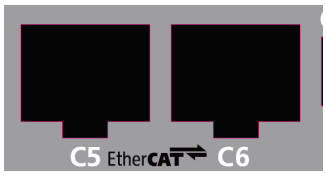


Figure 2-9. CDHD EtherCAT ports

Connectors C5 and C6 function as transmitter (Tx) and receiver (Rx), respectively.

Interfaces C5 and C6 (on **EB** and **EC** models) each have two LEDs that indicate the fieldbus status when communicating on an EtherCAT network:

- **Green**:
  - **Flashing** – Communication activity
  - **Not lit** – No communication activity

- **Orange**:
  - **Steadily lit** – Operational (OP) state
  - **Slow flashing** – Safe-Operation (SAFEOP) state
  - **Fast flashing** – Pre-Operational (PREOP) state
  - **Very fast flashing** – Bootstrap (BOOT) state
  - **Not lit** – Initial (INIT) state

2.5 CAN Bus Bit Rate

The drive is factory-configured for a communication bus rate of 500 kbps, which is defined by the drive parameter CANBITRATE=3.

If necessary, you can manually set the value of CANBITRATE through the ServoStudio **Terminal** screen. After setting the CANBITRATE value, you must issue the serial command **SAVE**, and then power cycle the drive.

CANBITRATE can be set to one of the following values:

- 1 for 125 kbps
- 2 for 250 kbps
- 3 for 500 kbps (default)
- 4 for 1000 kbps (1 megabit)

2.6 Interpolation Time (Cyclic Synchronous)

The drive parameters FBITPRD and FBITIDX define, respectively, the interpolation time period and time index used for calculating fieldbus cyclic sync time in Cyclic Synchronous modes of operation.

The following equation defines the relationship of these parameters:

$$\text{FBITPRD} \times 10^{\text{FBITIDX}} = \text{Fieldbus cyclic synchronous time, in seconds.}$$

It is possible to set these parameters through object 60C2h sub-indices 1 and 2.

During INIT state, the host controller must set the values of the indexes to the equivalent cycle time as the controller.

If necessary, you can manually set the value of FBITPRD and FBITIDX through the ServoStudio **Terminal** screen. After setting FBITPRD and FBITIDX, you must issue the serial command **SAVE**.

3 Configuring softMC Controller for Use with CDHD EtherCAT (EC) Drive

Information on configuring the softMC controller for use with CDHD can be found in the softMC documentation wiki:

The articles should be accessed and read in the following order:

1. http://softmc.servotronix.com/wiki/Category:EtherCAT:EC_SETUP
2. http://softmc.servotronix.com/wiki/EtherCAT:EC_INSTALL_STX_CDHD

To login to the softMC wiki:

- Username: softMC
- Password: documentation

For additional assistance with the installation and configuration, contact Servotronix Technical Support.

4 Configuring Horner Controller for Use with CDHD CAN (AF) Drive

This chapter explains how to configure the CDHD CAN servo drive for communication and operation with the Horner controller on a CAN network.

The application system consists of the following elements:

- CDHD CAN servo drive, servo motor, and ServoStudio software.
- Horner controller with CAN communication port, and Horner Cscape software.

Notes: Horner controllers have a CAN port that can be used in either CsCAN or CANopen mode. **CsCAN** is a standard developed by Horner. It provides a network to other units or SCADA systems, and provides a single point of connection to the network for programming, monitoring and troubleshooting. **CANopen** is an industry recognized standard that enables the connectivity options to a third-party equipment such as drives and IO modules.

Horner **Cscape** Programmable Logic Controller software combines logic, messaging and networking. It enables programming of graphical ladder diagrams (based on IEC-1131) along with development of the operator interface.

These configuration instructions assume the Horner controller and CDHD CAN drive are operating and communicating according to **CANopen protocol**.

4.1 CDHD Hardware and Software Settings

Refer to the chapter *Fieldbus Wiring and* Setup*.* The diagram in Figure 2-2 shows a setup with a Horner controller.

Make sure all hardware settings are in accordance with the instructions in the following sections.

- Fieldbus Wiring
- Node Address
- Termination Resistor Switch
- Command Interface Mode
- CAN Bus Bit Rate
- Interpolation Time

Make sure the correct ***.eds** file is installed in the controller.

4.2 Communication Between Controller and PC

1. Activate **Cscape**.

   When Cscape software is activated, communication between the controller and the PC must be established.

2. Use the **Connection Wizard** to define the method of communication.

   - Select **Serial**.

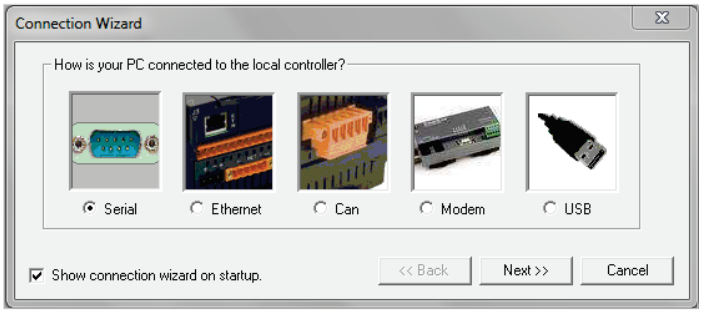


Figure 4-1. Cscape Connection Wizard

3. Click the **New File** button to start a new application program.

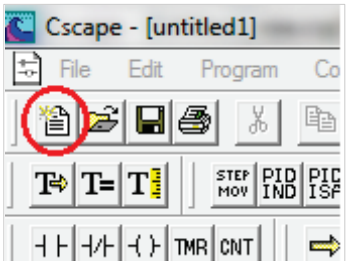


Figure 4-2. New File Button

4. Select the type of editor to be used for developing the application program.

   - Select **Advanced Ladder Editor**.

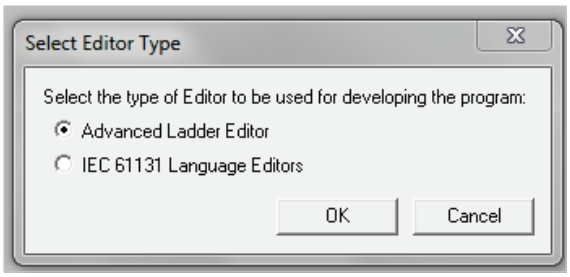


Figure 4-3. Editor Type options

4.3 Communication Between Controller and Drive

1. Activate the CANopen Network Configurator:
   - In the Project Navigator pane, select Networking > **Network Configuration**.

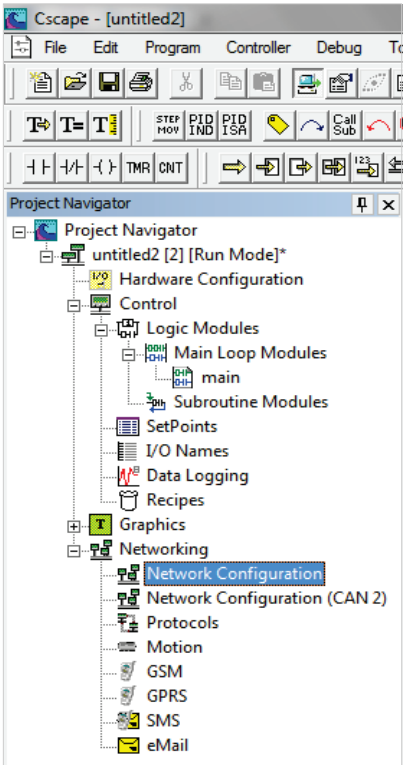


Figure 4-4. Project Navigator

   - Wait for the CANopen Network Configurator to start.

2. Select the type of node to be created for the CANopen controller. Since the controller will be the master, select **Add As Master.**

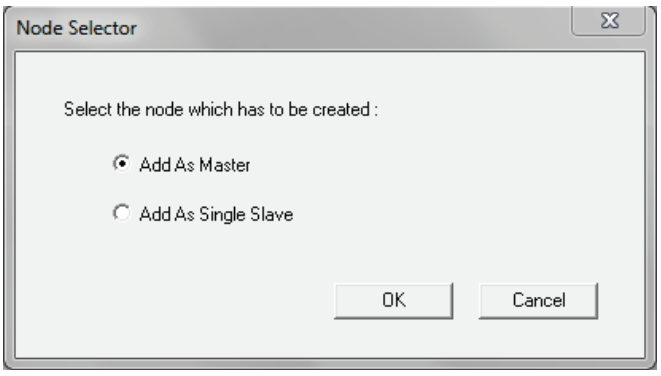


Figure 4-5. Node Selector

3. Configure the communication settings for the CANopen master. Use the settings shown in the following figure:

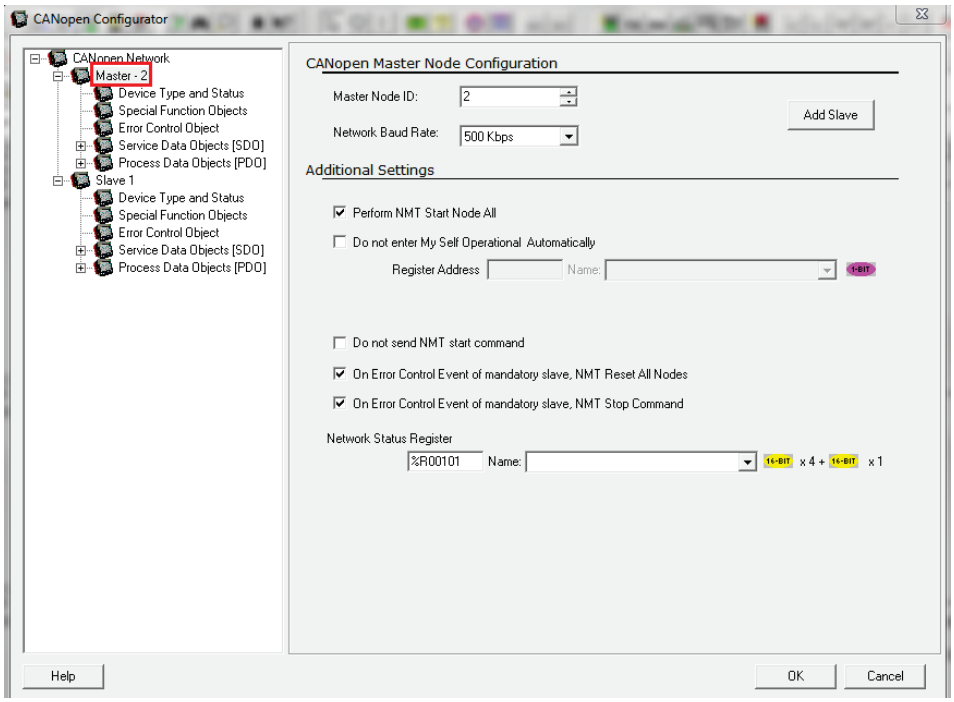


Figure 4-6. CANopen Configurator – Master

4. Configure the settings for the CANopen slave (the drive). Use the settings shown in the following figure:

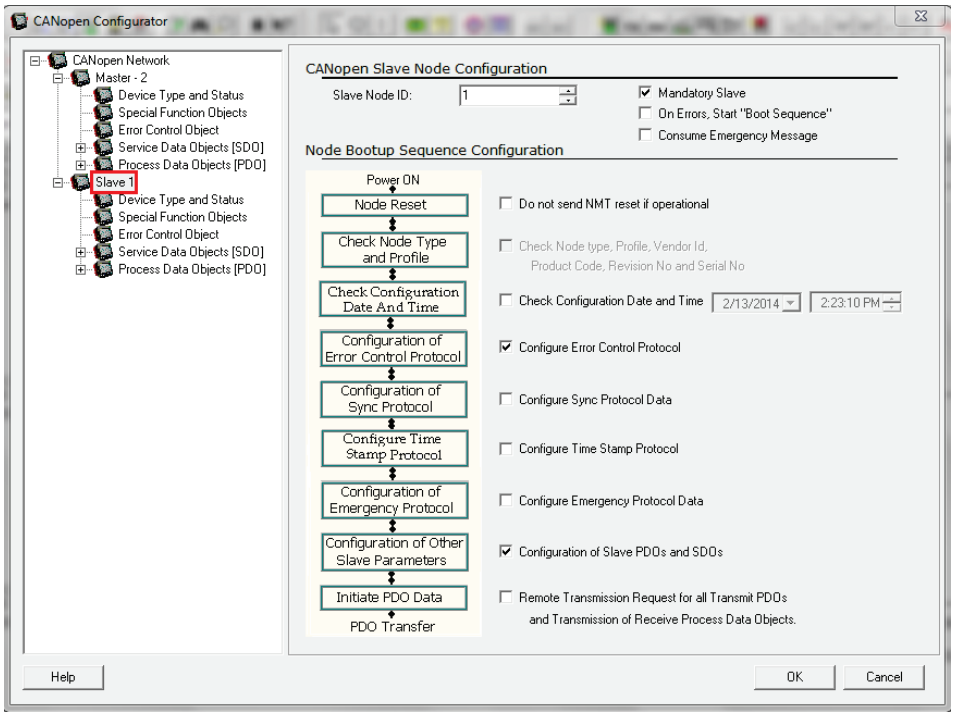


Figure 4-7. CANopen Configurator – Slave

Note: Be sure the Slave Node ID matches the physical address of the CDHD.

5. In the CANopen Configurator screen, select CANopen Network > **Master** *x* > **Special Function Objects**, and configure the settings:

- Enable the option **Generate SYNC Message.**
- Set the value of object 1006h-Communication Cycle Period. For this application, set it to 1000 µs or 1 ms
- Set the value of object 1007h-Synchronous Window Length. For this application, set it to 5000 µs or 5 ms

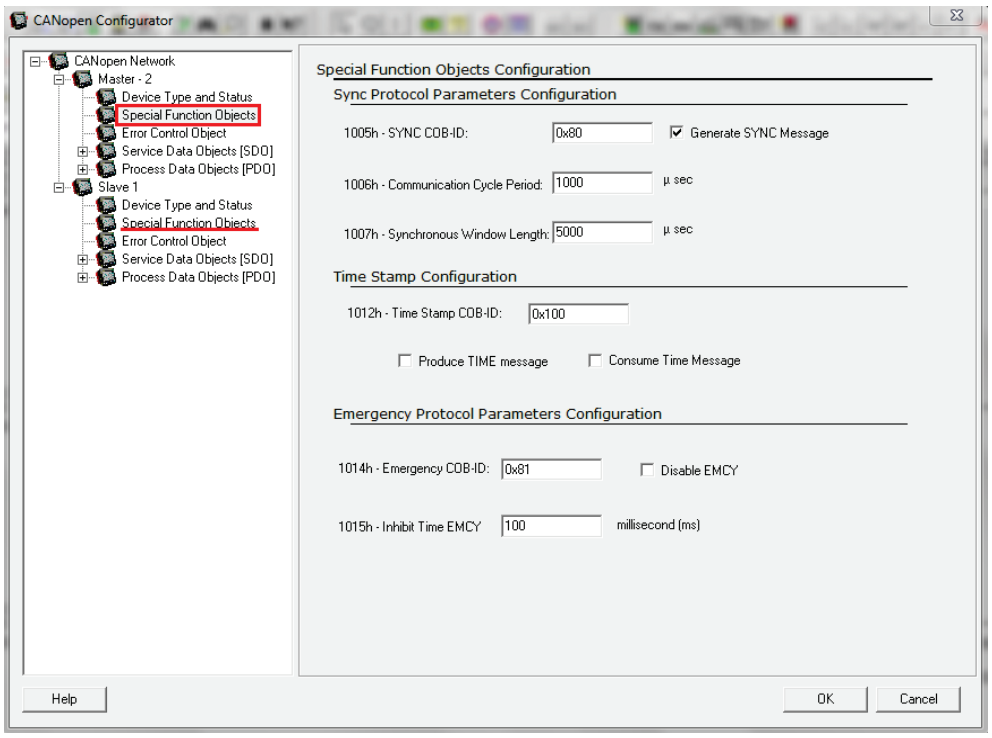


Figure 4-8.

6. Repeat Step 5, configuring the same settings for **Slave** *x* > **Special Function Objects.**

4.4 PDO Object Mapping

Before you can begin writing the application program in Cscape, all the PDO objects in the EDS file must be mapped to the controller.

Cscape will automatically map the PDO objects after you complete the following procedure.

1. Activate **Cscape**.
2. From the menu bar, select Program > **Motion Configuration.**

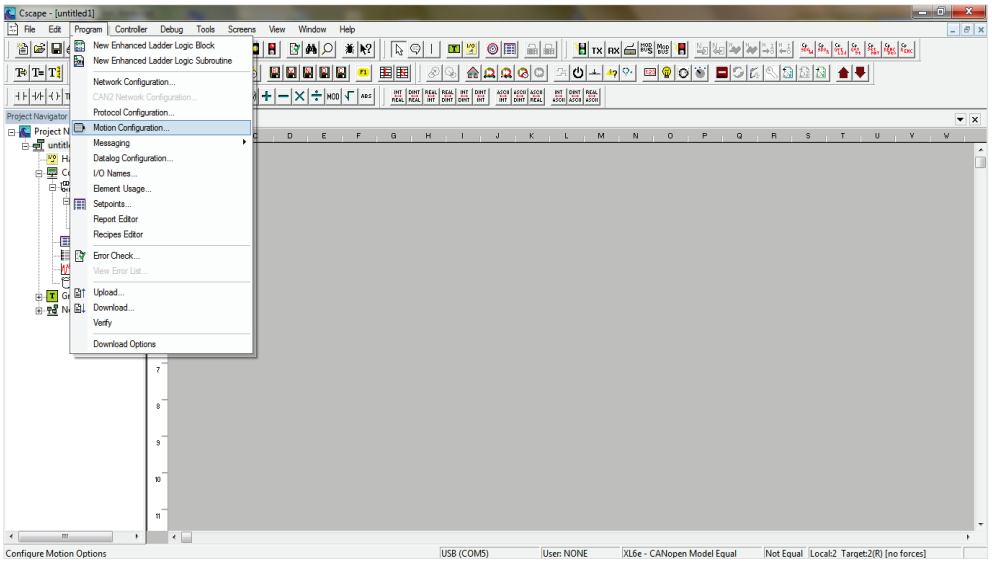


Figure 4-9.

3. In the **Network status register** field, enter **%R0100**, and press **Add**.

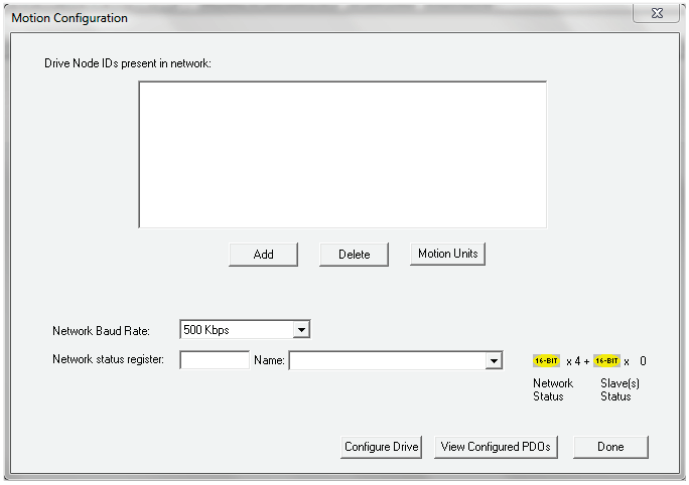


Figure 4-10.

4. Configure the first internal controller memory register to complete the PDO mapping.

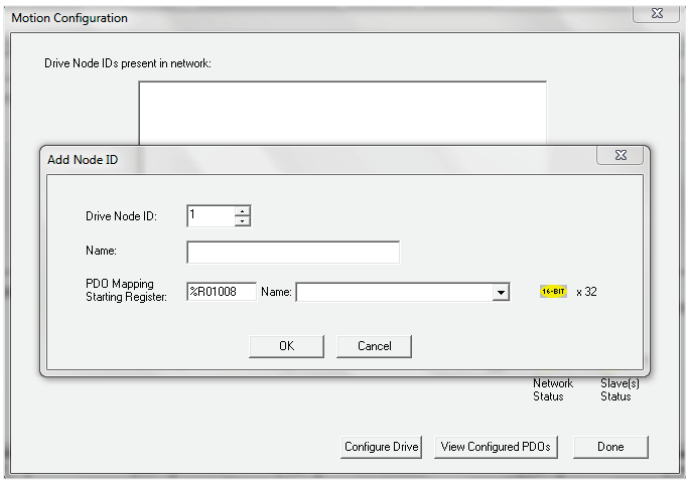


Figure 4-11.

5. Make sure Network Baudrate is set to 500 Kbps.

6. Press the **Configure Drive** button.

All PDO objects from the EDS file will be exported to the controller through a Horner-ServoStudio application bridge.

7. Immediately close the Horner–ServoStudio application bridge immediately. Wait for Cscape to receive the PDO objects from the drive.

8. After the process is completed, you can view the variable mapping by pressing the **View Configured PDO** button.

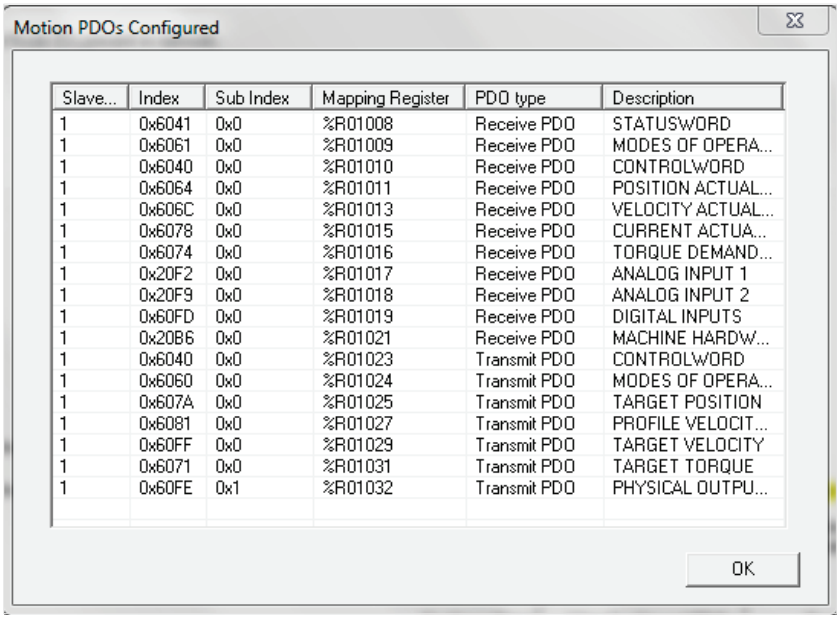


Figure 4-12.

9. Once the PDO mapping process is completed, you can begin developing the application program.

Note: Using the Cscape software, the CDHD parameters PNUM, PDEN, FBGDS, FBGMS, FBITPRD and FBITIDX can be set by means of their corresponding CANopen objects, using SDO Read/Write function blocks.

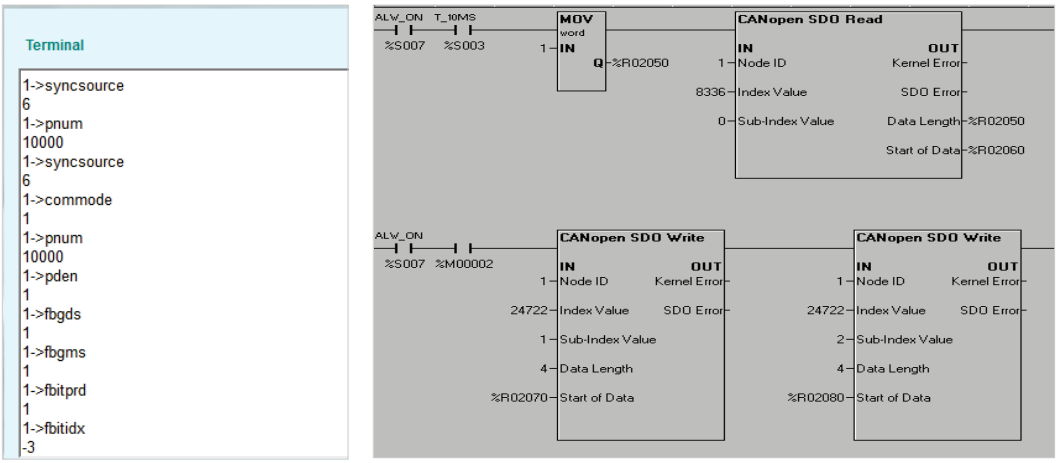


Figure 4-13. Parameter Settings in ServoStudio and in Cscape

5 Configuring Beckhoff Controller for Use with CDHD EtherCAT (EC) Drive

This chapter explains how to configure the Beckhoff controller for communication and operation with the CDHD EC models.

The application system consists of the following elements:

- CDHD EC Ethernet servo drive, servo motor, and ServoStudio software.
- Beckhoff controller with EtherCAT communication module, and TwinCAT software.

Notes: Beckhoff controller refers to TwinCAT NC PTP (point-to-point axis positioning software).

TwinCAT NC PTP includes axis positioning software (set value generation, position control), an integrated software PLC with NC interface, operating program for commissioning and an I/O connection to the axes through various fieldbuses. TwinCAT NC PTP replaces conventional positioning modules and NC controllers. The controllers that are simulated by the PC cyclically exchange data with drives and measuring systems via the fieldbus.

Beckhoff controllers are programmed in accordance with the IEC 61131-3 programming standard.

5.1 CDHD Hardware and Software Settings

Refer to the chapter *Fieldbus Wiring and* Setup*.* The diagram in Figure 2-5 shows a setup with a Beckhoff controller.

Make sure all hardware settings are in accordance with the instructions in the following sections.

- Fieldbus Wiring
- Node Address
- Termination Resistor Switch
- Command Interface Mode
- CAN Bus Bit Rate
- Interpolation Time

Before activating the **TwinCAT System Manager**, make sure the correct ***.xml** file (according to the firmware version) resides at C:\TwinCAT\Io\EtherCAT.

5.2 Communication between Controller and PC

Using **TwinCAT** software, establish communication between the controller and the PC by performing the following steps.

1. Activate **TwinCAT** software.
2. In the navigation pane, select **SYSTEM – Configuration**. Then, in the **Version (Local) tab**, click **Choose Target.**

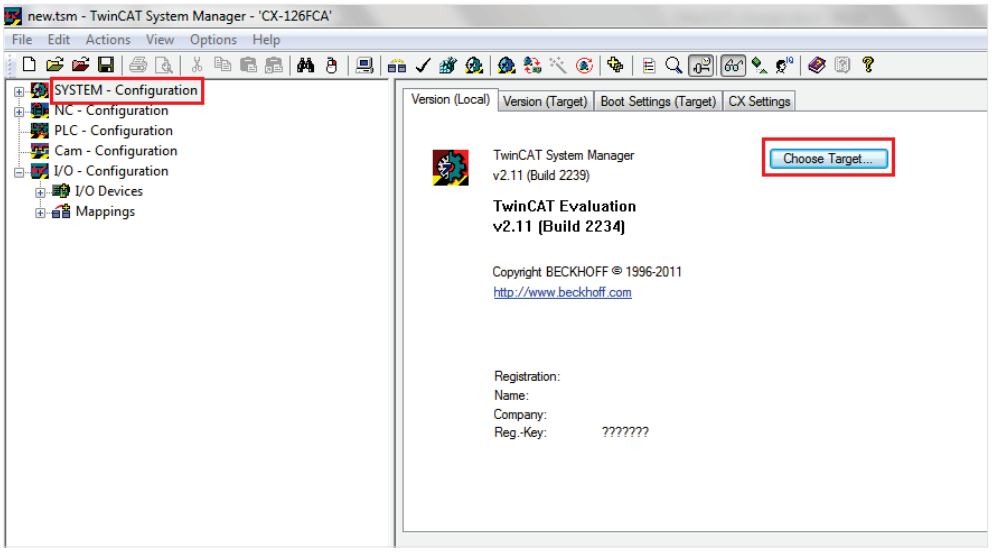


Figure 5-1.

3. Click **Search (Ethernet)** to search for the controller in the network.

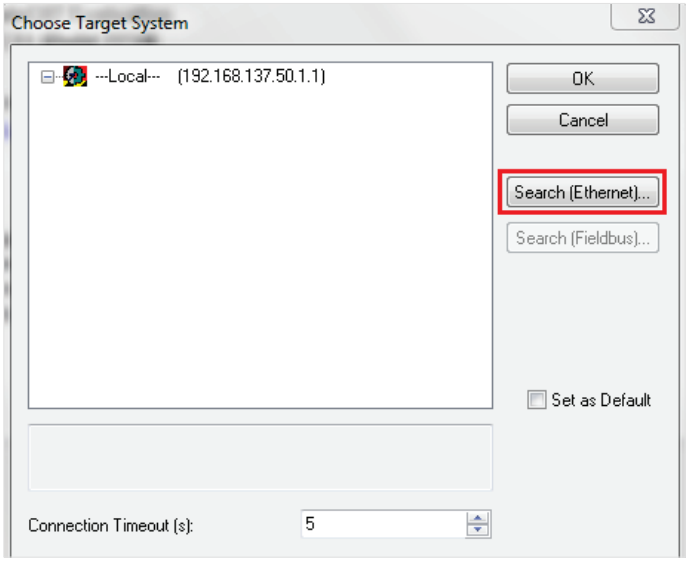


Figure 5-2.

4. Enable the option **IP Address**, and click **Broadcast Search.**

Wait for the controller name (in the format CX-xxx) to appear.

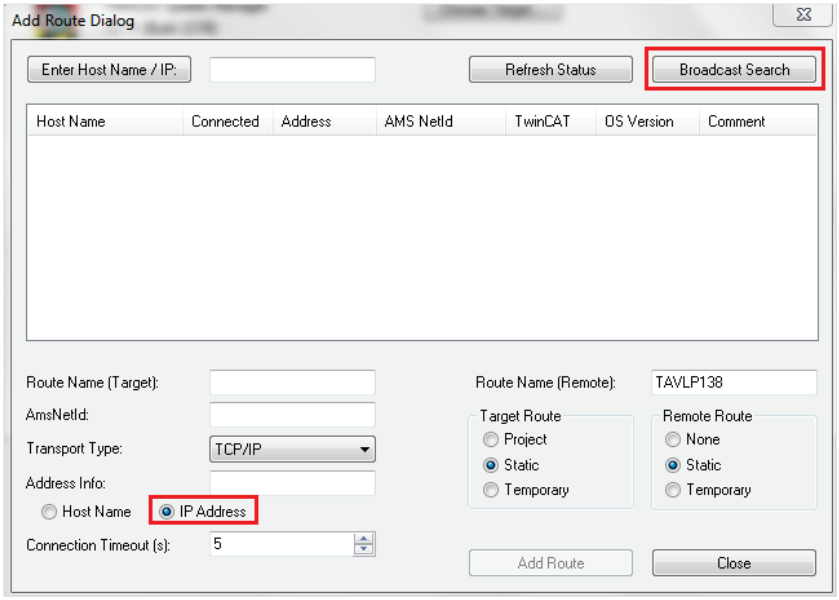


Figure 5-3.

5. After the controller appears, the option **Add Route** is displayed.

Click Add Route

6. In the Logon dialog box, enter the following:
User Name: **Administrator**
Password: 1

Click **OK.**

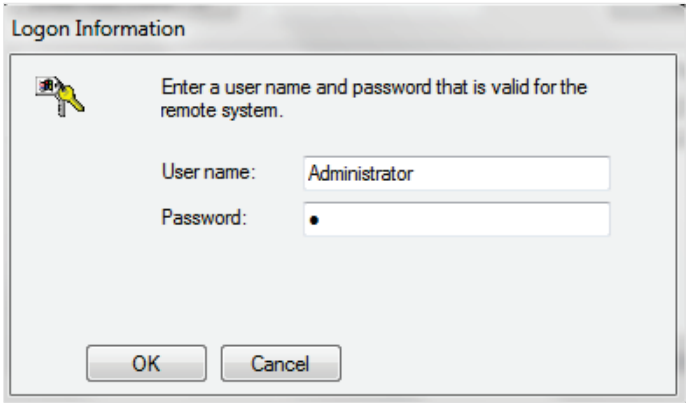


Figure 5-4.

7. In the Add Route dialog box, be sure an **X** appears next to the controller name. This means the controller is properly connected to the PC.

Close this dialog box.

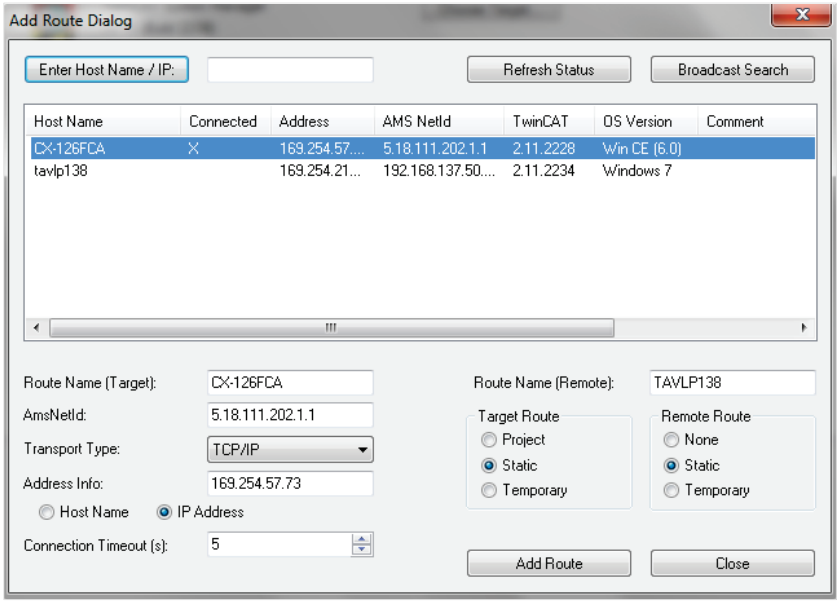
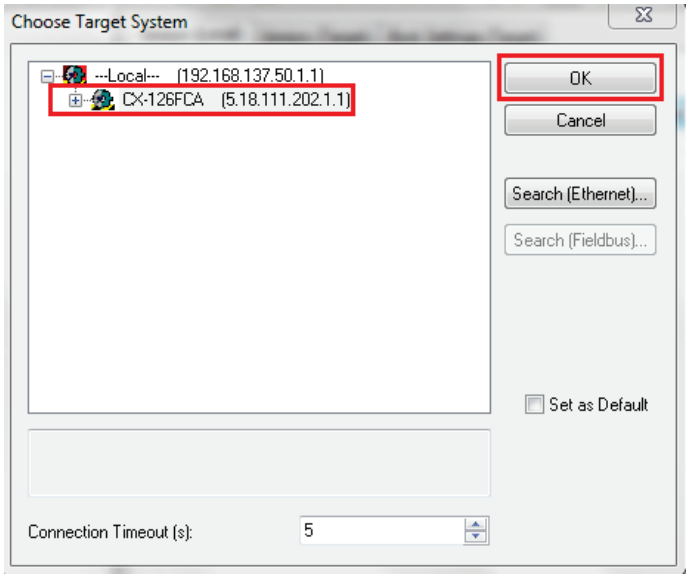


Figure 5-5.

8. In the Choose Target System dialog box, click on the controller, and click **OK**.



9. Open the TwinCAT System Manager, and make sure it is in **Config Mode**.

Figure 5-6.

5.3 Communication between Controller and Drive

Using **TwinCAT** software, establish communication between the controller and the drive by performing the following steps.

1. In the navigation pane, expand **I/O–Configuration**, and then right-click on **I/O Devices**.
2. Select **Scan Devices.**

   At the prompt, click **OK**.

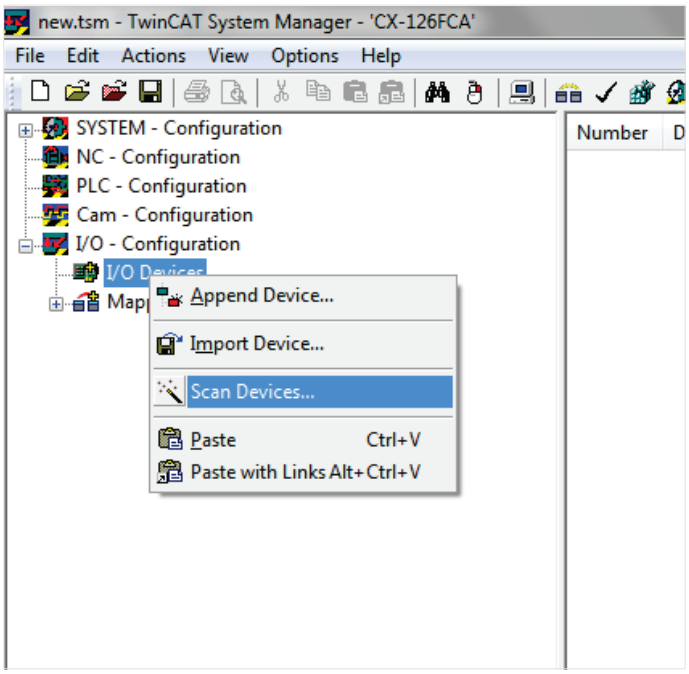


Figure 5-7.

3. After the scanning, detected devices are displayed.

   CDHD is identified as **Device 1 (EtherCAT).**

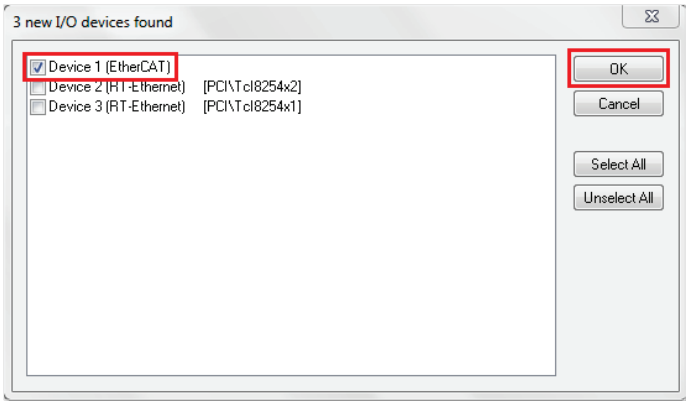


Figure 5-8.

4. Enable the option **Device 1 (EtherCAT**), and click **OK**.

5. At the prompt to scan for boxes (slaves), click **Yes**.

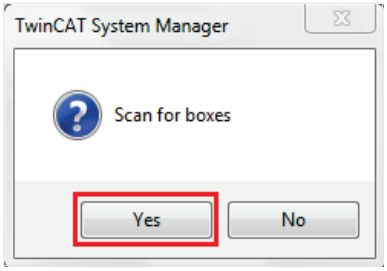


Figure 5-9.

6. At the prompt to append the linked axis to the NC configuration, click **Yes**.

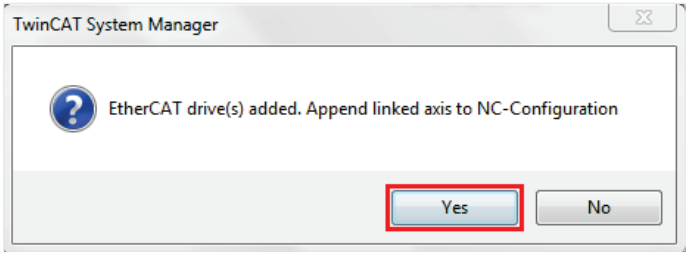


Figure 5-10.

7. At the prompt to activate FreeRun, click **No**.

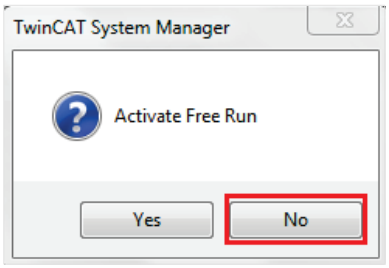


Figure 5-11.

8. At the end of this procedure, **Device 1 (EtherCAT)** is displayed in the navigation pane, with all components (TPDO and RPDO) listed and automatically linked to **NC–Configuration>Axis 1**.

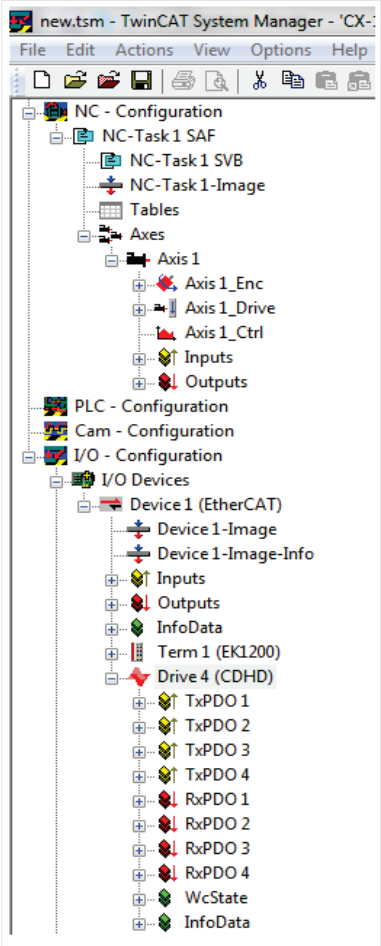


Figure 5-12.

5.4 Generating Motion

Setup for Motion

1. Open the TwinCAT System Manager, and make sure it is in **Config Mode**.

Figure 5-13.

2. In the navigation pane, expand **SYSTEM–Configuration**, and select **Real Time Settings**.

- In the **Settings** tab, select Base Time = 1 ms.

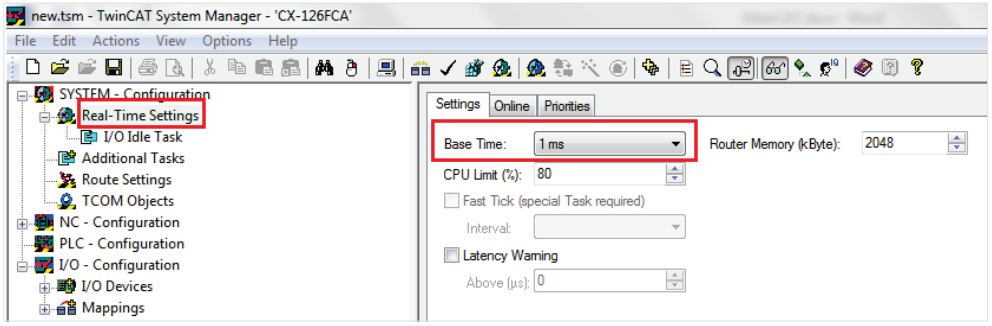


Figure 5-14.

- In the **Priorities** tab, enable **Automatic Priority Management.**

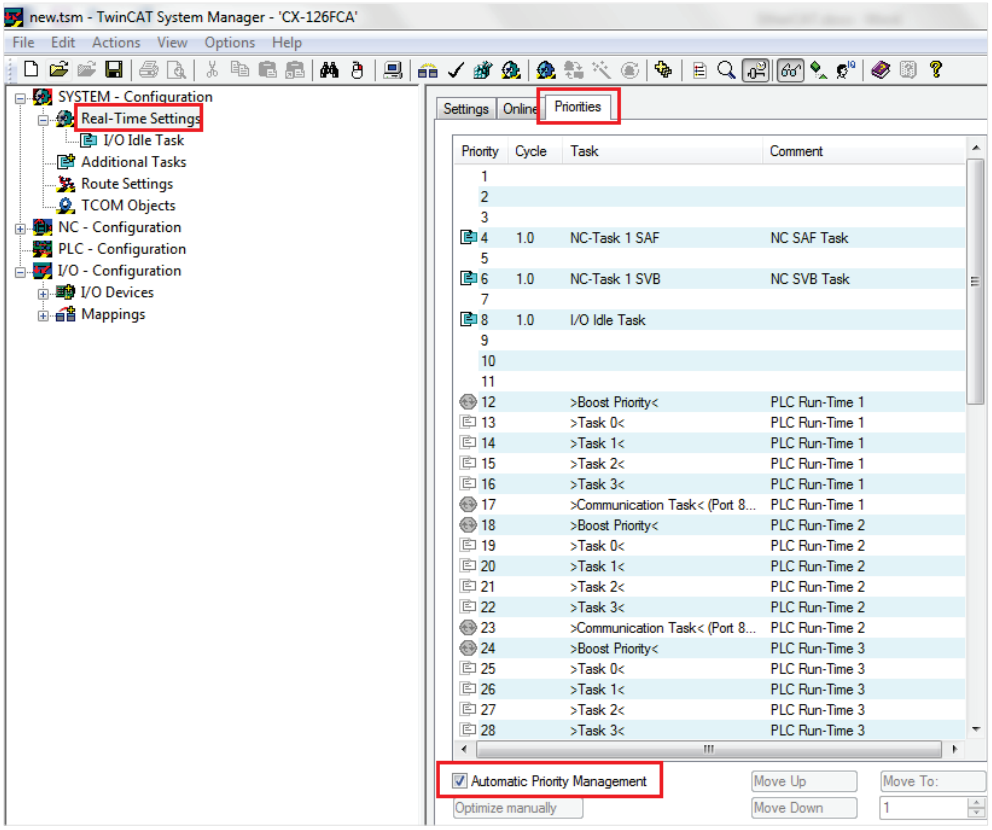


Figure 5-15.

3. Expand **SYSTEM–Configuration**, and select Real Time Settings > **I/O Idle Task.**

In the **Task** tab, select Cycle ticks = 1 ms.

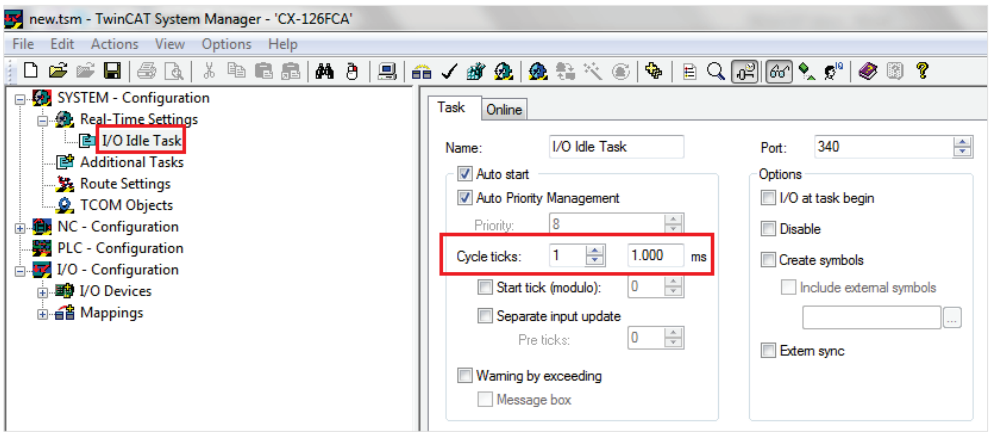


Figure 5-16.

4. In the navigation pane, expand **NC–Configuration**, and select **NC-Task1SAF.**

- In the **Task** tab, select Cycle ticks = 1 ms.

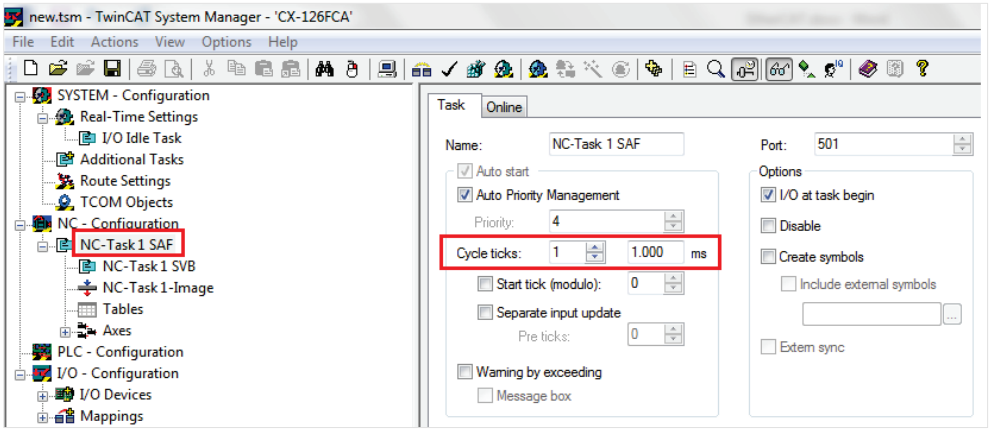


Figure 5-17.

5. Expand **NCT-Task1SAF**, and select **NC-Task1SVB**.

- In the **Task** tab, select Cycle ticks = 1 ms.
- Be sure the priority of NC-Task1 SVB has a higher value than the priority of NC-Task1 SAF.

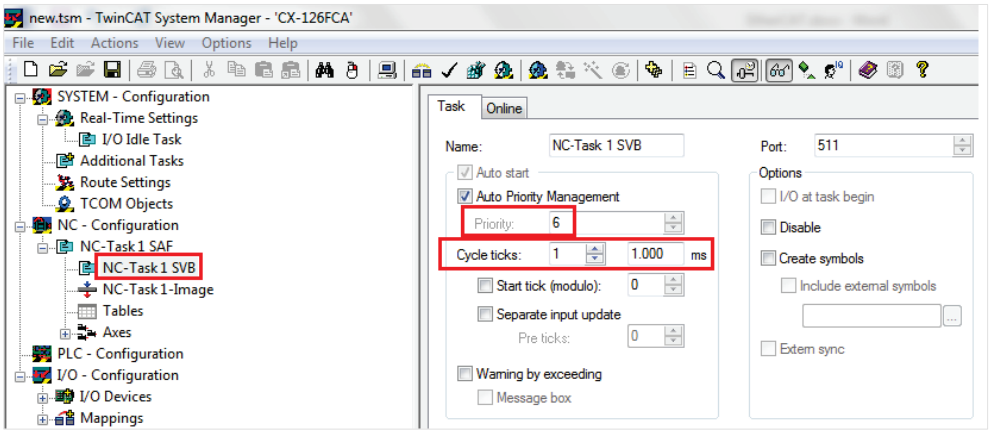


Figure 5-18.

6. Expand **NC-Configuration** > Axes > Axis 1 > **Axis 1_Enc**.

In the **Parameter** tab, do the following:

- **Encoder Evaluation** > **Scaling Factor** = 1.
  Click **Download**.

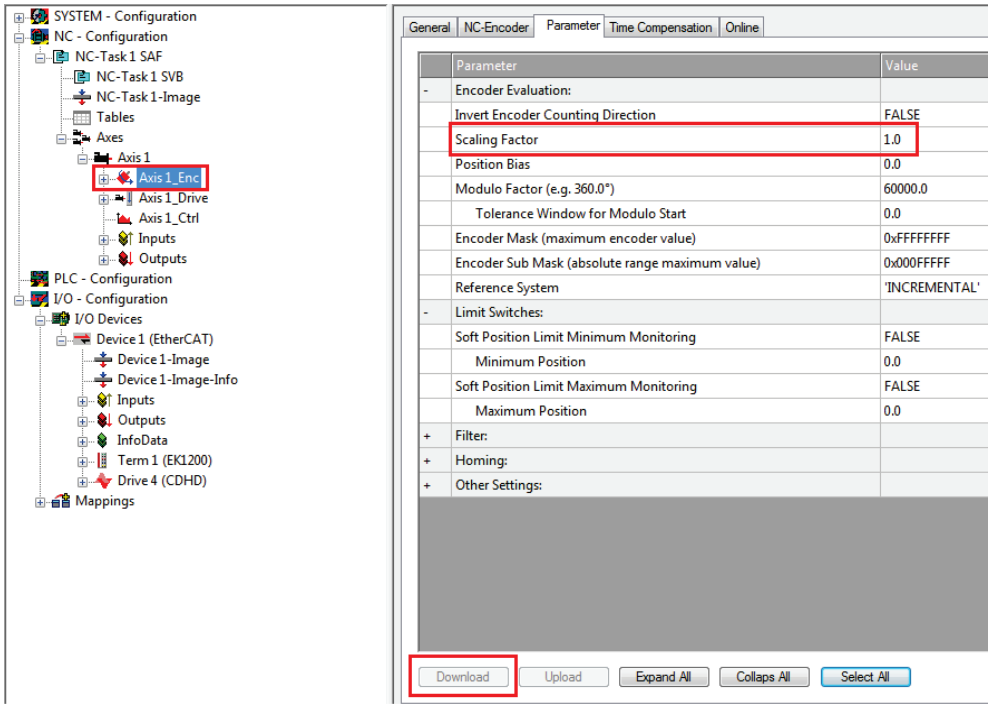


Figure 5-19.

- **Encoder Evaluation** > **Modulo Factor** = PNUM value.
  Click **Download**.

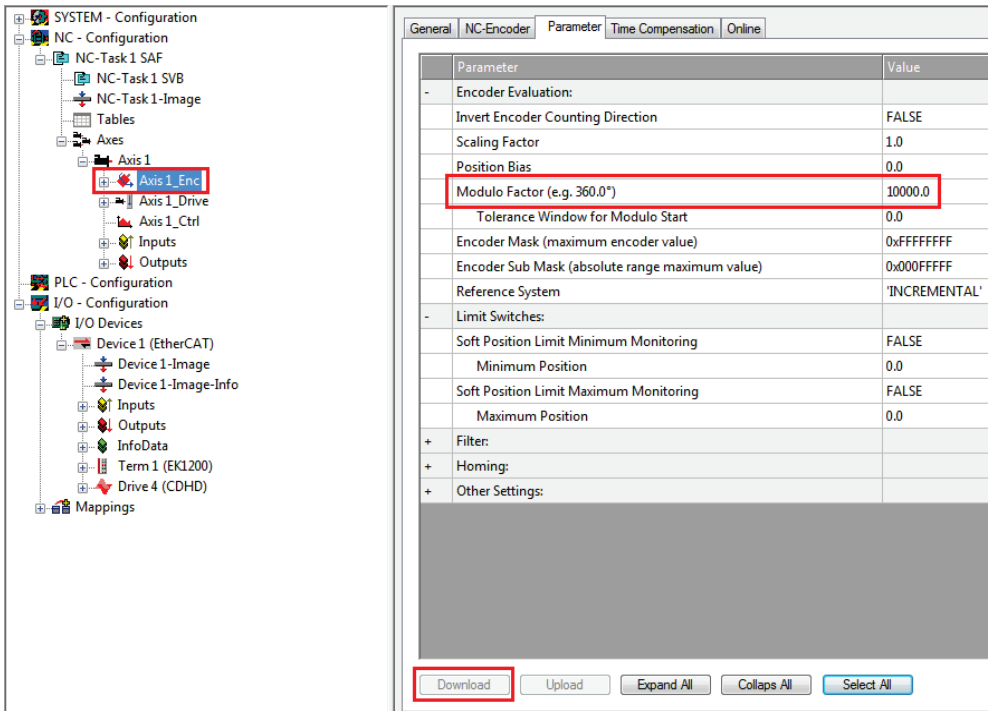


Figure 5-20.

7. Expand **NC-Configuration** > Axes > Axis 1 > **Axis 1_Ctrl**.

In the **Parameter** tab, do the following:

- **Monitoring** > Position Lag Monitoring = FALSE

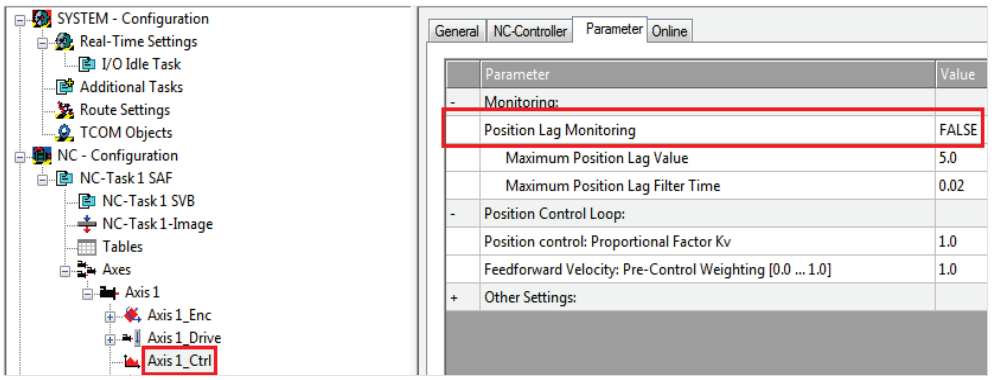


Figure 5-21.

8. Expand **IO-Configuration** > **I/O Devices** > Device (EtherCAT), and select the drive indicated by the red icon.

- In the **DC** tab, select Operation Mode = **DC-Synchronous**

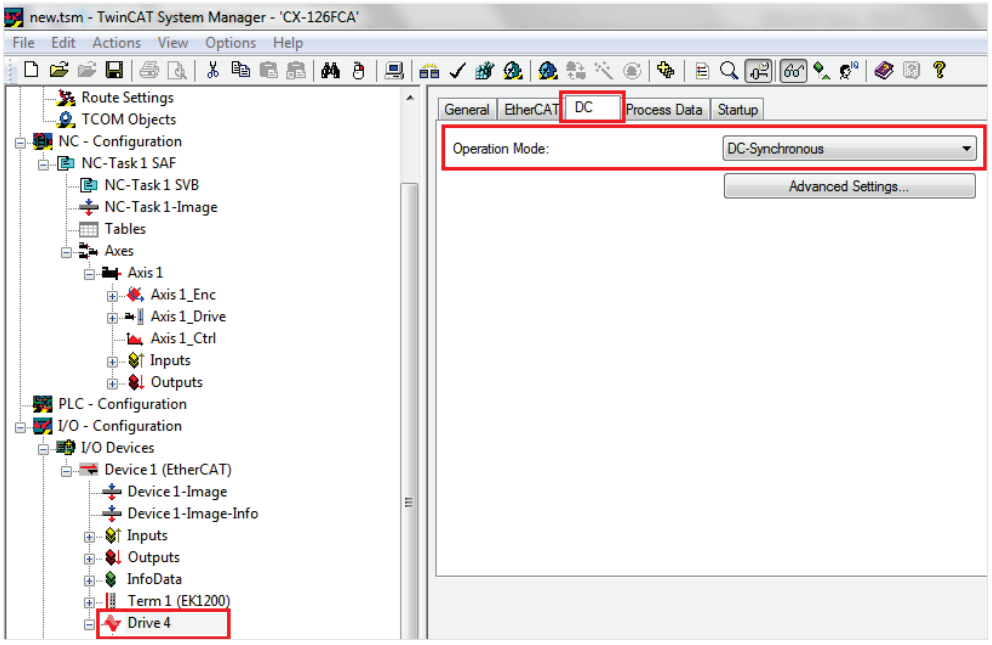


Figure 5-22.

9. Press the **Run Mode** button in the toolbar.

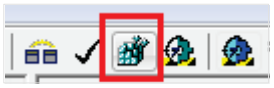


Figure 5-23.

Additional tabs are now available.

10. Go to the **CoE Online** tab.

The CoE Online tab shows only the SDO objects (CDHD EtherCAT parameters) that the drive manages.

Be sure the values of the objects 6060h and 60C2h are as follows:

- Object **6060h = 8**

  The drive is set to Cyclic Synchronous Position mode, OPMODE 8, through protocol object 6060h.

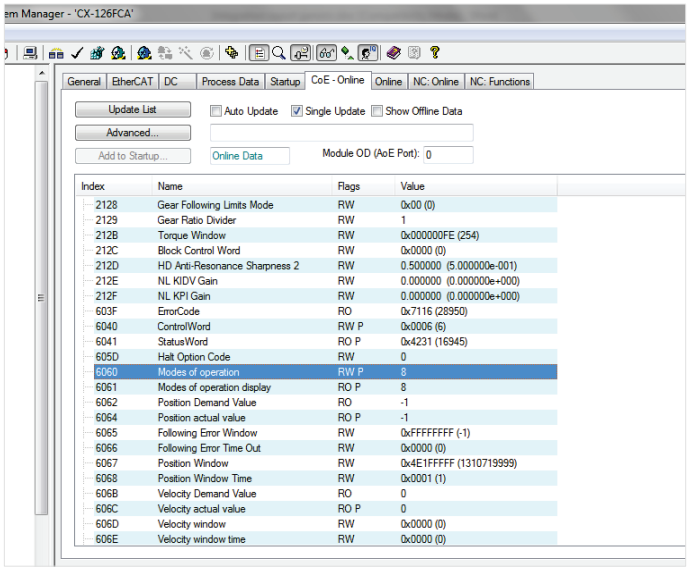


Figure 5-24.

- Object 60C2h:
  Sub-index 01 **(60C2:01) = 1**
  Sub-index 02 **(60C2:02) = -3**

  The interpolation time for the Cyclic Synchronous operation modes is set through object 60C2h (sub-index 01 and sub-index 02).

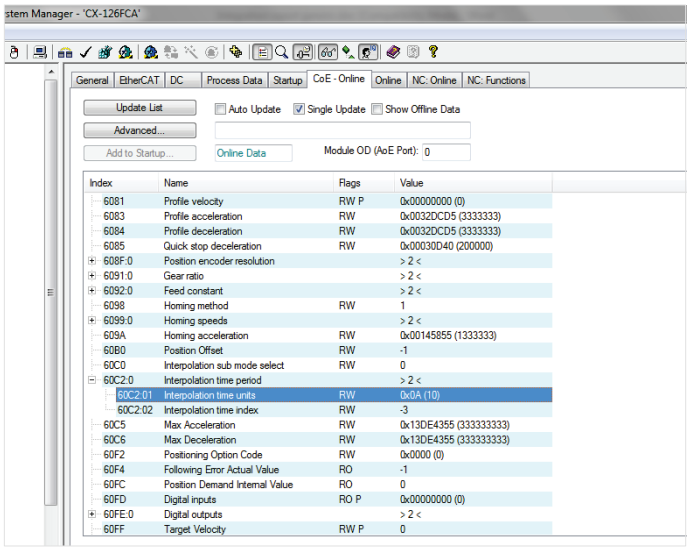


Figure 5-25.

Note: The interpolation time must be configured with the same value of cycle ticks as configured in I/O Idle Task, in NC-Task 1 SAF, and in NC-Task 1 SVB.

11. Now activate **Run Mode** by pressing the following two buttons in the toolbar:

- Generate Mappings
- Check Configuration

Figure 5-26.

In Run mode, motion can be generated. The NC PTP communicates with the drive and receives all the values of the variables contained in each of the PDO objects (which were automatically mapped by the controller).

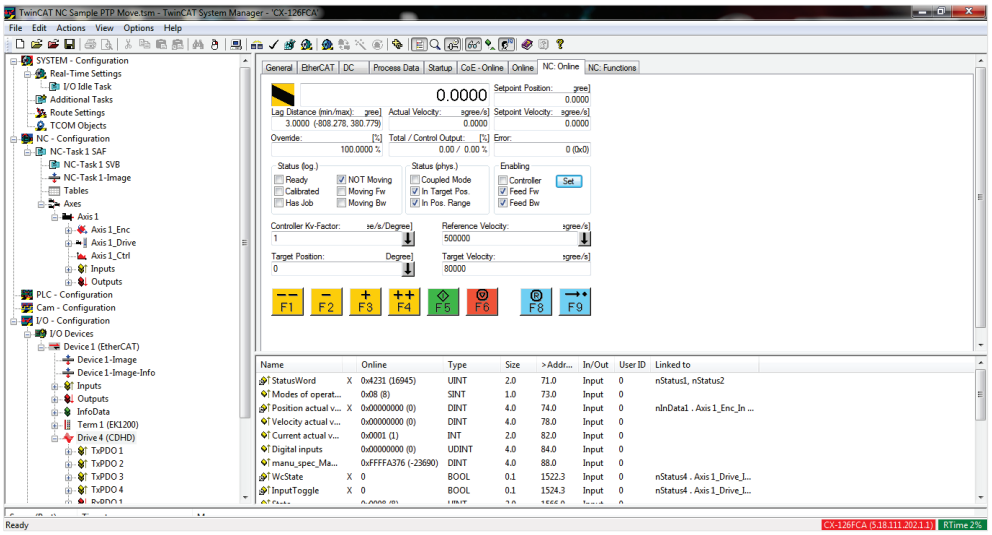


Figure 5-27.

12. In the **NC-Online** tab, test communication with the drive:

Take hold of the motor shaft, and turn it manually; check whether the position feedback value changes.

Refer to the following figure, which shows the various functions.

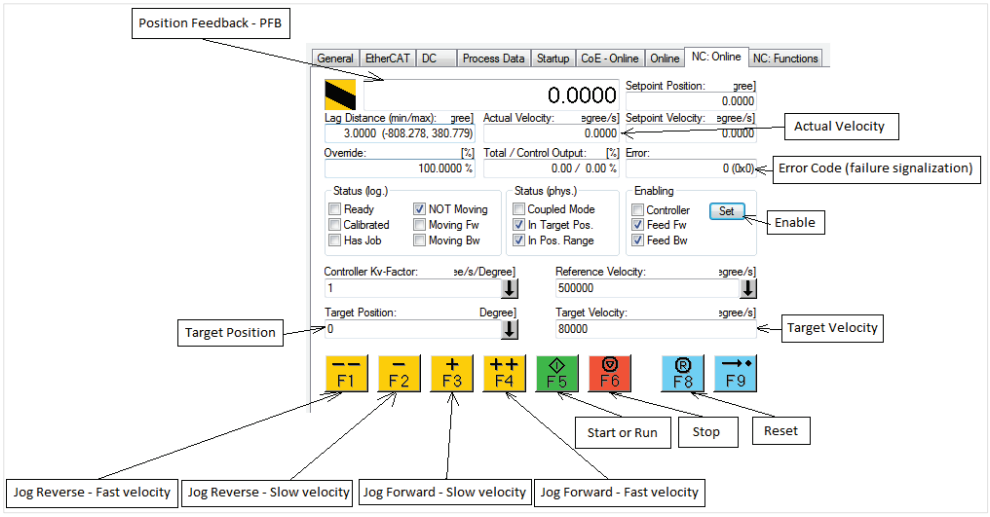


Figure 5-28.

Generating Motion in Cyclic Synchronous Position Mode

The following steps demonstrate how to generate a motion in Cyclic Synchronous Position mode. In the **NC-Online** tab, you will send a target position with a velocity to the drive. The controller will execute a motion profile.

1. Enable the drive:

a. NC-Online Screen > **Enabling** > **Set**

b. Enable the options: **Controller**, **Feed Fw** and **Feed Bw**, or select **All**

c. **OK**

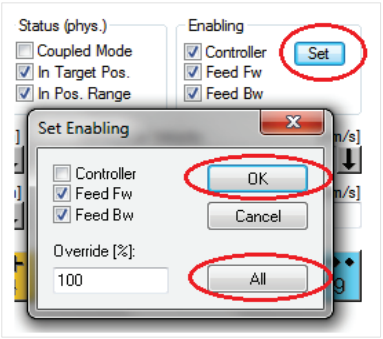


Figure 5-29.

Note: To disable the drive:
NC-Online Screen > **Enabling** > Clear the option **Controller** > **OK**

2. Use the motion buttons – F1, F2, F3 and F4 to generate the following motion profiles.

Configure the velocity in the controller using **NC-Configuration** > **NC-Task1 SAF** > **Axes** > **Axis1** > **Parameters** > **Manual Velocity** (Slow and Fast), as shown in the following figure.

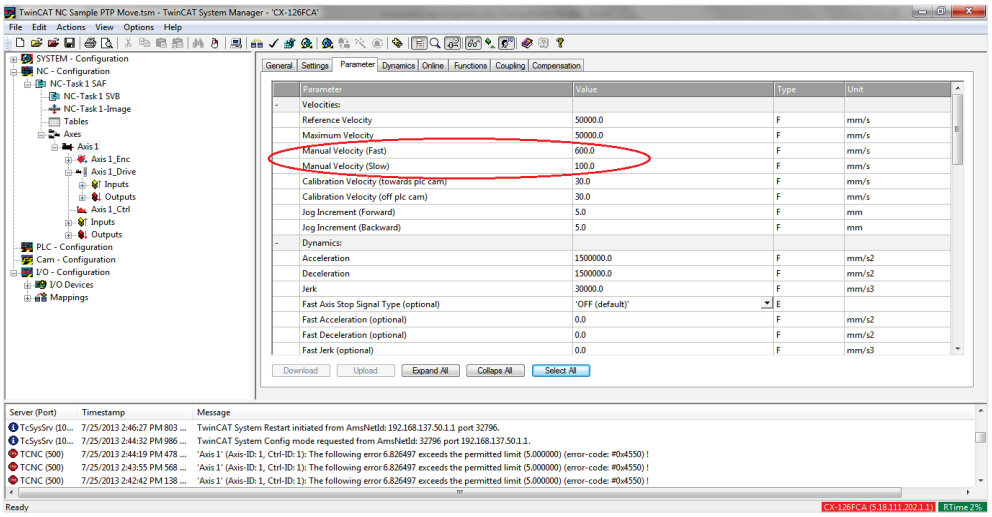


Figure 5-30.

- **F1**: Sends a jog command in the negative direction (CCW) with a fast velocity.
- **F2**: Sends a jog command in the negative direction (CCW) with slow velocity.
- **F3**: Sends a jog command in the positive direction (CW) with slow velocity.
- **F4**: Sends a jog command in the positive direction (CW) with fast velocity.

3. Set values for **Target Position** and **Target Velocity** as shown in the following figure.

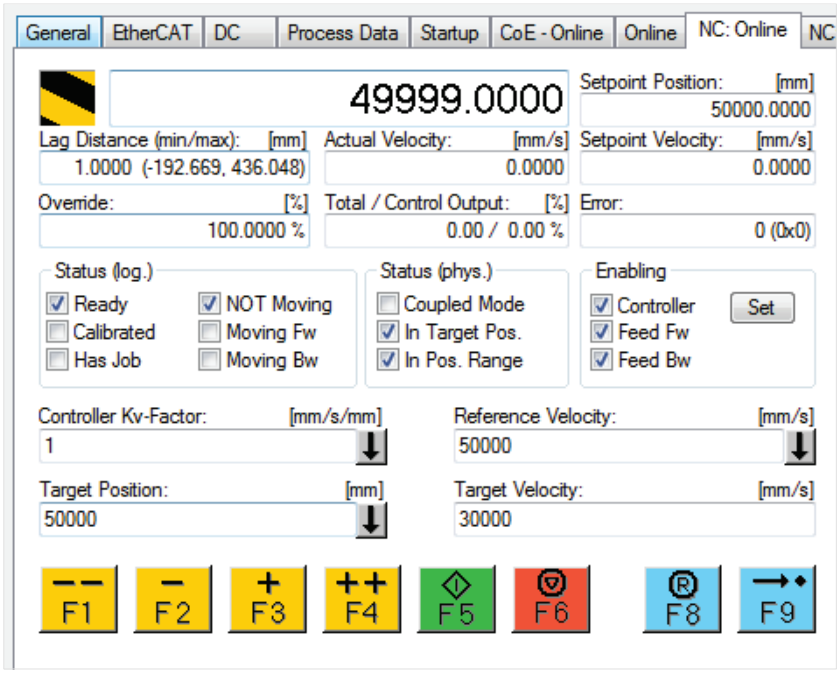


Figure 5-31.

4. Press **F5** (green button) to start the motion profile in Synchronous Position mode.

- Press **F6** (red button) to stop the motion.
- Press **F8** (blue button) to clear any faults.

The graph in the following figure reflects the motion performed:

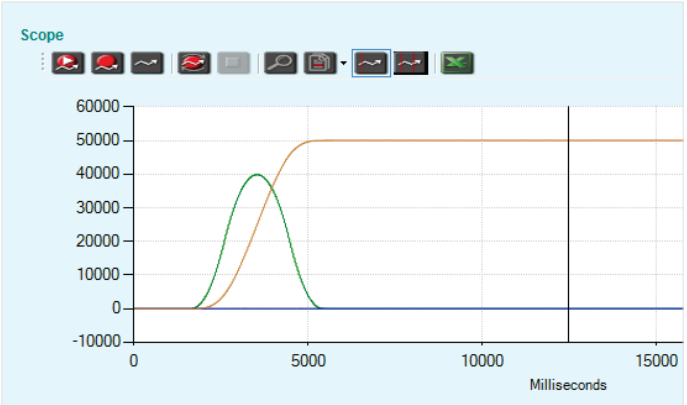


Figure 5-32.

- Brown line = Position feedback – PFB
- Green line = Point to point generator velocity command – PTPVCMD
- Blue line = Position error – PE
- X axis = milliseconds, Y axis = counts

Generating Absolute and Relative Motion

To generate absolute or relative motion in Position Profile mode, refer to the following two figures, and do the following:

1. Go to the **Functions** tab.
2. Configure the target position, the target velocity, the acceleration and deceleration, and the jerk of the motion.

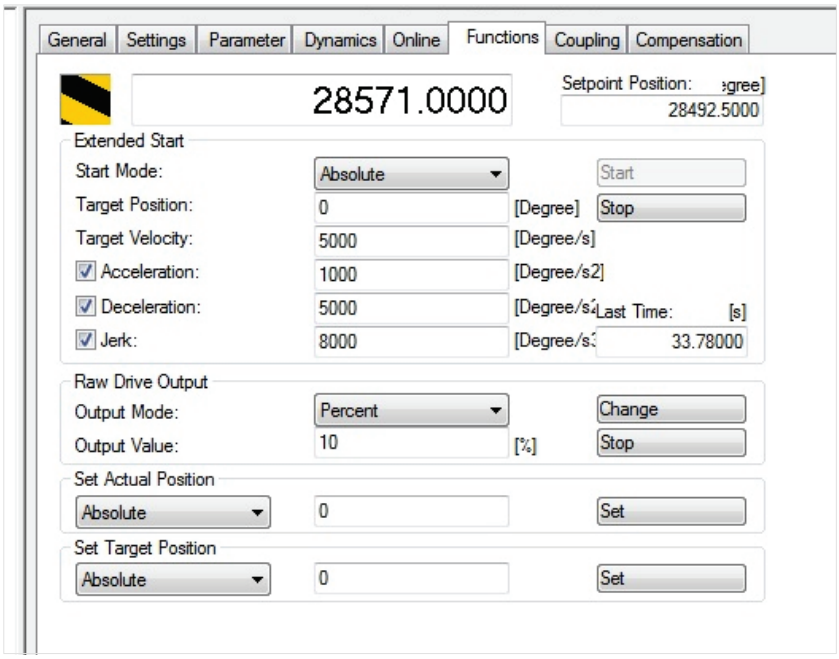


Figure 5-33.

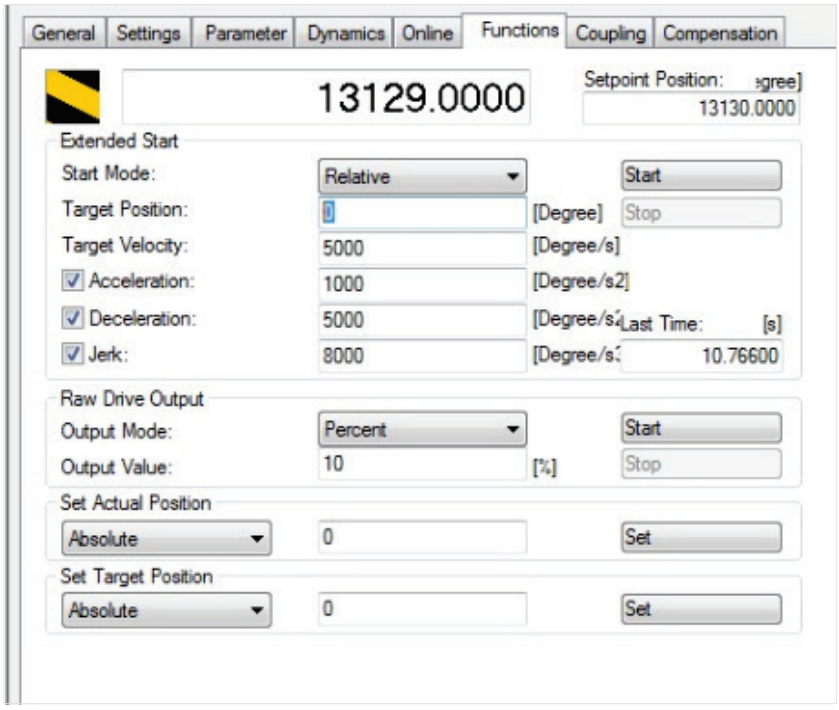


Figure 5-34.

Generating a Step Motion

To generate a step sequence in the Velocity profile, refer to the following two figures, and do the following:

1. Go to the **Functions** tab.
2. Configure the target velocity, and a time (duration) for the step.

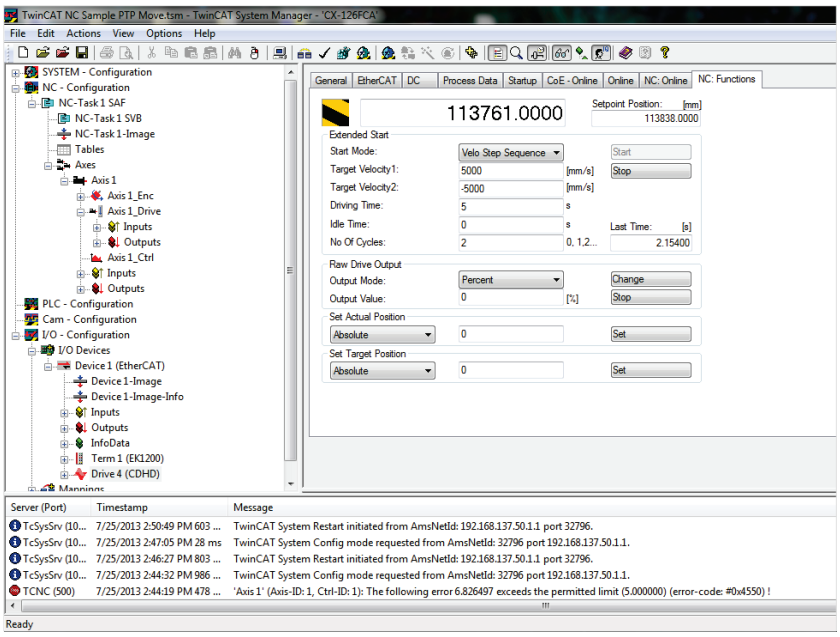


Figure 5-35.

The graph in the following figure reflects the motion performed:

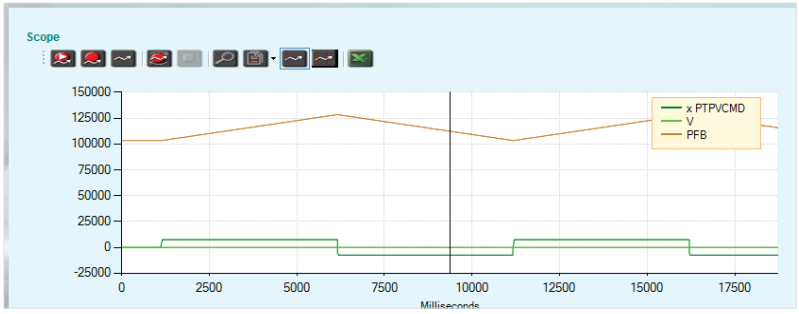


Figure 5-36.

- Brown line = Position feedback – PFB
- Dark green line = Point to point generator velocity command – PTPVCMD
- Light green line = Velocity – V
- X axis = milliseconds, Y axis = counts

6 Configuring Keba Controller for Use with CDHD EtherCAT (EC) Drive

To configure the Keba motion controller for use with CDHD EtherCAT drive, a customized set of files need to be installed on the PC.

To obtain these files, and for assistance with the installation and configuration, contact Servotronix Technical Support.

- **CustomDrivesIO**

  Extract all the files to the folder:

  C:\Kemro\KeStudioV2.3\Targets\KeMotion_CP24xCP25x_02.60\io\CustomDrives\Flexy2.0_EtherCatDrive

- **McCustomDriveLibrary**

  Extract the file to the library folder, and overwrite the existing file:

  C:\Kemro\KeStudio V2.3\Targets\KeMotion_CP24xCP25x_02.60\lib

Note: The folder *KeMotion_CP24xCP25x_02.60* may be named differently, depending on the software installation.

Once these files have been put in place, the PLC configuration can be performed.

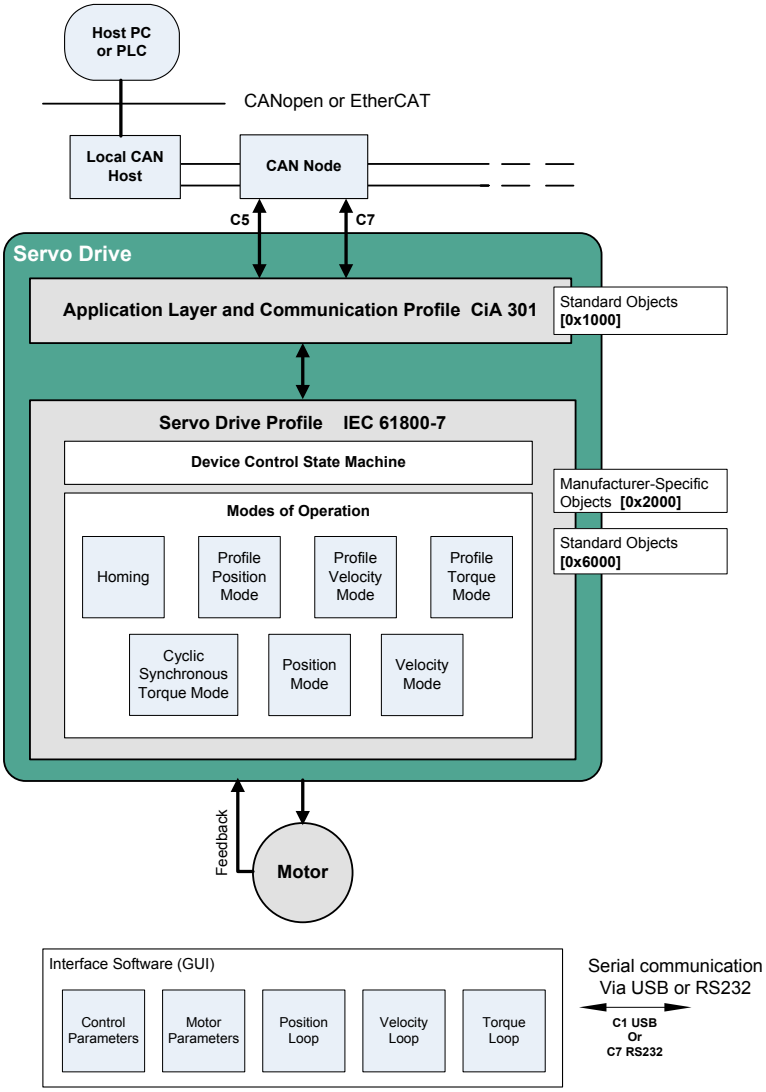
When prompted for the drive type, select CDHD.

7 CANopen Operation

7.1 Device Communication

The CDHD communication interface conforms to the following standards:

- **CiA 301**: CANopen Application Layer and Communication Profile
- **IEC 61800-7-1**: Interface Definition; (previously CiA 402-1: General Definitions)
- **IEC 61800-7-201**: Profile Type 1 (CiA 402); (previously CiA 402-2: Operation Modes and Application Data)
- **IEC 61800-7-301**: Mapping of Profile Type 1; (previously CiA 402-3: PDO Mapping)



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.

Figure 7-1. Communication Architecture

7.2 Communication Objects

Communication objects are used for exchanging process and service data, for process or system time synchronization, for error state supervision, and for control and monitoring of node states. These objects are defined by their structure, transmission types and their CAN identifier.

Service Data Communication

Service data objects (SDOs) provide direct access to object entries in the 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.

In general, an SDO is transferred as a sequence of segments. Prior to transferring the segments there is an initialization phase in which client and server prepare 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.

The client always 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).

Process Data Communication

Process data objects (PDOs) perform real-time data transfer. The transfer of PDOs is performed without any protocol overhead.

The PDOs 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. CDHD supports variable PDO mapping; therefore, the number of PDOs 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.

PDOs are used for both 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. CDHD supports both. 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, a pair of communication and mapping parameters is mandatory.

By default 4 TPDOs and 4 RPDOs are implemented in the CDHD:

TPDO1

- Statusword (6041h), 16 bits
- Modes of operation display (6061h)
- Torque actual value (6077h), 16 bits

TPDO2

- Position actual value (6064h), 32 bits

TPDO3

- Torque demand command (6074h), 16 bits
- Analog input 1 (20F2h), 16 bits

TPDO4

- Digital inputs (60FDh), 32 bits
- Position external command (20b6h), 32 bits
- Following error actual value (60F4h), 32 bits

RPDO1

- Control word (6040h), 16 bits
- Mode of operation (6060h), 8 bits

RPDO2

- Target position (607Ah), 32 bits
- Profile velocity (6081h), 32 bits

RPDO3

- Target velocity (60FFh), 32 bits

RPDO4

- Target torque (6071h), 16 bits
- Digital outputs (60FEh), 32 bits
- Torque offset (60B2h), 16 bits

7.3 Device Control and State Machine

The power drive system finite-state automaton (PDS FSA) is a mathematical model that defines the behavior of the power drive system. Because a power drive system 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 shows how the power drive system operates remotely via the network, or locally.

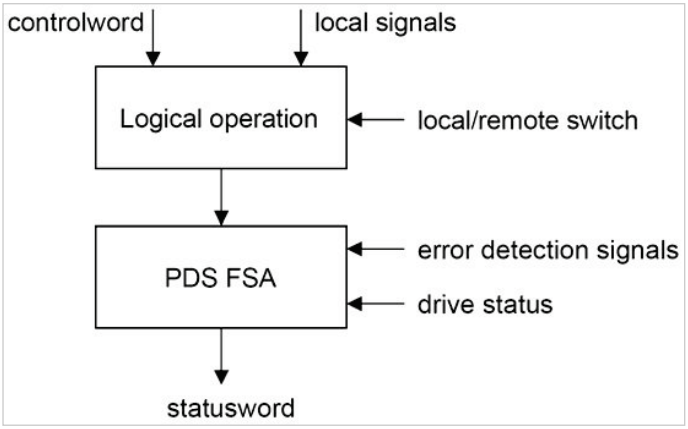


Figure 7-2. Remote and Local Control

The power drive system is operated by the **Controlword** sent by the control device via the network. The state of the power drive system is reported by the **Statusword** produced by the drive device. The FSA is also controlled by error detection signals.

The PDS FSA defines the power drive system status and the possible control sequence of the power drive system. A single state represents a special internal or external behavior. The state of the power drive system 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.

7.4 Indicating the Operating State

After switching on, and when an operating mode is started, the power drive system goes through a number of operating states. The operating states are internally monitored and influenced by monitoring functions

Figure 7-3 illustrates the PDS FSA behavior. It takes into consideration the control of the power electronics, in accordance with user commands and internal drive faults.

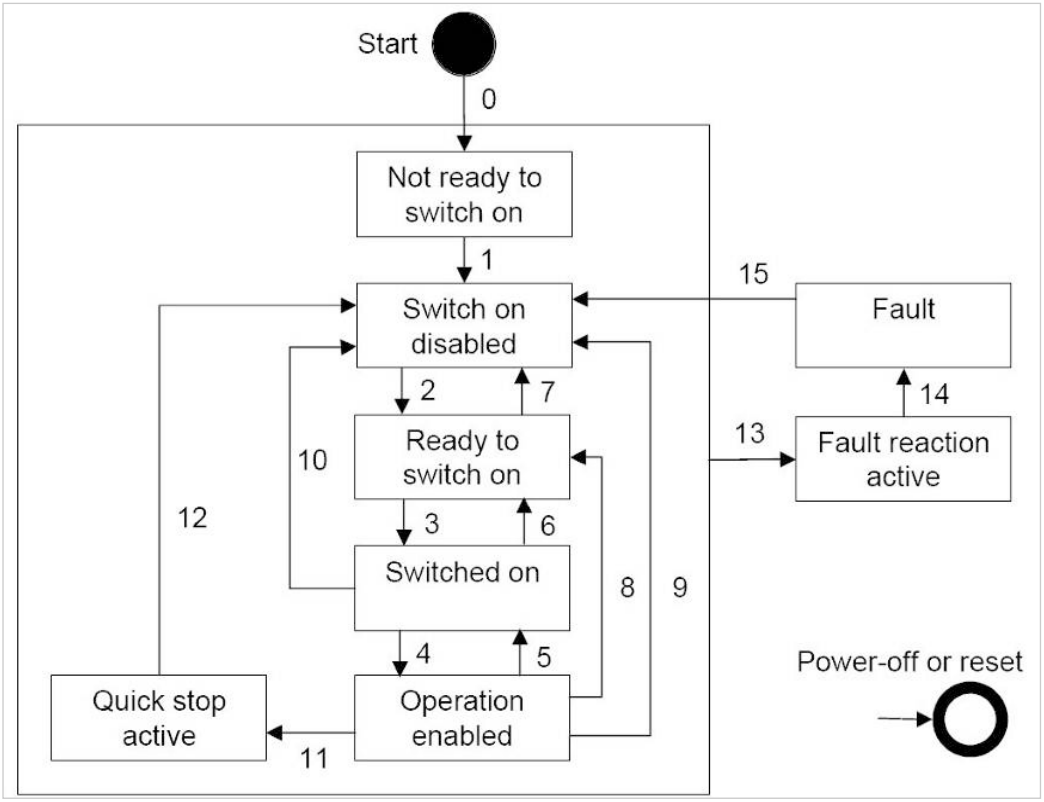


Figure 7-3. Power Drive System State Diagram

Notes:

Not Ready to Switch On	"Not ready to operate" received from the controller.
Switch On Disabled	Ready to operate. Can read and write parameters. Motion functionality cannot be executed.
Ready to Switch On	Ready to operate. Can read and write parameters. Motion functionality cannot be executed. Bus voltage must be switched on.

Operation Enabled	Drive power stage is enabled. No fault is present. Motion functionality can be executed.
Quick Stop Active	Drive was stopped using controlled stop. Power stage is enabled. Motion functionality cannot be executed.
Fault Reaction Active	A fault has occurred. Drive is in the process of ramping down to 0 velocity (Active Disable process).
Fault	A fault has occurred. Power stage is disabled.

Bits 0, 1, 2, 3, 5 and 6 of the parameter Statusword provide information on the operating state.

	Operating State	**Bit 6: Switch On Disabled**	**Bit 5: Quick Stop**	**Bit 3: Fault**	**Bit 2: Operation Enabled**	**Bit 1: Switch On**	**Bit 0: Ready to Switch On**
2	Not Ready To Switch On	0	X	0	0	0	0
3	Switch On Disabled	1	X	0	0	0	0
4	Ready To Switch On	0	1	0	0	0	1
5	Switched On	0	1	0	0	1	1
6	Operation Enabled	0	1	0	1	1	1
7	Quick Stop Active	0	0	0	1	1	1
8	Fault Reaction Active	0	X	1	1	1	1
9	Fault	0	X	1	0	0	0

Parameter Name	**Bit Assignments**	**Data Type R/W**
Statusword	Bits 0–3 = Status bits Bit 4 = Voltage enabled Bits 5–6 = Status bits Bit 7 = Warning Bit 8 = Reserved Bit 9 = Remote Bit 10 = Target reached Bit 11 = Internal limit is active Bit 12 = Operating mode-specific Bit 13 = Operating mode-specific Bit 14 = Manufacturer-specific Bit 15 = Manufacturer-specific	Unsigned16 Read Only

Notes:

Bit 4	Bit 4=1 indicates whether the DC bus voltage is correct. If the voltage is missing or is too low, the device does not transition from operating state 3 to operating state 4.
Bit 7	If bit 7 (warning) of the status word is 1, it indicates the presence of a warning condition. Warning is not an error or fault (e.g., temperature limit exceeded, job refused). The status of the PDS FSA does not change. The cause of the warning may be given in the fault code parameter object (603Fh).

Bit 9	If bit 9 is set, the device carries out commands via the fieldbus. If Bit 9 is reset, the device is controlled via a different interface. In such a case, it is still possible to read or write parameters via the fieldbus.
Bit 10	Bit 10 is used for monitoring the current operating mode.
Bit 12	Bit 12 is used for monitoring the current operating mode.
Bit 13	Bit 13 only becomes 1 if an error needs to be resolved prior to further processing.

7.5 Changing the Operating State

The parameter Controlword can be used to switch between operating states.

Parameter Name	Bit Assignments	Data Type R/W
Controlword	Bit 0 = Switch On Bit 1 = Enable Voltage Bit 2 = Quick Stop Bit 3 = Enable Operation Bits 4–6 = Operating Mode specific Bit 7 = Fault Reset Bit 8 = Halt Bit 9 = Reserved Bits 10–15 = Reserved (must be 0) Changed settings become active immediately.	Unsigned16 Read Only

Bits 0, 1, 2, 3 and 7 of the parameter Controlword allow you to switch between the operating states.

Fieldbus Command	State Transitions	State Transition To	Bit 7: Fault Reset	Bit 3: Enable Operate	Bit 2: Quick Stop	Bit 1: Enable Voltage	Bit 0: Switch On
Shutdown	T2, T6, T8	4 – Ready To Switch On	X	X	1	1	0
Switch On	T3	5 – Switched On	X	X	1	1	1
Disable Voltage	T7, T9, T10, T12	3 – Switch On Disabled	X	X	X	0	X
Quick Stop	T7, T10 T11	3 – Switch On Disabled 7 – Quick Stop Active	X	X	0	1	X
Disable Operation	T5	5 – Switched On	X	0	1	1	1
Enable Operation	T4, T16	6 – Operation Enabled	X	1	1	1	1
Fault Reset	T15	3 – Switch On Disabled	0 » 1	X	X	X	X

Notes:

Bit 4—6	Bits 4 to 6 are used for the operating mode-specific settings.
Bit 8	A Halt can be triggered with bit 8=1.
Bit 9–15	Reserved.

7.6 Starting and Changing an Operating Mode

The parameter Mode of Operation (6060h) is used to set the desired operating mode.

Parameter Name	Description	Data Type R/W
Mode of operation	Operating mode 1 Profile Position 3 Profile Velocity 4 Profile Torque 6 Homing 7 Interpolated Position 8 Cyclic Synchronous Position 9 Cyclic Synchronous Velocity 10 Cyclic Synchronous Torque Changed settings become active immediately.	Integer8 Read/Write

The parameter Mode of operation display (6061h) can be used to read the current operating mode.

Parameter Name	Description	Data Type R/W
Mode of operation	Operating mode 1 Profile Position 3 Profile Velocity 4 Profile Torque 6 Homing 7 Interpolated Position 8 Cyclic Synchronous Position 9 Cyclic Synchronous Velocity 10 Cyclic Synchronous Torque Changed settings become active immediately.	Integer8 Read/Write

7.7 Profile Position Mode

Description

In the operating mode Profile Position, a movement to a desired target position is performed.

Procedure

- Set [Mode of operation (6060h)] to operating mode Profile position (1).
- Set [Target position (607Ah)] to the target position (unit = pulse).
- Set [Profile velocity (6081h)] to profile velocity (unit = pulses per second).
- Set [Controlword (6040h)] to start the movement.
- Query [Position actual value (6064h)] to get the actual position of the motor.
- Query [Statusword (6041h)] to get the current status of following error, set-point acknowledge and target reached.

Optional

Additional information on the operating mode Profile Position:

- Query [Position demand value (6062h)] to get the internal reference value (unit = pulse).
- Query [Position actual value (6063h)] to get the actual position value (unit = increments).

Following error:

- Set [Following error window (6065h)] to the permissible following error (unit = pulse).
- Query [Following error actual value (60F4h)] to get the current following error (unit = pulse).

Standstill window:

- Set [Position window (6067h)] to the value for the standstill window. If the difference between the target position and the current motor position remains in the standstill window for the time Position window time (6065h), the target position is considered to have been reached (unit = pulse).
- Set [Position window time (6068h)] to the value for the standstill window. If the difference between the target position and the current motor position remains in the standstill window for the time Position window time (6065h), the target position is considered to have been reached (unit = pulse).

Associated Objects

Index	Sub-index	Object	PDO	Data Type	Takes Effect
6040h	0	Controlword	R_PDO	Unsigned16	Immediately
6041h	0	Statusword	T_PDO	Unsigned16	-
6060h	0	Modes of operation	No	Integer8	Immediately
6061h	0	Modes of operation display	No	Integer8	-

Index	Sub-index	Object	PDO	Data Type	Takes Effect
6062h	0	Position demand value	No	Integer32	-
6063h	0	Position actual value	No	Integer32	-
6064h	0	Position actual value	T_PDO	Integer32	-
6065h	0	Following error window	No	Unsigned32	-
6067h	0	Position window	No	Unsigned32	-
6068h	0	Position window time	No	Unsigned16	Immediately
6081h	0	Profile velocity	R_PDO	Unsigned32	Next movement
6091h 6092h	1	Numerator (Position factor)	R_PDO	Unsigned32	Immediately
6091h 6092h	2	Speed constant (Position factor)	R_PDO	Unsigned32	Immediately
60F2h	0	Position option code	No	Unsigned16	Next movement
60F4h	0	Following error actual value	No	Integer32	-
60FCh	0	Position demand value	No	Integer32	-

Example: Profile Position

Starting the Operating Mode

The operating mode must be set in the parameter Mode of operation (6060h). Writing the parameter value activates the operating mode. The movement is started via the Controlword.

Controlword

Bits 4–6 and bit 8 in the parameter Controlword (6040h) start a movement.

Bit 5: Change Set Point Immediately	Bit 4: New Target Value	Meaning
0	0 » 1	Starts a movement to a target position. Target values transmitted during a movement become immediately effective and are executed at the target. The movement is stopped at the current target position.*
1	0 » 1	Starts a movement to a target position. Target values transmitted during a movement become immediately effective and are executed at the target. The movement is not stopped at the current target position.*

*** Note**: Target values include target position, target velocity, acceleration and deceleration.

Parameter Value	Meaning
Bit 6 = Absolute / relative	0: Absolute movement 1: Relative movement
Bit 8 = Halt	Stop movement with Halt

Terminating the Operating Mode

The operating mode is terminated when the motor is at a standstill and one of the following conditions is met:

- Target position reached
- Stop caused by Halt or Quick Stop
- Stop caused by an error

Statusword

Information on the current movement is available via bits 10 and 12–15 in the parameter Statusword (6041h).

Parameter Value	Meaning
Bit 10 = Target reached	0 = Target position not reached 1 = Target position reached
Bit 12 = Target value acknowledge	0 = New position possible 1 = New target position accepted
Bit 13 = Following error bit	0 = No following error 1 = Following error
Bit 14 = Manufacturer-specific	
Bit 15 = Manufacturer-specific	

Example Node Address 1

Work Step COB ID / Data
» Set target velocity to 4000 `601 / 23 7A 60 00 A0 0F 00 00` « `581 / 60 7A 60 00 00 00 00 00`

» NMT Start remote node
`0 / 01 00`
« T_PDO2 with Statusword
`281 / 31 66 00 00 00 00`

» Enable power stage with R_PDO1
`201 / 00 00 00 00 00 00`
`201 / 06 00 00 00 00 00`
`201 / 0F 00 00 00 00 00`
« T_PDO1 (operating state: 6 Operation Enabled)
`181 / 37 42 00 00 00 00`

» Starting the operating mode
`601 / 2F 60 60 00 01 00 00 00`
`581 / 60 60 60 00 00 00 00 00`

Work Step COB ID / Data
» Check operating mode* 601 / 40 61 60 00 00 00 00 00 « Operating mode active 581 / 4F 61 60 00 01 61 08 00
» Issue a move command 601 / 23 40 60 00 00 00 00 1F « 581 / 60 40 60 00 00 00 00 00

*** Note**: The operating mode must be checked until the device has activated the specified operating mode.

7.8 Homing Mode

Description

In the operating mode Homing, a movement is performed to a defined position. This position is defined as the reference point.

Procedure

- Set [Mode of operation (6060h)] to operating mode Homing (6).
- Set [Home offset (607Ch)].
- Set [Home method (6098h)], the value range is 1 to 35 and specifies the different homing methods.
- Set [Home speeds (6099h sub-index 1)] to the value for velocity for the search for the limit switches (unit = min^{-1}).
- Set [Home speeds (6099h sub-index 2)] to the value for velocity for the search for the index pulse (unit = min^{-1}).
- Set [Home acceleration (6099h sub-index 2)] to the value for the acceleration ramp (unit = milliseconds form 0 to 3000 min^{-1}).
- Set [Controlword (6040h)] to start the operating mode.
- Start Homing.
- Query [Statusword (6041h)] to get the device status.

Associated Objects

Index	Sub-index	Object	PDO	Data Type	Takes Effect
6040h	0	Controlword	R_PDO	Unsigned16	Immediately
6041h	0	Statusword	T_PDO	Unsigned16	-
6060h	0	Modes of operation	No	Integer8	Immediately
6061h	0	Modes of operation display	No	Integer8	-
607Ch	0	Home offset	No	Integer32	Next movement
6098h	0	Homing method	No	Integer8	Next movement

Index	Sub-index	Object	PDO	Data Type	Takes Effect
6099h	1	Speed during search for switch	No	Unsigned32	Next movement
6099h	2	Speed during search for zero	No	Unsigned32	Next movement
609Ah	0	Homing acceleration	No	Unsigned32	Next movement

Example: Homing

Starting the Operating Mode

The operating mode must be set in the parameter Mode of operation (6060h). Writing the parameter value activates the operating mode.

The movement is started via the Controlword.

Controlword

Bits 4 in the parameter Controlword (6040h) starts a movement, bit 8 terminates the movement.

Parameter Value	Meaning
Bit 4 = Homing operation start	Start Homing
Bit 5 = Reserved	Not relevant for this operating mode
Bit 6 = Reserved	Not relevant for this operating mode
Bit 8 = Halt	Stop movement with Halt

Terminating the Operating Mode

The operating mode is terminated when the motor is at a standstill and one of the following conditions is met:

- Homing successful
- Stop caused by Halt or Quick Stop
- Stop caused by an error

Statusword

Information on the current movement is available via bits 10 and 12–15 in the parameter Statusword (6041h).

Parameter Value	Meaning
Bit 10 = Target reached	0 = Homing not completed 1 = Homing completed
Bit 12 = Homing attained	1 = Homing successfully completed
Bit 13 = Homing error	1 = Homing error
Bit 14 = Manufacturer-specific	
Bit 15 = Manufacturer-specific	

Example Node Address 1

Work Step **COB ID / Data**
» Velocity for searching the limit switch to 100 601 / 23 99 60 01 64 00 00 00 « 581 / 60 99 60 01 00 00 00 00
» Velocity for moving away from switch to 10 601 / 23 99 60 02 0A 00 00 00 « 581 / 60 99 60 02 00 00 00 00
» NMT Start remote node 0 / 01 00 « T_PDO1 with Statusword 181 / 31 62
» Enable power stage with R_PDO1 201 / 00 00 201 / 06 00 201 / 0F 00 « T_PDO1 (operating state: 6 operation enabled) 181 / 37 42
» Starting the operating mode 601 / 2F 60 60 00 06 00 00 00 « 581 / 60 60 60 00 00 00 00 00
» Check operating mode * 601 / 40 61 60 00 00 00 00 00 « Operating mode active 581 / 4F 61 60 00 06 61 01 00
» Select method 17 601 / 2F 98 60 00 11 00 00 00 « 581 / 60 98 60 00 00 00 00 00
» Start reference movement (Homing operation start) 201 / 1F 00 « T_PDO1 reference movement active 181 / 37 02 « T_PDO1 reference movement terminated 181 / 37 D6

*** Note**: The operating mode must be checked until the device has activated the specified operating mode.

7.9 Profile Velocity Mode

Description

In the operating mode Profile Velocity, a movement is made with a desired target velocity.

Procedure

- Set [Mode of operation (6060)] to operating mode Profile Velocity (3).
- Set [Controlword (6040h)] to start the operating mode.
- Set [Target velocity (60FFh)] to the target velocity. If the power stage is enabled, the new target velocity will become active immediately and the movement will start. The value is reset to zero if the operating mode is changed, the power stage is disabled or a Quick Stop is triggered.
- Query [Statusword (6041h)] to get the device status.

Optional

- Query [Velocity demand value (606Bh)] to get the reference velocity.
- Query [Velocity actual value (60C3h)] to get the actual velocity.
- Set [Velocity window (606Dh)] to the value of the velocity window.
- Set [Velocity window time (606Eh)] to the duration in the velocity window required to consider the velocity to have been reached unit = milliseconds).
- Query [Velocity threshold (60F4h)] to set the standstill window.

Associated Objects

Index	Sub-index	Object	PDO	Data Type	Takes Effect
6040h	0	Controlword	R_PDO	Unsigned16	Immediately
6041h	0	Statusword	T_PDO	Unsigned16	-
6060h	0	Modes of Operation	No	Integer8	Immediately
6061h	0	Modes of Operation Display	No	Integer8	-
606Bh	0	Velocity Demand Value	No	Integer32	-
606Ch	0	Velocity Actual Value	No	Integer32	-
606Dh	0	Velocity Window	No	Unsigned16	Immediately
606Eh	0	Velocity Window Time	No	Unsigned16	Immediately
606Fh	0	Velocity Threshold	No	Unsigned16	Immediately
60FFh	0	Target Velocity	No	Integer32	Immediately

Example: Profile Velocity

Starting the Operating Mode

The operating mode must be set in the parameter Mode of operation (6060h). Writing the parameter value activates the operating mode.

The parameter Target velocity (60FFh) starts the movement.

Parameter Name	Description	Data Type R/W
Target Velocity	Target velocity for operating mode Profile Velocity Changed settings become active immediately.	Integer32 Read/Write

Controlword

Bit 8 in parameter **Controlword** (6040h) is used to stop a movement with Halt.

Parameter Value	Meaning
Bit 4 = Reserved	Not relevant for this operating mode
Bit 5 = Reserved	Not relevant for this operating mode
Bit 6 = Reserved	Not relevant for this operating mode
Bit 8 = Halt	Stop movement with Halt
Bit 9 = Change on set point	Not relevant for this operating mode

Terminating the Operating Mode

The operating mode is terminated when the motor is at a standstill and one of the following conditions is met:

- Stop caused by Halt or Quick Stop
- Stop caused by an error

Statusword

Information on the current movement is available via bits 10 and 12 in the parameter Statusword (6041h).

Parameter Value	Meaning
Bit 10 = Target reached	0 = Target velocity not reached 1 = Target velocity reached
Bit 12 = Velocity	0 = Velocity > 0 1 = Velocity = 0
Bit 14 = Manufacturer-specific	
Bit 15 = Manufacturer-specific	

Example Node Address 1

Work Step COB ID / Data
» NMT Start remote node 0 / 01 00
« T_PDO3 with Statusword 381 / 31 66 00 00 00 00

Work Step **COB ID / Data**
» Enable power stage with R_PDO3 201 / 00 00 00 00 00 00 201 / 06 00 00 00 00 00 201 / 0F 00 00 00 00 00 « T_PDO3 (operating state: 6 Operation Enabled) 181 / 37 46 00 00 00 00
» Starting the operating mode 601 / 2F 60 60 00 03 00 00 00 « 581 / 60 60 60 00 00 00 00 00
» Check operating mode * 601 / 40 61 60 00 00 00 00 00 « Operating mode active 581 / 4F 61 60 00 00 00 00 00
» R_PDO3: Specification of target velocity 1000 301 / E8 03 00 00 « T_PDO2 with Statusword and velocity actual value 381 / 37 02 00 00 00 00 « Target velocity reached 381 / 37 06 E8 03 00 00
» Terminate operating mode with Quick Stop with R_PDO3 401 / 0B 00 00 00 00 00 « T_PDO3 with Statusword 381 / 17 66 00 00 00 00
» Clear Quick Stop with R_PDO3 401 / 0F 00 00 00 00 00 « T_PDO3 with Statusword 381 / 37 46 00 00 00 00

*** Note**: The operating mode must be checked until the device has activated the specified operating mode.

7.10 Profile Torque Mode

Description

In the operating mode Profile Torque, a movement is made with a desired target torque.

Procedure

- Set [Mode of operation (6060)] to operating mode Profile Torque (4).
- Set [Controlword (6040h)] to start the operating mode.

  When the operating mode is started, the target torque is set to zero.
- Set [Motor rated current (6075)] to a value according to motor specifications (unit = mA).
- Set [Target torque (6071h)] to the value for the target torque (unit = 0.1% of nominal torque. The value is reset to zero if the operating mode is changed, the power stage is disabled or a Quick Stop is triggered.

Optional

- Query [Torque rated current (6075h)] to get the nominal current depending on the motor and the drive (unit = multiples of mA).
- Query [Current actual value (6078h)] to get the actual current (unit = increments of 0.1 % of the nominal current).

Associated Objects

Index	Sub-index	Object	PDO	Data Type	Takes Effect
6040h	0	Controlword	R_PDO	Unsigned16	Immediately
6041h	0	Statusword	T_PDO	Unsigned16	-
6060h	0	Modes of Operation	No	Integer8	Immediately
6061h	0	Modes of Operation Display	No	Integer8	-
6071h	0	Target Torque	R_PDO	Integer16	Immediately
6074h	0	Torque demand value	No	Integer16	-
6075h	0	Motor rated current	No	Unsigned32	-
6087h	0	Torque slope	R_PDO	Unsigned32	Immediately

Example: Profile Torque

Starting the Operating Mode

The operating mode must be set in the parameter Mode of operation (6060h). Writing the parameter value activates the operating mode.

The parameter Target torque (6071h) starts the movement.

Parameter Name	Description	Data Type R/W
Target Torque	Target torque for operating mode Profile Torque. 100.0% corresponds to the continuous stall. In increments of 0.1%. Changed settings become active immediately.	Integer16 Read/Write

Controlword

Bit 8 in parameter Controlword (6040h) is used to stop a movement with Halt.

Parameter Value	Meaning
Bit 4 = Reserved	Not relevant for this operating mode
Bit 5 = Reserved	Not relevant for this operating mode
Bit 6 = Reserved	Not relevant for this operating mode
Bit 8 = Halt	Stop movement with Halt
Bit 9 = Change on setpoint	Not relevant for this operating mode

Terminating the Operating Mode

The operating mode is terminated when the motor is at a standstill and one of the following conditions is met:

- Stop caused by Halt or Quick Stop
- Stop caused by an error

Statusword

Information on the movement is available via bit 10 in the parameter **Statusword** (6041h).

Parameter Value	Meaning
Bit 10 = Target reached	0 = Target torque not reached 1 = Target torque reached

Example Node Address 1

Work Step COB ID / Data
» NMT Start remote node `0 / 01 00`
« T_PDO1 with Statusword `181 / 31 62`

» Enable power stage with R_PDO1
`201 / 00 00`
`201 / 06 00`
`201 / 0F 00`

« T_PDO1 (operating state: 6 Operation Enabled) `181 / 37 62`

Work Step COB ID / Data
» Starting the operating mode 601 / 2F 60 60 00 04 00 00 00 « 581 / 60 60 60 00 00 00 00 00
» Check operating mode* 601 / 40 61 60 00 00 00 00 00 « Operating mode active 581 / 4F 61 60 00 02 00 00 00
» Target torque set to 100 (10.0%) 601 / 2B 71 60 00 64 00 00 00 « 581 / 60 71 60 00 00 00 00 00 « Target torque reached 181 / 37 06
» Terminate operating mode with Quick Stop with R_PDO1 201 / 0B 00 « T_PDO1 with Statusword 181 / 17 66
» Clear Quick Stop with R_PDO1 201 / 0F 00 « T_PDO1 with Statusword 181 / 37 46

*** Note**: The operating mode must be checked until the device has activated the specified operating mode.

7.11 Interpolated Position Mode

Description

In the operating mode Interpolated Position, a movement to a target position is performed according to the value of the synchronous cyclic time.

This mode uses a buffer of position commands. The buffer size is always 1, thus it is not possible to give a list of target position commands in advance.

Procedure

- Set [Mode of operation (6060h)] to operating mode Interpolated Position (7).
- Set [Target position (60C1h)] to the target position (unit = pulse).
- Set [Controlword (6040h)] to start the movement.
- Query [Position actual value (6064h)] to get the actual position of the motor.
- Query [Statusword (6041h)] to get the current status of following error, set-point acknowledge and target reached.

Optional

Additional information on the operating mode Profile Position:

- Query [Position demand value (6062h)] to get the internal reference value (unit = pulse).
- Query [Position actual value (6063h)] to get the actual position value (unit = increments).

Following error:

- Set [Following error window (6065h)] to the permissible following error (unit = pulse).
- Query [Following error actual value (60F4h)] to get the current following error (unit = pulse).

Associated Objects

Index	Sub-index	Object	PDO	Data Type	Takes Effect
6040h	0	Controlword	R_PDO	Unsigned16	Immediately
6041h	0	Statusword	T_PDO	Unsigned16	-
6060h	0	Modes of operation	R_PDO	Integer8	Immediately
6061h	0	Modes of operation display	T_PDO	Integer8	-
6062h	0	Position demand value	No	Integer32	-
6063h	0	Position actual value	No	Integer32	-
6064h	0	Position actual value	T_PDO	Integer32	-
6065h	0	Following error window	No	Unsigned32	-
6067h	0	Position window	No	Unsigned32	-
6068h	0	Position window time	No	Unsigned16	Immediately
6091h	1&2	Gear (Position factor)	No	Unsigned32	Immediately
6092h	1&2	Feedback constant (Units resolution factor)	No	Unsigned32	Immediately
60F2h	0	Position option code	No	Unsigned16	Next movement
60F4h	0	Following error actual value	T_PDO	Integer32	-
60FCh	0	Position demand internal value	No	Integer32	-

Example: Interpolated Position Profile

Starting the Operating Mode

The operating mode must be set in the parameter Mode of Operation (6060h). Writing the parameter value activates the operating mode. The movement is started via the Controlword.

Controlword

Bit 4 in the parameter Controlword (6040h) start a movement.

Bit 4: New Target Value	Meaning
0 » 1	Starts a movement to a target position. Target values transmitted during a movement every tick times according to the synchronous time value. The movement is stopped at the desired target position.

Terminating the Operating Mode

The operating mode is terminated when the motor is at a standstill and one of the following conditions is met:

- Target position reached
- Stop caused by Quick Stop
- Stop caused by an error

Statusword

Information on the current movement is available via bits 10 and 12–15 in the parameter Statusword (6041h).

Parameter Value	Meaning
Bit 10 = Target reached	0 = Target position not reached 1 = Target position reached
Bit 12 = Target value acknowledge	0 = New position possible 1 = New target position accepted
Bit 13 = Following error bit	0 = No following error 1 = Following error
Bit 14 = Manufacturer-specific	
Bit 15 = Manufacturer-specific	

Example Node Address 1

Work Step OB ID / Data
» Set opmode 7 interpolated position `601 : sD : 2f 60 60 00 07 00 00 00` « `581 : sD : 60 60 60 00 00 00 00 00`
» Check state is 8 sync position* `601 : sD : 40 61 60 00 00 00 00 00` « `581 : sD : 4f 61 60 00 07 00 00 00`
» Move to OP mode `000 : sD : 01 00`

Work Step OB ID / Data
» Set to enable 601 : sD : 2b 40 60 00 80 00 00 00 581 : sD : 60 40 60 00 00 00 00 00 601 : sD : 2b 40 60 00 06 00 00 00 581 : sD : 60 40 60 00 00 00 00 00 601 : sD : 2b 40 60 00 0f 00 00 00 581 : sD : 60 40 60 00 00 00 00 00
»Set target position via PDO 769/301 : sD : 24 c7 2d 00 00 00 00 00

*** Note**: The operating mode must be checked until the device has activated the specified operating mode.

7.12 Cyclic Synchronous Position Mode

Description

In the operating mode Cyclic Synchronous Position, a movement to a target position is performed according to the value of the synchronous cyclic time.

Procedure

- Set [Mode of operation (6060h)] to operating mode Cyclic Synchronous Position Profile (8).
- Set [Target position (607Ah)] to the target position (unit = pulse).
- Set [Controlword (6040h)] to start the movement.
- Query [Position actual value (6064h)] to get the actual position of the motor.
- Query [Statusword (6041h)] to get the current status of following error, set-point acknowledge and target reached.

Optional

Additional information on the operating mode Profile Position:

- Query [Position demand value (6062h)] to get the internal reference value (unit = pulse).
- Query [Position actual value (6063h)] to get the actual position value (unit = increments).

Following error:

- Set [Following error window (6065h)] to the permissible following error (unit = pulse).
- Query [Following error actual value (60F4h)] to get the current following error (unit = pulse).

Associated Objects

Index	Sub-index	Object	PDO	Data Type	Takes Effect
6040h	0	Controlword	R_PDO	Unsigned16	Immediately
6041h	0	Statusword	T_PDO	Unsigned16	-
6060h	0	Modes of operation	R_PDO	Integer8	Immediately
6061h	0	Modes of operation display	T_PDO	Integer8	-
6062h	0	Position demand value	No	Integer32	-
6063h	0	Position actual value	No	Integer32	-
6064h	0	Position actual value	T_PDO	Integer32	-
6065h	0	Following error window	No	Unsigned32	-
6067h	0	Position window	No	Unsigned32	-
6068h	0	Position window time	No	Unsigned16	Immediately
6091h	1&2	Gear (Position factor)	No	Unsigned32	Immediately
6092h	1&2	Feedback constant (Units resolution factor)	No	Unsigned32	Immediately
60F2h	0	Position option code	No	Unsigned16	Next movement
60F4h	0	Following error actual value	T_PDO	Integer32	-
60FCh	0	Position demand internal value	No	Integer32	-

Example: Cyclic Synchronous Position Profile

Starting the Operating Mode

The operating mode must be set in the parameter Mode of Operation (6060h). Writing the parameter value activates the operating mode. The movement is started via the Controlword.

Controlword

Bit 4 in the parameter Controlword (6040h) start a movement.

Bit 4: New Target Value	Meaning
0 » 1	Starts a movement to a target position. Target values transmitted during a movement every tick times according to the synchronous time value. The movement is stopped at the desired target position.

Terminating the Operating Mode

The operating mode is terminated when the motor is at a standstill and one of the following conditions is met:

- Target position reached

- Stop caused by Quick Stop
- Stop caused by an error

Statusword

Statusword does not change during movement when in operating in Cyclic Synchronous Position Profile mode.

Example Node Address 1

Work Step **COB ID / Data**
» Set opmode 8 sync position 601 : sD : 2f 60 60 00 08 00 00 00 « 581 : sD : 60 60 60 00 00 00 00 00
» Check state is 8 sync position* 601 : sD : 40 61 60 00 00 00 00 00 « 581 : sD : 4f 61 60 00 08 00 00 00
» Move to OP mode 000 : sD : 01 00
» Set to enable 601 : sD : 2b 40 60 00 80 00 00 00 581 : sD : 60 40 60 00 00 00 00 00 601 : sD : 2b 40 60 00 06 00 00 00 581 : sD : 60 40 60 00 00 00 00 00 601 : sD : 2b 40 60 00 0f 00 00 00 581 : sD : 60 40 60 00 00 00 00 00
»Set target position via PDO 769/301 : sD : 24 c7 2d 00 00 00 00 00

*** Note**: The operating mode must be checked until the device has activated the specified operating mode.

7.13 Cyclic Synchronous Velocity Mode

Description

In the operating mode Cyclic Synchronous Velocity, a movement to a desired target velocity is performed according to the value of the synchronous cyclic time.

Procedure

- Set [Mode of operation (6060h)] to operating mode Cyclic Synchronous Velocity Profile (9).
- Set [Target velocity (60FFh)] to the target velocity. If the power stage is enabled, the new target velocity will become active immediately and the movement will start.
- Set [Controlword (6040h)] to start the movement.
- Query [Statusword (6041h)] to get the current status of following error, set-point acknowledge and target reached.

Optional

Additional information on the operating mode cyclic synchronous velocity:

- Query [Velocity demand value (606Bh)] to get the reference velocity.
- Query [Velocity actual value (60C3h)] to get the actual velocity.
- Set [Velocity window (606Dh)] to the value of the velocity window.

  Set [Velocity window time (606Eh)] to the duration required in the velocity window to consider the velocity has been reached (unit = milliseconds).
- Query [Velocity threshold (60F4h)] to set the standstill window.

Associated Objects

Index	Sub-index	Object	PDO	Data Type	Takes Effect
6040h	0	Controlword	R_PDO	Unsigned16	Immediately
6041h	0	Statusword	T_PDO	Unsigned16	-
6060h	0	Modes of Operation	R_PDO	Integer8	Immediately
6061h	0	Modes of Operation Display	T_PDO	Integer8	-
606Bh	0	Velocity Demand Value	No	Integer32	-
606Ch	0	Velocity Actual Value	T_PDO	Integer32	-
606Dh	0	Velocity Window	No	Unsigned16	Immediately
606Eh	0	Velocity Window Time	No	Unsigned16	Immediately
606Fh	0	Velocity Threshold	No	Unsigned16	Immediately
60FFh	0	Target Velocity	R_PDO	Integer32	Immediately

Example: Cyclic Synchronous Velocity

Starting the Operating Mode

The operating mode must be set in the parameter Mode of operation (6060h). Writing the parameter value activates the operating mode.

The parameter Target velocity (60FFh) starts the movement.

Parameter Name	Description	Data Type R/W
Target Velocity	Target velocity for operating mode Cyclic Synchronous Velocity Changed settings become active immediately.	Integer32 Read/Write

Controlword

Bit 8 in parameter **Controlword** (6040h) is used to stop a movement with Halt.

Parameter Value	Meaning
Bit 4 = Reserved	Not relevant for this operating mode
Bit 5 = Reserved	Not relevant for this operating mode
Bit 6 = Reserved	Not relevant for this operating mode
Bit 8 = Halt	Stop movement with Halt
Bit 9 = Change on setpoint	Not relevant for this operating mode

Terminating the Operating Mode

The operating mode is terminated when the motor is at a standstill and one of the following conditions is met:

- Stop caused by Halt or Quick Stop
- Stop caused by an error

Statusword

Statusword does not change during movement when in operating in Cyclic Synchronous Velocity mode.

Example Node Address 1

Work Step COB ID / Data
» Set opmode 9 sync velocity 601 : sD : 2f 60 60 00 09 00 00 00 « 581 : sD : 60 60 60 00 00 00 00 00
» Check state is 9 sync velocity* 601 : sD : 40 61 60 00 00 00 00 00 « 581 : sD : 4f 61 60 00 09 00 00 00
» Move to OP mode 000 : sD : 01 00

Work Step COB ID / Data
» Set to enable 601 : sD : 2b 40 60 00 80 00 00 00 581 : sD : 60 40 60 00 00 00 00 00 601 : sD : 2b 40 60 00 06 00 00 00 581 : sD : 60 40 60 00 00 00 00 00 601 : sD : 2b 40 60 00 0f 00 00 00 581 : sD : 60 40 60 00 00 00 00 00
»Set target velocity via PDO 401 : sD : 64 00 00 00

*** Note**: The operating mode must be checked until the device has activated the specified operating mode.

7.14 Cyclic Synchronous Torque Mode

Description

In the operating mode Cyclic Synchronous Torque, a movement to a desired target torque is performed according to the value of the synchronous cyclic time.

Procedure

- Set [Mode of operation (6060h)] to operating mode Cyclic Synchronous Torque (10).
- Set [Target torque (6071h)] to the target torque. If the power stage is enabled, the new target torque will become active immediately and the movement will start.
- Set [Controlword (6040h)] to start the movement.
- Query [Statusword (6041h)] to get the current status of following error, set-point acknowledge and target reached.

Optional

Additional information on the operating mode cyclic synchronous velocity:

- Query [Torque rated current (6075h)] to get the nominal current depending on the motor and the drive (unit = multiples of mA).
- Query [Current actual value (6078h)] to get the actual current (unit = increments of 0.1% of the nominal current)

Associated Objects

Index	Sub-index	Object	PDO	Data Type	Takes Effect
6040h	0	Controlword	R_PDO	Unsigned16	Immediately
6041h	0	Statusword	T_PDO	Unsigned16	-
6060h	0	Modes of Operation	R_PDO	Integer8	Immediately
6061h	0	Modes of Operation Display	T_PDO	Integer8	-

Index	Sub-index	Object	PDO	Data Type	Takes Effect
6071h	0	Target Torque	R_PDO	Integer16	Immediately
6074h	0	Torque demand value	T_PDO	Integer16	-
6075h	0	Motor rated current	No	Unsigned32	-
6087h	0	Torque slope	No	Unsigned32	

Example: Cyclic Synchronous Torque

Starting the Operating Mode

The operating mode must be set in the parameter Mode of operation (6060h).

Writing the parameter value activates the operating mode.

The parameter Target torque (6071h) starts the movement.

Parameter Name	Description	Data Type R/W
Target Torque	Target torque for operating mode cyclic synchronous torque. 100.0% corresponds to the continuous stall. In increments of 0.1%. Changed settings become active immediately.	Integer32 Read/Write

Controlword

Bit 8 in parameter Controlword (6040h) is used to stop a movement with Halt.

Parameter Value	Meaning
Bit 4 = Reserved	Not relevant for this operating mode
Bit 5 = Reserved	Not relevant for this operating mode
Bit 6 = Reserved	Not relevant for this operating mode
Bit 8 = Halt	Stop movement with Halt
Bit 9 = Change on setpoint	Not relevant for this operating mode

Terminating the Operating Mode

The operating mode is terminated when the motor is at a standstill and one of the following conditions is met:

- Stop caused by Halt or Quick Stop
- Stop caused by an error

Statusword

Statusword does not change during movement when in operating in Cyclic Synchronous Torque mode.

Example Node Address 1

Work Step **COB ID / Data**
» Set opmode 10 sync torque 601 : sD : 2f 60 60 00 0A 00 00 00 « 581 : sD : 60 60 60 00 00 00 00 00
» Check state is 10 sync torque* 601 : sD : 40 61 60 00 00 00 00 00 « 581 : sD : 4f 61 60 00 0A 00 00 00
» Move to OP mode 000 : sD : 01 00
» Set to enable 601 : sD : 2b 40 60 00 80 00 00 00 581 : sD : 60 40 60 00 00 00 00 00 601 : sD : 2b 40 60 00 06 00 00 00 581 : sD : 60 40 60 00 00 00 00 00 601 : sD : 2b 40 60 00 0f 00 00 00 581 : sD : 60 40 60 00 00 00 00 00
»Set target torque via PDO 501 : sD : 64 00 00 00

*** Note**: The operating mode must be checked until the device has activated the specified operating mode.

7.15 Digital Output Operation

The following procedure describes how to control a CDHD digital output.

1. Enable the digital outputs to be controlled manually:

- Set object 60FEh sub-index 2 to FFFFFFFFh

This gives you permission to write to all digital outputs.

2. Define the mode of a specific output as idle to give you (and not drive logic) manual control of the output.

For example, define digital output 3 as idle:

- Set object 209Ch sub-index 1 to value 3
- Set object 209Ch sub-index 2 to value 0

3. Set the output state by writing to the object.

Digital input 3 is represented by bit 18 in object 60FE; therefore:

- Set object 60FE sub-index 1 to 40000h (2^{18}=262144).

8 Units

8.1 Units Overview

CiA and ETG standards provide two objects for setting the gear ratio and the feed constant conversion factors, each of which has two sub-indices.

These objects have four equivalent (VarCom) drive parameters, as shown in the following table.

CAN Object	VarCom | ServoStudio	Description
6092h, sub-index 1	**PNUM:** Feed Constant (Unit Conversion) Numerator	Conversion factors of the user-defined unit. Used to multiply the **motor revolution** (rotary motors) or the **motor pitch** (linear motors), according to motor type.
6092h, sub-index 2	**PDEN:** Feed Constant (Unit Conversion) Denominator	
6091h, sub-index 1	**FBGMS:** Fieldbus Gear Ratio – Motor Shaft Scaling	The conversion factor of the fieldbus device's **motor** shaft revolution.
6091h, sub-index 2	**FBGDS:** Fieldbus Gear Ratio – Drive Shaft Scaling	The conversion factor of the fieldbus device's **drive** shaft revolution.

You can modify the values by writing directly to the objects.

Alternately, you can use the **CANopen Units** pane in the ServoStudio **Motion Units** screen:

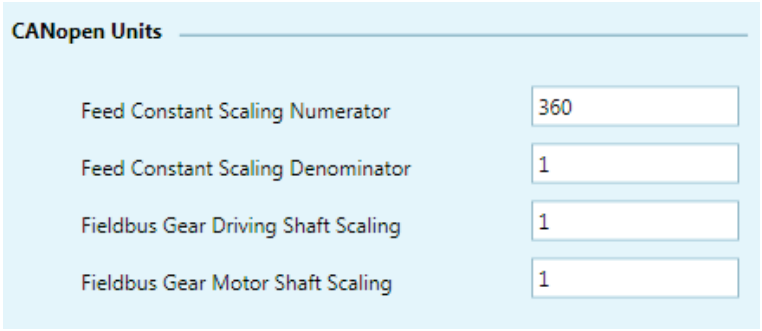


Figure 8-1. ServoStudio Motion Units | CANopen Units

8.2 Position Units

Position units are expressed by the following equation:

$$\frac{0x6091\ sub\text{-}index\ 1}{0x6091\ sub\text{-}index\ 2} \times \frac{0x6092\ sub\text{-}index\ 1}{0x6092\ sub\text{-}index\ 2} = \textbf{1 motor revolution}$$

For example:

6091h sub-index 1 = **1048576**

6091h sub-index 2 = 1

6092h sub-index 1 = 1

6092h sub-index 2 = 1

Therefore:

$$\frac{1048576}{1} \times \frac{1}{1} = 1048576$$

That is, 1048576 position units = 1 motor revolution.

Position Resolution - Examples

Position resolution should be as high as possible; it must certainly be no less than the encoder resolution.

When the drive is operating in Synchronous Position mode, the controller sends the drive one position command per cycle.

Low Resolution

CAN Object	Parameter	Value
6092h, sub-index 1	PNUM - Feed Constant (Unit Conversion) Numerator	360
6092h, sub-index 2	PDEN - Feed Constant (Unit Conversion) Denominator	1

Let's assume the controller intends to move the motor at a slow speed of 60 rpm; that is, 1 revolution per second, or **360 degrees per second**.

A typical EtherCAT cycle time is 1 ms; thus, the controller divides 360 degrees by 1000, and sends a command every 1 ms. Since EtherCAT supports integers only, and 0.36 (360/1000) is not an integer, the following will result:

Cycle	1	2	3	4	5	6	..	..	n
Profile generator in controller	0.36	0.72	1.08	1.44	1.8	2.16	..	..	
EtherCAT position command	0	0	1	0	0	2	..	..	INT(n×0.36)
Position command in drive in units of 10000 counts/rev	0	0	27	0	0	55	..	..	INT(n×0.36)×10000/360

From the table, it can be seen that the command will be updated, on average, only once every three cycles. As a result, the motor will move 27 encoder counts in one cycle and be stopped for two cycles, producing significant acoustic noise. Should the speed be lowered, the noise will become even more severe.

High Resolution

CAN Object	Parameter	Value
6092h, sub-index 1	PNUM - Feed Constant (Unit Conversion) Numerator	1
6092h, sub-index 2	PDEN - Feed Constant (Unit Conversion) Denominator	1

Let's assume the controller intends to move the motor at a slow speed of 60 rpm; that is, 1 revolution per second, or **360000 counts per second**.

A typical EtherCAT cycle time is 1 ms; thus, the controller divides 360000 counts by 1000, and sends a command every 1 ms. Since 360000/1000 equals the integer 360, the following will result:

Cycle #	1	2	3	4	5	6	..	..	n
Profile generator in controller	360	720	1080	1440	1800	2160	..	..	
EtherCAT position command	360	720	1080	1440	1800	2160	..	..	INT(n×360)
Position command in drive in units of 10000 counts/rev	10	20	30	40	50	60	..	..	INT(n×360)×10000/360000

From the table, it can be seen that the command will be consistently updated at each cycle. Speed will remain constant and there will be no acoustic noise.

Position commands sent over EtherCAT have the advantage of being highly accurate, thereby improving system performance.

8.3 Velocity Units

Velocity units are expressed by the following equation:

$$\frac{0x6091\ sub\text{-}index\ 1}{0x6091\ sub\text{-}index\ 2} \times \frac{0x6092\ sub\text{-}index\ 1}{0x6092\ sub\text{-}index\ 2} = \mathbf{1\ rps}$$

For example:

6091h sub-index 1 = 1048576

6091h sub-index 2 = 1

6092h sub-index 1 = 1

6092h sub-index 2 = 1

Therefore:

$$\frac{1048576}{1} \times \frac{1}{1} = 1048576$$

That is, 1048576 velocity units = 1 rps

8.4 Acceleration/Deceleration Units

Acceleration/deceleration units are expressed by the following equation:

$$\frac{0x6091\ sub\text{-}index\ 1}{0x6091\ sub\text{-}index\ 2} \times \frac{0x6092\ sub\text{-}index\ 1}{0x6092\ sub\text{-}index\ 2} = \textbf{1 rps/s}$$

For example:

6091h sub-index 1 = 1,048,576

6091h sub-index 2 = 1

6092h sub-index 1 = 1

6092h sub-index 2 = 1

Therefore:

$$\frac{1048576}{1} \times \frac{1}{1} = 10000$$

That is, 1,048,576 acc/dec units = **1 rps/s**

8.5 Current Units

Current units are derived from object 6075h (Motor Rated Current), which is defined in mA.

After setting a value for 6075h, all other current-related objects must receive values defined in 1/1000 (one-thousandth) of 6075h.

For example: Assuming 6075h has a value of 20000 mA,
then to set a value of 40000 mA for object 6073h (Max Current), write 2000 for object 6073h.

The calculation is: (2000÷1000) × 20000 = 40000 mA

8.6 Torque Units

Torque units are derived from object 6076h (Motor Rated Torque), which is defined in mNm.

After setting a value for 6076h, all other torque-related objects must receive values defined in 1/1000 (one thousandth) of 6076h.

For example: Assuming 6076h has a value of 500 mNm,
then to set a value of 100 mNm for object 6074h (Torque Demand), write 200 for object 6074h.

The calculation is: (200÷1000) × 500 = 100 mNm

8.7 Setting Units - Examples

Rotary Motor

Setting Units to Represent Revolutions

Position = rev

Velocity = rev/sec

Acceleration = rev/sec^2

CAN Object	Parameter	Value
6092h, sub-index 1	PNUM - Feed Constant (Unit Conversion) Numerator	1
6092h, sub-index 2	PDEN - Feed Constant (Unit Conversion) Denominator	1
6091h, sub-index 1	FBGMS - Fieldbus Gear Ratio – Motor Shaft Scaling	1
6091h, sub-index 2	FBGDS - Fieldbus Gear Ratio – Drive Shaft Scaling	1

Operating Mode: Profile Position

1. Set Mode of Operation (6060h) to Profile Position mode (1).
2. Set the Target Position (607Ah) value (unit = **revolutions**).

   If object 607Ah is **1**, the motor shaft will rotate one revolution.
3. Set the Profile Velocity (6081h) value (unit = **revolutions** per second).

   If object 6081h is **1**, the motor shaft speed will be 1 rev/sec.
4. Set Controlword (6040h) to start the movement.

Operating Mode: Profile Velocity

1. Set Mode of Operation (6060h) to Profile Velocity mode (3).
2. Set Controlword (6040h) to start the operating mode.
3. Set the Target Velocity (60FFh) value.

   If object 6081h is **1**, the motor shaft speed will be 1 rev/sec.

If the power stage is enabled, the new target velocity will become active immediately and the movement will start. The value is reset to zero if the operating mode is changed, the power stage is disabled, or a quick stop is triggered.

Setting Units to Represent Degrees

Position = deg

Velocity = deg/sec

Acceleration = deg/sec^2

CAN Object	Parameter	Value
6092h, sub-index 1	PNUM - Feed Constant (Unit Conversion) Numerator	360
6092h, sub-index 2	PDEN - Feed Constant (Unit Conversion) Denominator	1
6091h, sub-index 1	FBGMS - Fieldbus Gear Ratio – Motor Shaft Scaling	1
6091h, sub-index 2	FBGDS - Fieldbus Gear Ratio – Drive Shaft Scaling	1

Operating Mode: Profile Position

1. Set Mode of Operation (6060h) to Profile Position mode (1).
2. Set the Target Position (607Ah) value (unit = **degrees**).

   If object 607Ah is **360**, the motor shaft will rotate one revolution.
3. Set the Profile Velocity (6081h) value (unit = **degrees** per second).

   If object 6081h is **360**, the motor shaft speed will be 1 rev/sec.
4. Set Controlword (6040h) to start the movement.

Operating Mode: Profile Velocity

1. Set Mode of Operation (6060h) to Profile Velocity mode (3).
2. Set Controlword (6040h) to start the operating mode.
3. Set the Target Velocity (60FFh) value.

   If object 6081h is **360**, the motor shaft speed will be 360 deg/sec (one revolution per second).

If the power stage is enabled, the new target velocity will become active immediately and the movement will start. The value is reset to zero if the operating mode is changed, the power stage is disabled, or a quick stop is triggered.

Setting Units to Represent Feedback Counts

Position = counts

Velocity = counts/sec

Acceleration = counts/sec^2

CAN Object	Parameter	Value
6092h, sub-index 1	PNUM - Feed Constant (Unit Conversion) Numerator	*Motor_Resolution*
6092h, sub-index 2	PDEN - Feed Constant (Unit Conversion) Denominator	1
6091h, sub-index 1	FBGMS - Fieldbus Gear Ratio – Motor Shaft Scaling	1
6091h, sub-index 2	FBGDS - Fieldbus Gear Ratio – Drive Shaft Scaling	1

This example assumes that the feedback device (i.e., encoder) produces 10,000 counts per 1 motor revolution.

The *Motor_Resolution* parameter (MENCRES) defines the resolution of the motor encoder, in number of lines per revolution of the motor for a rotary motor, and in number of lines per pitch for a linear motor.

When an incremental encoder is used, the number of encoder counts per revolution or pitch is obtained by multiplying *Motor_Resolution* by 4.

Get the value of *Motor_Resolution*, multiple by 4, and then enter the number as the value of object 6092, sub-index 1.

Operating Mode: Profile Position

1. Set Mode of Operation (6060h) to Profile Position mode (1).
2. Set the Target Position (607Ah) value (unit = **counts**).

   If object 607Ah is **10,000**, the motor shaft will rotate 10,000 counts, which equals one revolution.

3. Set the Profile Velocity (6081h) value (unit = **counts** per second).

   If object 6081h is **10,000**, the motor shaft speed will be 10,000 counts/sec (one revolution per second).

4. Set Controlword (6040h) to start the movement.

Operating Mode: Profile Velocity

1. Set Mode of Operation (6060h) to Profile Velocity mode (3).
2. Set Controlword (6040h) to start the operating mode.
3. Set the Target Velocity (60FFh) value.

   If object 6081h is **10,000**, the motor shaft speed will be 10,000 counts/sec (one revolution per second).

If the power stage is enabled, the new target velocity will become active immediately and the movement will start. The value is reset to zero if the operating mode is changed, the power stage is disabled, or a quick stop is triggered.

Linear Motor

The fundamental parameter of linear motor is the motor pitch – the distance between two successive magnetic poles of the motor. Pitch data is expressed in millimeters.

To read the pitch distance, query object 207Dh, sub-index 0.

In a linear motor, the feedback resolution is defined as the number of encoder counts per the motor pitch distance.

Setting Units to Represent Motor Pitch

Position = pitch

Velocity = pitch/sec

Acceleration = pitch/sec^2

CAN Object	Parameter	Value
6092h, sub-index 1	PNUM - Feed Constant (Unit Conversion) Numerator	1
6092h, sub-index 2	PDEN - Feed Constant (Unit Conversion) Denominator	1
6091h, sub-index 1	FBGMS - Fieldbus Gear Ratio – Motor Shaft Scaling	1
6091h, sub-index 2	FBGDS - Fieldbus Gear Ratio – Drive Shaft Scaling	1

Operating Mode: Profile Position

1. Set Mode of Operation (6060h) to Profile Position mode (1).
2. Set the Target Position (607Ah) value (unit = **motor pitch**).

   If object 607Ah is **1**, the motor shaft will move a distance of 1 pitch.

3. Set the Profile Velocity (6081h) value (unit = **counts** per second).

   If object 6081h is **1**, the motor speed will be 1 pitch/sec (one pitch per second).

4. Set Controlword (6040h) to start the movement.

Operating Mode: Profile Velocity

1. Set Mode of Operation (6060h) to Profile Velocity mode (3).
2. Set Controlword (6040h) to start the operating mode.
3. Set the Target Velocity (60FFh) value.

   If object 6081h is **1**, the motor speed will be 1 pitch/sec.

If the power stage is enabled, the new target velocity will become active immediately and the movement will start. The value is reset to zero if the operating mode is changed, the power stage is disabled, or a quick stop is triggered.

Setting Units to Represent Millimeters

Position = mm

Velocity = mm/sec

Acceleration = mm/sec^2

CAN Object	Parameter	Value
6092h, sub-index 1	PNUM - Feed Constant (Unit Conversion) Numerator	*Motor Pitch Distance* [mm]
6092h, sub-index 2	PDEN - Feed Constant (Unit Conversion) Denominator	1
6091h, sub-index 1	FBGMS - Fieldbus Gear Ratio – Motor Shaft Scaling	1
6091h, sub-index 2	FBGDS - Fieldbus Gear Ratio – Drive Shaft Scaling	1

This example assumes that the pitch value is **32.**

Operating Mode: Profile Position

1. Set Mode of Operation (6060h) to Profile Position mode (1).
2. Set the Target position (607Ah) value (unit = **mm**).

   If object 607Ah is **32**, the motor will move a distance of 1 **mm**
3. Set the Profile Velocity (6081h) value (unit = **mm** per second).

   If object 6081h is **32**, the motor speed will be 1 **mm/sec**
4. Set Controlword (6040h) to start the operating mode.

Operating Mode: Profile Velocity

1. Set Mode of Operation (6060h) to Profile Velocity mode (3).
2. Set Controlword (6040h) to start the operating mode.
3. Set the Target Velocity (60FFh) value.

   If object 6081h is **32**, the motor speed will be 1 **mm/sec** (one millimeter per second).

If the power stage is enabled, the new target velocity will become active immediately and the movement will start. The value is reset to zero if the operating mode is changed, the power stage is disabled, or a quick stop is triggered.

Setting Units to Represent Feedback Counts

Position = counts

Velocity = counts/sec

Acceleration = counts/sec^2

CAN Object	Parameter	Value
6092h, sub-index 1	PNUM - Feed Constant (Unit Conversion) Numerator	*Motor_Resolution*
6092h, sub-index 2	PDEN - Feed Constant (Unit Conversion) Denominator	1
6091h, sub-index 1	FBGMS - Fieldbus Gear Ratio – Motor Shaft Scaling	1
6091h, sub-index 2	FBGDS - Fieldbus Gear Ratio – Drive Shaft Scaling	1

The *Motor_Resolution* parameter (MENCRES) defines the resolution of the encoder, in number of lines per revolution of the motor for a rotary motor, and number of lines per pitch for a linear motor.

When an incremental encoder is used, the number of encoder counts per motor pitch distance is obtained by multiplying *Motor_Resolution* by 4

Operating Mode: Profile Position

1. Set Mode of Operation (6060h) to Profile Position mode (1).
2. Set the Target Position (607Ah) value (unit = **counts**).
3. If object 607Ah is **1**, the motor will move a distance of one count.
4. Set the Profile Velocity (6081h) value (unit = **counts** per second).

   If object 6081h is **1**, the motor speed will be 1 counts/sec (one count per second).
5. Set Controlword (6040h) to start the movement.

Operating Mode: Profile Velocity

1. Set Mode of Operation (6060h) to Profile Velocity mode (3).
2. Set Controlword (6040h) to start the operating mode.
3. Set the Target Velocity (60FFh) value.

   If object 6081h is **1**, the motor speed will be 1 counts/sec (one count per second).

If the power stage is enabled, the new target velocity will become active immediately and the movement will start. The value is reset to zero if the operating mode is changed, the power stage is disabled, or a quick stop is triggered.

9 Communication Objects

The following communication profile objects have been implemented in the CDHD servo drives.

For more information, refer to the specific CAN documentation.

1000h – Device Type

Object Description

Index	1000
Description	Contains information about the device type and functionality. It is comprised of a 16-bit field that describes the device profile used, and a second 16-bit field that gives additional information about optional functionality of the device.
Object Code	Variable
Data Type	Unsigned32
Category	Mandatory

Entry Description

Access	Constant
PDO Mapping	No
Default Value	4325778
Range	0 to 4294967295
Units	Not Applicable

1001h – Error Register

Object Description

Index	1001
Description	An error register for the device. A field of 8 bits, each of which indicates a particular type of error. If a bit is set to 1, the specified error has occurred. **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
Object Code	Variable
Data Type	Unsigned8
Category	Mandatory

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 255
Units	Not Applicable

1002h – Manufacturer Status Register

Object Description

Index	1002
Description	A common status register for manufacturer specific purposes.
Note	Valid only for CANopen.
Object Code	Variable
Data Type	Unsigned32
Category	Optional

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	Not Applicable

1003h – Predefined Error Field

Object Description

Index	1003
Description	Holds errors that occurred in the device and have been signaled via the Emergency object. It is an error history.
Note	Valid only for CANopen.
Object Code	Array
Data Type	Unsigned32
Category	Optional

Entry Description

Sub-Index	000
Description	Number of errors. Contains the number of actual errors recorded in the array, starting at sub-index 1. It can read 0 if no error is registered, or 1 if an error is registered. Writing a 0 to sub-index 0 deletes the entire error history.
Object Code	Variable
Data Type	Unsigned8
Category	Mandatory
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 254
Units	Not Applicable

Sub-Index	001 – 002 – 003 – 004 – 005 006 – 007 – 008 – 009 – 010
Description	Standard error field
Object Code	Variable
Data Type	Unsigned32
Category	Mandatory
Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	Not Applicable

1005h – COB-ID SYNC Message

Object Description

Index	1005
Description	Defines the COB-ID of the synchronization object (SYNC). If bit 30 is set to high, the device generates a SYNC message to be used by the drive. The meaning of other bits is the same as for other communication objects.
Note	Valid only for CANopen.
Object Code	Variable
Data Type	Unsigned32
Category	Optional

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	128
Range	1 to 4294967295
Units	Not Applicable

1006h – Communication Cycle Period

Object Description

Index	1006
Description	Defines the communication cycle period. It is 0 if not used.
Note	Valid only for CANopen.
Object Code	Variable
Data Type	Unsigned32
Category	Optional

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	µs

1007h – Synchronous Window Length

Object Description

Index	1007
Description	Defines the length of the time window for synchronous messages. It is 0 if not used.
Note	Valid only for CANopen.
Object Code	Variable
Data Type	Unsigned32
Category	Optional

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	µs

1008h – Manufacturer Device Name

Object Description

Index	1008
Description	Device name assigned by manufacturer.
Note	Valid only for CANopen.
Object Code	Variable
Data Type	Visible_String
Category	Optional

Entry Description

Access	Constant
PDO Mapping	No
Default Value	0
Range	Not Applicable
Units	Not Applicable

1009h – Manufacturer Hardware Version

Object Description

Index	1009
Description	Device version assigned by manufacturer.
Note	Valid only for CANopen.
Object Code	Variable
Data Type	Visible_String
Category	Optional

Entry Description

Access	Constant
PDO Mapping	No
Default Value	0
Range	Not Applicable
Units	Not Applicable

100Ah – Manufacturer Software Version

Object Description

Index	100A
Description	The version number of the manufacturer's software.
Note	Valid only for CANopen.
Object Code	Variable
Data Type	Visible_String
Category	Optional

Entry Description

Access	Constant
PDO Mapping	No
Default Value	Not Applicable (depends on firmware)
Range	Not Applicable
Units	Not Applicable

100Ch – Guard Time

Object Description

Index	100C
Description	The guard time, in milliseconds. It is 0 if not used.
Note	Valid only for CANopen.
Object Code	Variable
Data Type	Unsigned16
Category	Optional

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	ms

100Dh – Lifetime Factor

Object Description

Index	100D
Description	The lifetime factor multiplied by the guard time gives the lifetime of the device. It is 0 if not used.
Note	Valid only for CANopen.
Object Code	Variable
Data Type	Unsigned8
Category	Optional

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 255
Units	Not Applicable

1010h – Store Parameters

Object Description

Index	1010
Description	Controls the saving of parameters in non-volatile memory. Sub-index 1: All parameters can be stored Writing 65766173h (ASCII value of "save") to the sub-index saves the parameters.
Object Code	Array
Data Type	Unsigned32
Category	Optional
VarCom	SAVE

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	1
Range	0 to 127
Units	Not Applicable

Sub-Index	001
Description	Saves all parameters
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	Not Applicable

1011h – Restore Default Parameters

Object Description

Index	1011
Description	Loads the default values of parameters. Sub-index 1: All parameters Writing 64616F6Ch (ASCII value of "load") to the sub-index restores the parameters.
Note	Valid only for CANopen.
Object Code	Array
Data Type	Unsigned32
Category	Optional
VarCom	LOAD

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	1
Range	0 to 127
Units	Not Applicable

Sub-Index	001
Description	Restores all default parameters
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	Not Applicable

1014h – COB-ID EMCY

Object Description

Index	1014
Description	Defines the COB-ID of the Emergency object (EMCY)
Note	Valid only for CANopen.
Object Code	Variable
Data Type	Unsigned32
Category	Optional

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	128
Range	1 to 4294967295
Units	Not Applicable

1015h – Inhibit Time Emergency

Object Description

Index	1015
Description	Defines the inhibit time used for emergency message.
Note	Valid only for CANopen.
Object Code	Variable
Data Type	Unsigned16
Category	Optional

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	100 millisecond (ms)

1016h – Heartbeat Consumer Time

Object Description

Index	1016
Description	The consumer heartbeat time defines the expected heartbeat cycle time and thus has to be higher than the corresponding producer heartbeat time configured on the device producing this heartbeat. Monitoring starts after the reception of the first heartbeat. If the consumer heartbeat time is 0, the corresponding entry is not used. **Bit Description** 31-24 = Must be 0 for each sub-index 23-16 = Node ID 15-0 = Heartbeat time
Note	Valid only for CANopen.
Object Code	Array
Data Type	Unsigned32
Category	Optional

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	1
Range	1 to 127
Units	Not Applicable

Sub-Index	001
Description	Consumer heartbeat time 1
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 50331647
Units	Not Applicable

1017h – Producer Heartbeat Time

Object Description

Index	1017
Description	This object defines the cycle time of the heartbeat, which must be a multiple of 1 millisecond. It is 0 if not used.
Note	Valid only for CANopen.
Object Code	Variable
Data Type	Unsigned16
Category	Optional

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	milliseconds (ms)

1018h – Identity Object

Object Description

Index	1018
Description	Contains general information about the device. Sub-index 1: Defines a unique value allocated to each manufacturer. Sub-index 2: Defines the manufacturer product code (device version). Sub-index 3: Defines the revision number Bit 31-16 = major revision number Bit 15-0 = minor revision number Sub-index 4: Defines the manufacturer serial number.
Object Code	Record
Data Type	Not Applicable
Category	Mandatory

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Mandatory
Access	Read Only
PDO Mapping	No
Default Value	4
Range	1 to 4
Units	Not Applicable

Sub-Index	001
Description	Vendor ID
Object Code	Variable
Data Type	Unsigned32
Category	Mandatory
Access	Read Only
PDO Mapping	No
Default Value	737
Range	0 to 4294967295
Units	Not Applicable

Sub-Index	002
Description	Product code
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	1
Range	0 to 4294967295
Units	Not Applicable

Sub-Index	003
Description	Revision number
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	Not Applicable

Sub-Index	004
Description	Serial number
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	Not Applicable

1019h – Synchronous Counter Overflow Value

Object Description

Index	1019
Description	Defines whether a counter is mapped into the SYNC message, and the highest possible value of the counter. 0 = SYNC message transmitted with length 0 1 = Reserved 2..240 = SYNC message transmitted with length 1, first data byte contains the counter value 241..255 = Reserved
Note	Valid only for CANopen.
Object Code	Variable
Data Type	Unsigned8
Category	Optional

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 240
Units	Not Applicable

1029h – Error Behavior

Object Description

Index	1029
Description	Error behavior. Sub-indices 001 to 254 contain device profile or manufacturer specific error classes. The value of an error class can be: 0 = Pre-operational 1 = No state change 2 = Stopped 3 .. 127 = Reserved 128 = Ignore CAN interface bus-off condition
Note	Valid only for CANopen.
Object Code	Array
Data Type	Unsigned8
Category	Optional

Entry Description

Sub-Index	000
Description	The number of error classes.
Object Code	
Data Type	
Category	Mandatory
Access	Read Only
PDO Mapping	No
Default Value	1
Range	1 to 254
Units	Not Applicable

Sub-Index	001
Description	The error class for a communication error.
Object Code	
Data Type	Unsigned8
Category	Mandatory
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 127
Units	Not Applicable

1200h – Server SDO Parameter 1

Object Description

Index	1200
Description	Contains the parameters for the SDOs for which the device is the server.
Note	Valid only for CANopen.
Object Code	Record
Data Type	Not Applicable
Category	Optional

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	2
Range	2
Units	Not Applicable

Sub-Index	001
Description	COB-ID client to server
Object Code	Variable
Data Type	Unsigned32
Category	Mandatory
Access	Read Only
PDO Mapping	No
Default Value	1536
Range	1536 to 3221225471
Units	Not Applicable

Sub-Index	002
Description	COB-ID server to client
Object Code	Variable
Data Type	Unsigned32
Category	Mandatory
Access	Read Only
PDO Mapping	No
Default Value	1408
Range	1408 to 3221225471
Units	Not Applicable

1201h – Server SDO Parameter 2

Object Description

Index	1200
Description	Contains the parameters for the SDOs for which the device is the server.
Note	Valid only for CANopen.
Object Code	Record
Data Type	Not Applicable
Category	Optional

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	3
Range	2 to 3
Units	Not Applicable

Sub-Index	001
Description	COB-ID client to server
Object Code	Variable
Data Type	Unsigned32
Category	Mandatory
Access	Read Only
PDO Mapping	No
Default Value	2147483648
Range	1 to 4294967295
Units	Not Applicable

Sub-Index	002
Description	COB-ID server to client
Object Code	Variable
Data Type	Unsigned32
Category	Mandatory
Access	Read Only
PDO Mapping	No
Default Value	2147483648
Range	1 to 4294967295
Units	Not Applicable

Sub-Index	002
Description	Node ID of the SDO client
Object Code	Variable
Data Type	Unsigned8
Category	Mandatory
Access	Read Only
PDO Mapping	No
Default Value	127
Range	0 to 127
Units	Not Applicable

1400h – Receive PDO Communication Parameter 1

Object Description

Index	1400
Description	Contains the communication parameters of the current PDO the device is able to receive. Sub-index 0: Defines the number of PDO parameters implemented. Sub-index 1: Defines the COB-ID. If bit 31 is set, the PDO is disabled. Sub-index 2: Defines the transmission type. Sub-index 3: Defines the inhibit time.
Note	Valid only for CANopen.
Object Code	Record
Data Type	Not Applicable
Category	Optional

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	3
Range	2 to 5
Units	Not Applicable

Sub-Index	001
Description	COB-ID used by PDO
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	512
Range	1 to 4294967295
Units	Not Applicable

Sub-Index	002
Description	Transmission type
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	255
Range	0 to 255
Units	Not Applicable

Sub-Index	003
Description	Inhibit time
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	100 µs

1401h – Receive PDO Communication Parameter 2

Object Description

Index	1401
Description	Contains the communication parameters of the current PDO the device is able to receive. Sub-index 0: Defines the number of PDO parameters implemented. Sub-index 1: Defines the COB-ID. If bit 31 is set, the PDO is disabled. Sub-index 2: Defines the transmission type. Sub-index 3: Defines the inhibit time.
Note	Valid only for CANopen.
Object Code	Record
Data Type	Not Applicable
Category	Optional

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	3
Range	2 to 5
Units	Not Applicable

Sub-Index	001
Description	COB-ID used by PDO
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	768
Range	1 to 4294967295
Units	Not Applicable

Sub-Index	002
Description	Transmission Type
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	255
Range	0 to 255
Units	Not Applicable

Sub-Index	003
Description	Inhibit Time
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	100 µs

1402h – Receive PDO Communication Parameter 3

Object Description

Index	1402
Description	Contains the communication parameters of the current PDO the device is able to receive. Sub-index 0: Defines the number of PDO parameters implemented. Sub-index 1: Defines the COB-ID. If bit 31 is set, the PDO is disabled. Sub-index 2: Defines the transmission type. Sub-index 3: Defines the inhibit time.
Note	Valid only for CANopen.
Object Code	Record
Data Type	Not Applicable
Category	Optional

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	3
Range	2 to 5
Units	Not Applicable

Sub-Index	001
Description	COB-ID used by PDO
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	1024
Range	1 to 4294967295
Units	Not Applicable

Sub-Index	002
Description	Transmission Type
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	1
Range	0 to 255
Units	Not Applicable

Sub-Index	003
Description	Inhibit Time
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	100 µs

1403h – Receive PDO Communication Parameter 4

Object Description

Index	1403
Description	Contains the communication parameters of the current PDO the device is able to receive. Sub-index 0: Defines the number of PDO parameters implemented. Sub-index 1: Defines the COB-ID. If bit 31 is set, the PDO is disabled. Sub-index 2: Defines the transmission type. Sub-index 3: Defines the inhibit time.
Note	Valid only for CANopen.
Object Code	Record
Data Type	Not Applicable
Category	Optional

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	3
Range	2 to 5
Units	Not Applicable

Sub-Index	001
Description	COB-ID used by PDO
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	1280
Range	1 to 4294967295
Units	Not Applicable

Sub-Index	002
Description	Transmission Type
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	1
Range	0 to 255
Units	Not Applicable

Sub-Index	003
Description	Inhibit Time
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	100 µs

1600h – Receive PDO Mapping Parameter 1

Object Description

Index	1600
Description	Contains the mapping for the PDOs the device is able to receive. Sub-index 0: Defines the number of valid entries in the mapping record. This number of entries is also the number of the application variables that are received with the corresponding PDO. Sub-indices 1 to *number of entries*: Contain 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 defines the length of the object in bits.
Object Code	Record
Data Type	Not Applicable
Category	Optional

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Mandatory
Access	Read/Write
PDO Mapping	No
Default Value	2
Range	0 to 64
Units	Not Applicable

Sub-Index	001
Description	Mapping entry 1
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	1614807056
Range	0 to 4294967295
Units	Not Applicable

Sub-Index	002
Description	Mapping entry 2
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	1616904200
Range	0 to 4294967295
Units	Not Applicable

Sub-Index	003
Description	Mapping entry 3
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	Not Applicable

Sub-Index	004
Description	Mapping entry 4
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	Not Applicable

1601h – Receive PDO Mapping Parameter 2

Object Description

Index	1601
Description	Contains the mapping for the PDOs the device is able to receive. Sub-index 0: Defines the number of valid entries in the mapping record. This number of entries is also the number of the application variables that are received with the corresponding PDO. Sub-indices 1 to *number of entries*: Contain 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 defines the length of the object in bits. This parameter can be used to verify the overall mapping length. It is mandatory.
Object Code	Record
Data Type	Not Applicable
Category	Optional

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Mandatory
Access	Read/Write
PDO Mapping	No
Default Value	2
Range	0 to 64
Units	Not Applicable

Sub-Index	001
Description	Mapping entry 1
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	1618608160
Range	0 to 4294967295
Units	Not Applicable

Sub-Index	002
Description	Mapping entry 2
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	1619066912
Range	0 to 4294967295
Units	Not Applicable

Sub-Index	003
Description	Mapping entry 3
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	Not Applicable

Sub-Index	004
Description	Mapping entry 4
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	Not Applicable

1602h – Receive PDO Mapping Parameter 3

Object Description

Index	1602
Description	Contains the mapping for the PDOs the device is able to receive. Sub-index 0: Defines the number of valid entries in the mapping record. This number of entries is also the number of the application variables that are received with the corresponding PDO. Sub-indices 1 to *number of entries*: Contain 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 defines the length of the object in bits. This parameter can be used to verify the overall mapping length. It is mandatory.
Object Code	Record
Data Type	Not Applicable
Category	Optional

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Mandatory
Access	Read/Write
PDO Mapping	No
Default Value	1
Range	0 to 64
Units	Not Applicable

Sub-Index	001
Description	Mapping entry 1
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	1627324448
Range	0 to 4294967295
Units	Not Applicable

Sub-Index	002
Description	Mapping entry 2
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	Not Applicable

Sub-Index	003
Description	Mapping entry 3
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	Not Applicable

Sub-Index	004
Description	Mapping entry 4
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	Not Applicable

1603h – Receive PDO Mapping Parameter 4

Object Description

Index	1603
Description	Contains the mapping for the PDOs the device is able to receive. Sub-index 0: Defines the number of valid entries in the mapping record. This number of entries is also the number of the application variables that are received with the corresponding PDO. Sub-indices 1 to *number of entries*: Contain 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 defines the length of the object in bits. This parameter can be used to verify the overall mapping length. It is mandatory.
Object Code	Record
Data Type	Not Applicable
Category	Optional

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Mandatory
Access	Read/Write
PDO Mapping	No
Default Value	2
Range	0 to 64
Units	Not Applicable

Sub-Index	001
Description	Mapping entry 1
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	1618018320
Range	0 to 4294967295
Units	Not Applicable

Sub-Index	002
Description	Mapping entry 2
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	1627259168
Range	0 to 4294967295
Units	Not Applicable

Sub-Index	003
Description	Mapping entry 3
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	Not Applicable

Sub-Index	004
Description	Mapping entry 4
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	Not Applicable

1800h – Transmit PDO Communication Parameter 1

Object Description

Index	1800
Description	Contains the communication parameters of the current PDO the device is able to transmit. Sub-index 0: Defines 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. Sub-index 3: Defines the inhibit time. Sub-index 4: Reserved Sub-index 5: Defines the event time Sub-index 6: Defines the SYNC start value. Start value 0 = SYNC message has no data content. Start value 1 to 240 = SYNC message has 1 byte data. This data byte is considered a counter value. The SYNC message whose counter value equals the SYNC start value is considered the first received SYNC message.
Note	Valid only for CANopen.
Object Code	Record
Data Type	Not Applicable
Category	Optional

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	5
Range	2 to 6
Units	Not Applicable

Sub-Index	001
Description	COB-ID used by PDO
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	384
Range	1 to 4294967295
Units	Not Applicable

Sub-Index	002
Description	Transmission type
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	1
Range	0 to 255
Units	Not Applicable

Sub-Index	003
Description	Inhibit time
Variable	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	100 µs

Sub-Index	004
Description	Compatibility entry
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 255
Units	Not Applicable

Sub-Index	005
Description	Event timer
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	ms

1801h – Transmit PDO Communication Parameter 2

Object Description

Index	1801
Description	Contains the communication parameters of the current PDO the device is able to transmit. Sub-index 0: Defines 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. Sub-index 3: Defines the inhibit time. Sub-index 4: Reserved Sub-index 5: Defines the event time Sub-index 6: Defines the SYNC start value. Start value 0 = SYNC message has no data content. Start value 1 to 240 = SYNC message has 1 byte data. This data byte is considered a counter value. The SYNC message whose counter value equals the SYNC start value is considered the first received SYNC message.
Note	Valid only for CANopen.
Object Code	Record
Data Type	Not Applicable
Category	Optional

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	5
Range	2 to 6
Units	Not Applicable

Sub-Index	001
Description	COB-ID used by PDO
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	640
Range	1 to 4294967295
Units	Not Applicable

Sub-Index	002
Description	Transmission Type
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	1
Range	0 to 255
Units	Not Applicable

Sub-Index	003
Description	Inhibit Time
Variable	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	100 µs

Sub-Index	004
Description	Compatibility Entry
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 255
Units	Not Applicable

Sub-Index	005
Description	Event Timer
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	ms

1802h – Transmit PDO Communication Parameter 3

Object Description

Index	1802
Description	Contains the communication parameters of the current PDO the device is able to transmit. Sub-index 0: Defines 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. Sub-index 3: Defines the inhibit time. Sub-index 4: Reserved Sub-index 5: Defines the event time Sub-index 6: Defines the SYNC start value. Start value 0 = SYNC message has no data content. Start value 1 to 240 = SYNC message has 1 byte data. This data byte is considered a counter value. The SYNC message whose counter value equals the SYNC start value is considered the first received SYNC message.
Note	Valid only for CANopen.
Object Code	Record
Data Type	Not Applicable
Category	Optional

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	5
Range	2 to 6
Units	Not Applicable

Sub-Index	001
Description	COB-ID used by PDO
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	896
Range	1 to 4294967295
Units	Not Applicable

Sub-Index	002
Description	Transmission type
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	1
Range	0 to 255
Units	Not Applicable

Sub-Index	003
Description	Inhibit time
Variable	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	100 µs

Sub-Index	004
Description	Compatibility entry
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 255
Units	Not Applicable

Sub-Index	005
Description	Event Timer
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	ms

1803h – Transmit PDO Communication Parameter 4

Object Description

Index	1803
Description	Contains the communication parameters of the current PDO the device is able to transmit. Sub-index 0: Defines 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. Sub-index 3: Defines the inhibit time. Sub-index 4: Reserved Sub-index 5: Defines the event time Sub-index 6: Defines the SYNC start value. Start value 0 = SYNC message has no data content. Start value 1 to 240 = SYNC message has 1 byte data. This data byte is considered a counter value. The SYNC message whose counter value equals the SYNC start value is considered the first received SYNC message.
Note	Valid only for CANopen.
Object Code	Record
Data Type	Not Applicable
Category	Optional

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	5
Range	2 to 6
Units	Not Applicable

Sub-Index	001
Description	COB-ID used by PDO
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	1152
Range	1 to 4294967295
Units	Not Applicable

Sub-Index	002
Description	Transmission type
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	1
Range	0 to 255
Units	Not Applicable

Sub-Index	003
Description	Inhibit Time
Variable	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	100 µs

Sub-Index	004
Description	Compatibility entry
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 255
Units	Not Applicable

Sub-Index	005
Description	Event timer
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	ms

1A00h – Transmit PDO Mapping Parameter 1

Object Description

Index	1A00
Description	Contains the mapping for the PDOs the device is able to transmit. Sub-index 0: Defines the number of valid entries in the mapping record. This number of entries is also the number of the application variables that are transmitted with the corresponding PDO. Sub-indices 1 to *number of entries*: Contain 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 defines the length of the object in bits. This parameter can be used to verify the overall mapping length. It is mandatory.
Object Code	Record
Data Type	Not Applicable
Category	Optional

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Mandatory
Access	Read/Write
PDO Mapping	No
Default Value	3
Range	0 to 255
Units	Not Applicable

Sub-Index	001
Description	Mapping entry 1
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	1614872592
Range	0 to 4294967295
Units	Not Applicable

Sub-Index	002
Description	Mapping entry 2
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 1616969736
Units	Not Applicable

Sub-Index	003
Description	Mapping entry 3
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	Not Applicable

Sub-Index	004
Description	Mapping entry 4
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	Not Applicable

1A01h – Transmit PDO Mapping Parameter 2

Object Description

Index	1A01
Description	Contains the mapping for the PDOs the device is able to transmit. Sub-index 0: Defines the number of valid entries in the mapping record. This number of entries is also the number of the application variables that are transmitted with the corresponding PDO. Sub-indices 1 to *number of entries*: Contain 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 defines the length of the object in bits. This parameter can be used to verify the overall mapping length. It is mandatory.
Object Code	Record
Data Type	Not Applicable
Category	Optional

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Mandatory
Access	Read/Write
PDO Mapping	No
Default Value	2
Range	0 to 255
Units	Not Applicable

Sub-Index	001
Description	Mapping entry 1
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	1617166368
Range	0 to 4294967295
Units	Not Applicable

Sub-Index	002
Description	Mapping entry 2
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	1617690656
Range	0 to 4294967295
Units	Not Applicable

Sub-Index	003
Description	Mapping entry 3
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	Not Applicable

Sub-Index	004
Description	Mapping entry 4
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	Not Applicable

1A02h – Transmit PDO Mapping Parameter 3

Object Description

Index	1A02
Description	Contains the mapping for the PDOs the device is able to transmit. Sub-index 0: Defines the number of valid entries in the mapping record. This number of entries is also the number of the application variables that are transmitted with the corresponding PDO. Sub-indices 1 to *number of entries*: Contain 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 defines the length of the object in bits. This parameter can be used to verify the overall mapping length. It is mandatory.
Object Code	Record
Data Type	Not Applicable
Category	Optional

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Mandatory
Access	Read/Write
PDO Mapping	No
Default Value	4
Range	0 to 255
Units	Not Applicable

Sub-Index	001
Description	Mapping entry 1
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	1618477072
Range	0 to 4294967295
Units	Not Applicable

Sub-Index	002
Description	Mapping entry 2
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	1618214928
Range	0 to 4294967295
Units	Not Applicable

Sub-Index	003
Description	Mapping Entry 3
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	552730640
Range	0 to 4294967295
Units	Not Applicable

Sub-Index	004
Description	Mapping entry 4
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	553189392
Range	0 to 4294967295
Units	Not Applicable

1A03h – Transmit PDO Mapping Parameter 4

Object Description

Index	1A03
Description	Contains the mapping for the PDOs the device is able to transmit. Sub-index 0: Defines the number of valid entries in the mapping record. This number of entries is also the number of the application variables that are transmitted with the corresponding PDO. Sub-indices 1 to *number of entries*: Contain 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 defines the length of the object in bits. This parameter can be used to verify the overall mapping length. It is mandatory.
Object Code	Record
Data Type	Not Applicable
Category	Optional

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Mandatory
Access	Read/Write
PDO Mapping	No
Default Value	2
Range	0 to 255
Units	Not Applicable

Sub-Index	001
Description	Mapping entry 1
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	1627193376
Range	0 to 4294967295
Units	Not Applicable

Sub-Index	002
Description	Mapping entry 2
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	548798496
Range	0 to 4294967295
Units	Not Applicable

Sub-Index	003
Description	Mapping entry 3
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	Not Applicable

Sub-Index	004
Description	Mapping entry 4
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	Not Applicable

1C00h – Sync Manager Communication Type

Object Description

Index	1C00
Description	Up to 32 sync manager types can be described. The first four sync manager types are fixed, and the following can be configured to one of the first four types. The default configuration is the following: 1 mailbox receive 2 mailbox send 3 process data output 4 process data input
Note	Valid only for EtherCAT.
Object Code	Array
Data Type	Unsigned8

Entry Description

Sub-Index	000
Description	Number of entries
Access	Read Only
PDO Mapping	No
Default Value	4
Range	0 to 20

Sub-Index	001
Description	Sub-index 1
Data Type	Unsigned8
Access	Read Only
PDO Mapping	No
Default Value	1
Range	0 to 4

Sub-Index	002
Description	Sub-index 2
Data Type	Unsigned8
Access	Read Only
PDO Mapping	No
Default Value	2
Range	0 to 4

Sub-Index	003
Description	Sub-index 3
Data Type	Unsigned8
Access	Read Only
PDO Mapping	No
Default Value	3
Range	0 to 4

Sub-Index	004
Description	Sub-index 4
Data Type	Unsigned8
Access	Read Only
PDO Mapping	No
Default Value	4
Range	0 to 4

1C10h – Sync Manager 0 PDO Assignment

Object Description

Index	1C10
Description	Using this object, PDOs can be assigned to the Sync Managers starting at Sync Manager 2.
Note	Valid only for EtherCAT.
Object Code	Array
Data Type	Unsigned16

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	0

1C11h – Sync Manager 1 PDO Assignment

Object Description

Index	1C11
Description	Sync Manager 1 PDO Assignment
Note	Valid only for EtherCAT.
Object Code	Array
Data Type	Unsigned16

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	0

1C12h – Sync Manager 2 PDO Assignment

Object Description

Index	1C12
Description	Sync Manager 2 PDO Assignment
Note	Valid only for EtherCAT.
Object Code	Array
Data Type	Unsigned16

Entry Description

Sub-Index	000
Description	Number of assigned Rx PDOs
Access	Read/Write
PDO Mapping	No
Default Value	4
Range	0 to 20

Sub-Index	001
Description	Sub-index 1
Data Type	Unsigned16
Access	Read/Write
PDO Mapping	No
Default Value	5632
Range	5632 to 6143

Sub-Index	002
Description	Sub-index 2
Data Type	Unsigned16
Access	Read/Write
PDO Mapping	No
Default Value	5633
Range	5632 to 6143

Sub-Index	003
Description	Sub-index 3
Data Type	Unsigned816
Access	Read/Write
PDO Mapping	No
Default Value	5634
Range	5632 to 6143

Sub-Index	004
Description	Sub-index 4
Data Type	Unsigned16
Access	Read/Write
PDO Mapping	No
Default Value	5635
Range	5632 to 6143

1C13h – Sync Manager 3 PDO Assignment

Object Description

Index	1C12
Description	Sync Manager 3 PDO Assignment
Note	Valid only for EtherCAT.
Object Code	Array
Data Type	Unsigned16

Entry Description

Sub-Index	000
Description	Number of assigned Tx PDOs
Access	Read/Write
PDO Mapping	No
Default Value	4
Range	0 to 255

Sub-Index	001
Description	Sub-index 1
Data Type	Unsigned16
Access	Read/Write
PDO Mapping	No
Default Value	6656
Range	6656 to 7167

Sub-Index	002
Description	Sub-index 2
Data Type	Unsigned16
Access	Read/Write
PDO Mapping	No
Default Value	6657
Range	6656 to 7167

Sub-Index	003
Description	Sub-index 3
Data Type	Unsigned816
Access	Read/Write
PDO Mapping	No
Default Value	6658
Range	6656 to 7167

Sub-Index	004
Description	Sub-index 4
Data Type	Unsigned16
Access	Read/Write
PDO Mapping	No
Default Value	6659
Range	6656 to 7167

10 Manufacturer-Specific Objects

2002h – Configuration Command

Object Description

Index	2002
Description	Performs a configuration sequence of the drive according to its internal parameters. Writing 01 initiates the configuration command.
Object Code	Variable
Data Type	Unsigned8
Category	Optional
VarCom	CONFIG

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 255
Units	Not Applicable

2003h – Current BEMF Compensation Gain

Object Description

Index	2003
Description	The feedforward BEMF compensation ratio for the current control.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	KCBEMF

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	1.0
Range	0.0 to 2.0
Units	Not Applicable

2006h – Current Integral (KI) Gain

Object Description

Index	2006
Description	The current controller integral gain.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	KCI

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	1.0
Range	0.0 to 100.0
Units	Not Applicable

2007h – Current Proportional (KP) Gain

Object Description

Index	2007
Description	The current controller proportional gain.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	KCP

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	1.0
Range	0.0 to 100.0
Units	Not Applicable

200Ah – HD Anti-Vibration Filter

Object Description

Index	200A
Description	HD anti-vibration filter.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	NLANTIVIBGAIN2

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0.0 to 1000.0
Range	0
Units	Not Applicable

200Bh – HD Anti-Resonance Sharpness

Object Description

Index	200B
Description	HD anti-resonance sharpness.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	NLANTIVIBSHARP

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0.5
Range	0.00999999977648 to 10.0
Units	Not Applicable

200Ch – HD Anti-Vibration Gain

Object Description

Index	200C
Description	HD anti-vibration gain.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	NLANTIVIBGAIN

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0.0
Range	0.0 to 10000.0
Units	Rad×10-3/N

200Dh – Absolute Feedback Offset

Object Description

Index	200D
Description	The initial absolute position after power-cycle.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	ABSOFFSET

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	CAN user position units

200Eh – Auto Home Mode

Object Description

Index	200E
Description	The type of automatic homing to be performed on power up. 0 = No Homing 1 = Attempt once at power-up. Fail once. 2 = Attempt at power-up. Perform whenever possible.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	AUTOHOME

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 2
Units	Not Applicable

200Fh – Fieldbus Unit Scaling

Object Description

Index	200F
Description	Fieldbus unit scaling for internal counts stating how many bits of 32-bit position are for number of revolutions.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	FBSCALE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	12
Range	0 to 20
Units	Not Applicable

2010h – Velocity Loop Bandwidth

Object Description

Index	2010
Description	The velocity control loop bandwidth for the pole placement controller.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	BW

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	30
Range	10 to 600
Units	Hz

2011h – Warning Bits

Object Description

Index	2011
Description	Lists warnings, by bits. Since CDHD warnings are 64 bits, they are split into two 32-bit segments. Refer to the section *Warning* Codes.
Object Code	Record
Data Type	Not Applicable
Category	Optional

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	2
Range	2
Units	Not Applicable

Sub-Index	001
Description	Lower 32 bits of warning (status) word.
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	Not Applicable

Sub-Index	002
Description	Upper 32 bits of warning (status) word.
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	Not Applicable

2013h – Current CL VD

Object Description

Index	2013
Description	The voltage command to the D component.
Object Code	Variable
Data Type	Integer16
Category	Optional
VarCom	CLVD

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	-32768 to 32767
Units	Not Applicable

2014h – Current CL VQ

Object Description

Index	2014
Description	The voltage command to the Q component.
Object Code	Variable
Data Type	Integer16
Category	Optional
VarCom	CLVQ

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	-32768 to 32767
Units	Not Applicable

2015h – Drive Name

Object Description

Index	2015
Description	The name assigned to the drive
Note	Valid only for CANopen.
Object Code	Variable
Data Type	Visible_String
Category	Optional
VarCom	DRIVENAME

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	Not Applicable
Units	Not Applicable

2016h – Electrical Position

Object Description

Index	2016
Description	The electrical angle position in 16-bit resolution.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	ELECTANGLE

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	65536/electrical cycle

2017h – HD Derivative Gain

Object Description

Index	2017
Description	HD derivative gain.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	KNLD

Entry Description

Access	Read/Write
PDO Mapping	0.0
Default Value	0.0
Range	0.0 to 2000.0
Units	hertz (Hz)

2018h – HD Integral Gain

Object Description

Index	2018
Description	HD integral gain.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	KNLI

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0.0
Range	0.0 to 200.0
Units	hertz (Hz)

2019h – HD Derivative-Integral Gain

Object Description

Index	2019
Description	HD derivative-integral gain.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	KNLIV

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0.0
Range	0.0 to 400.0
Units	hertz (Hz)

201Ah – HD Proportional Gain

Object Description

Index	201A
Description	HD proportional gain.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	KNLP

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0.0
Range	0.0 to 400.0
Units	hertz (Hz)

201Bh – HD Adaptive Gain Scale Factor

Object Description

Index	201B
Description	HD adaptive gain scale factor.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	KNLUSERGAIN

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	1.0
Range	0.0010000000475 to 3.0
Units	Not Applicable

201Ch – Position Acceleration Feedforward to Current

Object Description

Index	201C
Description	The position acceleration feedforward to current loop.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	KPAFRC

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0.0
Range	-1000.0. to 1000.0
Units	Not Applicable

201Dh – Position Acceleration Feedforward

Object Description

Index	201D
Description	The position acceleration feedforward.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	KPAFRV

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0.0
Range	-1000.0 to 1000.0
Units	Not Applicable

201Eh – Position Derivative (KD) Gain

Object Description

Index	201E
Description	The position controller derivative gain.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	KPD

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0.0
Range	0.0 to 1000.0
Units	Not Applicable

201Fh – Position Proportional Adaptive Gain

Object Description

Index	201F
Description	The position controller adaptive proportional gain.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	KPE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0.0
Range	0.0 to 4.0
Units	Not Applicable

2020h – Position Integral (KI) Gain

Object Description

Index	2020
Description	The position controller integrator gain.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	KPI

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0.0
Range	0.0 to 1000.0
Units	hertz (Hz)

2021h – Position Integral Output Saturation

Object Description

Index	2021
Description	The position integral output saturation.
Object Code	Variable
Data Type	Unsigned32
Category	Optional
VarCom	KPISATOUT

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	CAN user velocity units

2022h – Position Proportional (KP) Gain

Object Description

Index	2022
Description	The position controller proportional gain.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	KPP

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	1.0
Range	0.0 to 1200.0
Units	Not Applicable

2023h – Position Velocity Feedforward

Object Description

Index	2023
Description	The position controller velocity feedforward.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	KPVFR

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0.0
Range	-1000.0 to 1000.0
Units	Not Applicable

2024h – Motor Type

Object Description

Index	2024
Description	Motor type.
Object Code	Variable
Data Type	Unsigned8
Category	Optional
VarCom	MOTORTYPE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 2
Units	Not Applicable

2025h – Velocity Feedforward Ratio

Object Description

Index	2025
Description	The velocity feedforward ratio.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	KVFR

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0.0
Range	0.0 to 1.0
Units	Not Applicable

2026h – Velocity Integrator

Object Description

Index	2026
Description	The velocity integral gain.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	KVI

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0.0
Range	0.0 to 200000.0
Units	hertz (Hz)

2027h – Velocity Gain

Object Description

Index	2027
Description	The velocity proportional gain.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	KVP

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0.00999999977648
Range	0.0 to 1000000.0
Units	Not Applicable

2028h – Mechanical Angle

Object Description

Index	2028
Description	The position of the motor in revolutions.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	MECHANGLE

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	-32768 to 32767
Units	65536/electrical cycle

2029h – Encoder Type

Object Description

Index	2029
Description	The type of motor encoder
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	MENCTYPE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	11
Range	0 to 11
Units	Not Applicable

202Ah – Motor Encoder Index Position

Object Description

Index	202A
Description	The motor encoder index position.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	MENCZPOS

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	120
Range	0 to 359
Units	Electrical degree

202Bh – Motor and Feedback Direction

Object Description

Index	202B
Description	The direction and polarity of the motor and feedback.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	MFBDIR

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 7
Units	Not Applicable

202Ch – Point-to-Point Move Low Pass Filter

Object Description

Index	202C
Description	The low pass filter for point-to-point move.
Object Code	Variable
Data Type	Integer16
Category	Optional
VarCom	MOVESMOOTHLPFHZ

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	5000
Range	10 to 5000
Units	Not Applicable

202Dh – Motor Feedback Mode

Object Description

Index	202D
Description	Motor feedback mode. Enables/disables the resolution enhancement mechanism.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	MFBMODE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	1
Range	0 to 1
Units	Not Applicable

202Eh – Motor Foldback Status

Object Description

Index	202E
Description	Motor foldback status. Indicates whether the motor foldback limit has dropped below the application current limits.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	MFOLD

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	-32768 to 32767
Units	Not Applicable

202Fh – Motor Foldback Delay Time

Object Description

Index	202F
Description	Motor foldback delay time. The time delay for motor foldback; foldback is the amount of time the system current can exceed 6075h (MICONT) before the drive enters motor foldback state.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	MFOLDD

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	5.0
Range	1.0 to 2400.0
Units	seconds (s)

2030h – Motor Foldback Disable

Object Description

Index	2030
Description	Motor foldback disable. Enables/disables motor foldback protection.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	MFOLDDIS

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

2031h – Motor Foldback Recovery Time

Object Description

Index	2031
Description	The recovery time for motor foldback.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	MFOLDR

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	70.0
Range	5.0 to 3600.0
Units	seconds (s)

2032h – Motor Foldback Time Constant

Object Description

Index	2032
Description	The time constant for motor foldback.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	MFOLDT

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	5.0
Range	1.0 to 1200.0
Units	seconds (s)

2033h – Motor Foldback Current

Object Description

Index	2033
Description	The current limit derived from the motor foldback mechanism. Foldback condition occurs when 2033h (MIFOLD) goes below 6072h (ILIM).
Object Code	Variable
Data Type	Unsigned32
Category	Optional
VarCom	MIFOLD

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	mA

2034h – Motor Foldback Fault Threshold

Object Description

Index	2034
Description	The motor foldback fault threshold.
Object Code	Variable
Data Type	Unsigned32
Category	Optional
VarCom	MIFOLDFTHRESH

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	mA

2035h – Motor Foldback Warning Threshold

Object Description

Index	2035
Description	The motor foldback fault warning threshold.
Object Code	Variable
Data Type	Unsigned32
Category	Optional
VarCom	MIFOLDWTHRESH

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	mA

2036h – Motor Peak Current

Object Description

Index	2036
Description	The peak rated current of the motor.
Object Code	Variable
Data Type	Unsigned32
Category	Optional
VarCom	MIPEAK

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	mA

2037h – Rotor Inertia

Object Description

Index	2036
Description	The rotor inertia of a rotary motor.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	MJ

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0.02
Range	0.0 to 2000000.0
Units	$kg\text{-}m^2 \times 10^{-3}$

2038h – Torque Constant for Linear Motors

Object Description

Index	2038
Description	The motor torque constant for linear motors.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	MKF

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0.01600000076
Range	0.0010000000475 to 1000.0
Units	Not Applicable

2039h – Torque Constant

Object Description

Index	2039
Description	The motor torque constant.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	MKT

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0.01600000076
Range	0.0010000000475 to 65.0
Units	Nm/A

203Ah – Motor Inductance

Object Description

Index	203A
Description	The motor minimum line-to-line inductance.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	ML

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0.0
Range	0.0010000000475 to 1000.0
Units	megahertz (MHz)

203Bh – Adaptive Gain Value at Continuous Motor Current

Object Description

Index	203B
Description	The current loop adaptive gain value at continuous motor current.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	MLGAINC

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	1.0
Range	0.10000000149 to 1.0
Units	Not Applicable

203Ch – Adaptive Gain Value at Peak Motor Current

Object Description

Index	203C
Description	The current loop adaptive gain value at peak motor current.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	MLGAINP

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	1.0
Range	0.10000000149 to 1.0
Units	Not Applicable

203Dh – Rotor Coil Mass (Linear Motor)

Object Description

Index	203D
Description	The moveable mass of linear motor without payload.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	MMASS

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0.0
Range	0.0 to 10000.0
Units	kilogram (kg)

203Eh – Motor Commutation Type

Object Description

Index	203E
Description	The type of motor commutation – brushless or brush.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	MOTORCOMMTYPE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

203Fh – Motor Name

Object Description

Index	203F
Description	The name assigned to the motor.
Note	Valid only for CANopen.
Object Code	Variable
Data Type	Visible_String
Category	Optional
VarCom	MOTORNAME

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	Not Applicable
Units	Not Applicable

2040h – Phase Disconnect Scan

Object Description

Index	2040
Description	Enables/disables detection of wire breaks in motor phases.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	MOTORPHASESCAN

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

2041h – Motor Setup

Object Description

Index	2041
Description	Starts an automatic procedure for setting commutation variables. Write 1 to enter this mode.
Object Code	Variable
Data Type	Integer8
Category	Optional
VarCom	MOVESMOOTHLPFHZ

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

2042h – Motor Setup Status

Object Description

Index	2042
Description	The status of the automatic motor setup procedure, 2041h (MOTORSETUP).
Object Code	Variable
Data Type	Unsigned32
Category	Optional
VarCom	MOVESMOOTHLPFHZ

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	Not Applicable

2043h – Commutation Offset

Object Description

Index	2043
Description	The resolver/encoder phase relative to the standard commutation table.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	MPHASE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 359
Units	degrees (°)

2044h – Drive Temperature

Object Description

Index	2044
Description	The temperature of the drive control and power boards (Celsius degrees). Sub-index 1 = Control board temperature Sub-index 2 = Power board temperature
Object Code	Array
Data Type	Integer16
Category	Optional
VarCom	DRIVETEMP

Entry Description

Sub-Index	000
Description	Number of entries
Category	Optional
Data Type	Unsigned8
Access	Read Only
PDO Mapping	No
Default Value	2
Range	0 to 2
Units	Not Applicable

Sub-Index	001
Description	Control Temperature
Category	Optional
Data Type	Integer16
Access	Read Only
PDO Mapping	No
Default Value	0
Range	-32768 to 32767
Units	Celsius degrees (°C)

Sub-Index	002
Description	Power Temperature
Category	Optional
Data Type	Integer16
Access	Read Only
PDO Mapping	No
Default Value	0
Range	-32768 to 32767
Units	Celsius degrees (°C)

2045h – Feedback Direction

Object Description

Index	2045
Description	Feedback positive direction.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	DIR

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

2046h – Disabling Mode

Object Description

Index	2046
Description	Defines if and how Disabling mode is used for stopping the motor/
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	DISMODE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 5
Units	Not Applicable

2047h – Deceleration Distance

Object Description

Index	2047
Description	Deceleration distance. The target position offset value, relative to the position captured at a stop triggered by an input (input mode 15).
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	DECDIST

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	CAN user position units

2048h – Deceleration Distance 2

Object Description

Index	2048
Description	Deceleration distance 2. The target position offset value, relative to the position captured at a stop triggered by an input (input mode 16).
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	DECDIST2

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	CAN user position units

2049h – Quick Stop Deceleration Time

Object Description

Index	2049
Description	The deceleration time for an Active Disabling/emergency stop.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	DECSTOPTIME

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 6500
Units	milliseconds (ms)

204Ah – Active Disabling Speed Threshold

Object Description

Index	204A
Description	The velocity below which the motor is considered stopped by Active Disable.
Object Code	Variable
Data Type	Unsigned32
Category	Optional
VarCom	DISSPEED

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 2147483647
Units	CAN user velocity units

204Bh – Active Disabling Time

Object Description

Index	204B
Description	The time delay after 0204Ah (DISSPEED) is reached until drive is disabled by Active Disabling.
Object Code	Variable
Data Type	Unsigned32
Category	Optional
VarCom	DISTIME

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	10
Range	0 to 6500
Units	millisecond (ms)

204Ch – Factory Restore

Object Description

Index	204C
Description	Restores all configuration variables to factory default settings. Writing 01 initiates the factory restore command.
Object Code	Variable
Data Type	Unsigned8
Category	Optional
VarCom	FACTORYRESTORE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 255
Units	Not Applicable

204Dh – Feedback Type

Object Description

Index	204D
Description	The type of motor feedback.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	FEEDBACKTYPE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	2
Range	1 to 9
Units	Not Applicable

204Eh – Velocity Loop Output Filter Parameter 1

Object Description

Index	204E
Description	Velocity loop output filter first parameter.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	FILTHZ1

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	200
Range	1 to 10000
Units	hertz (Hz)

204Fh – Velocity Loop Output Filter Parameter 2

Object Description

Index	204F
Description	Velocity loop output filter second parameter.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	FILTHZ2

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	200
Range	1 to 10000
Units	hertz (Hz)

2050h – Velocity Loop Output Filter Mode

Object Description

Index	2050
Description	Defines the type of velocity loop output filter.
Object Code	Variable
Data Type	Unsigned8
Category	Optional
VarCom	FILTMODE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 6
Units	Not Applicable

2051h – Foldback Status

Object Description

Index	2051
Description	Indicates whether the drive foldback limit (IFOLD) has dropped below the applications current limits (ILIM).
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	FOLD

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

2052h – Friction Compensation Negative Current

Object Description

Index	2052
Description	The current added to the current command when the commanded velocity is negative. Limited by 207Bh (DIPEAK).
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	FRICINEG

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0.0
Range	-2147483648 to 2147483647
Units	milliampere (mA)

2053h – Friction Compensation Positive Current

Object Description

Index	2053
Description	The current added to the current command when the commanded velocity is positive. Limited by 207Bh (DIPEAK).
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	FRICIPOS

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0.0
Range	-2147483648 to 2147483647
Units	milliampere (mA)

2054h – Friction Compensation Negative Velocity Hysteresis

Object Description

Index	2054
Description	The velocity hysteresis in the negative direction for the friction compensation mechanism.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	FRICNVHYST

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	CAN user velocity units

2055h – Friction Compensation Positive Velocity Hysteresis

Object Description

Index	2055
Description	The velocity hysteresis in the positive direction for the friction compensation mechanism.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	FRICPVHYST

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	CAN user velocity units

2056h – Halls State

Object Description

Index	2056
Description	The state of the Hall commutation sensors. Sub-index 1 = Hall U Sub-index 2 = Hall V Sub-index 3 = Hall W
Object Code	Array
Data Type	Unsigned8
Category	Optional
VarCom	HALLS

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	3
Range	0 to 3
Units	Not Applicable

Sub-Index	001
Description	Hall U
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

Sub-Index	002
Description	Hall V
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

Sub-Index	003
Description	Hall W
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

2057h – Invert Hall Signals

Object Description

Index	2057
Description	Inverts the polarity of the Hall signals associated with motor phases UVW. Sub-index 1, value 1 = inverts Hall U Sub-index 2, value 1 = inverts Hall V Sub-index 3, value 1 = inverts Hall W
Object Code	Array
Data Type	Unsigned8
Category	Optional
VarCom	HALLSINV

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	3
Range	0 to 3
Units	Not Applicable

Sub-Index	001
Description	Hall U
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

Sub-Index	002
Description	Hall V
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

Sub-Index	003
Description	Hall W
Category	Optional
Data Type	Unsigned8
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

2058h – Hall Signals Type

Object Description

Index	2058
Description	Defines the connection of Hall sensors to the drive: single-ended or differential inputs.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	HALLSTYPE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 2
Units	Not Applicable

205Ah – Harmonic Correction Feedback Parameter 1

Object Description

Index	205A
Name	Harmonic Correction Feedback Param 1 Write 0x01 to the Config sub-index to perform the parameter configuration.
Object Code	Array
Data Type	Unsigned32
Category	Optional

Entry Description

Sub-Index	001
Description	Config
Entry Category	Optional
Data Type	Unsigned32
Access	Read/Write
PDO Mapping	No
Default Value	0x0
Lower Limit	0x0
Upper Limit	0xFFFFFFFF
Unit	-

Sub-Index	002
Description	Argument_1
Entry Category	Optional
Data Type	Unsigned32
Access	Read/Write
PDO Mapping	No
Default Value	0x0
Lower Limit	0x0
Upper Limit	0x28
Unit	-

Sub-Index	003
Description	Argument_2
Entry Category	Optional
Data Type	Unsigned32
Access	Read/Write
PDO Mapping	No
Default Value	0x0
Lower Limit	0x0
Upper Limit	0x167
Unit	-

Sub-Index	004
Description	Argument_3
Entry Category	Optional
Data Type	Unsigned32
Access	Read/Write
PDO Mapping	No
Default Value	0x0
Lower Limit	0x0
Upper Limit	0xFFFFFFFF
Unit	Position Units

205Bh – Harmonic Correction Feedback Parameter 2

Object Description

Index	205B
Name	Harmonic Correction Feedback Param 2 Write 0x01 to the Config sub-index to perform the parameter configuration
Object Code	Array
Data Type	Unsigned32
Category	Optional

Entry Description

Sub-Index	000
Description	Number of entries
Entry Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	0x4
Lower Limit	0x0
Upper Limit	0x4
Unit	-

Sub-Index	001
Description	Config
Entry Category	Optional
Data Type	Unsigned32
Access	Read/Write
PDO Mapping	No
Default Value	0x0
Lower Limit	0x0
Upper Limit	0xFFFFFFFF
Unit	-

Sub-Index	002
Description	Argument_1
Entry Category	Optional
Data Type	Unsigned32
Access	Read/Write
PDO Mapping	No
Default Value	0x0
Lower Limit	0x0
Upper Limit	0x28
Unit	-

Sub-Index	003
Description	Argument_2
Entry Category	Optional
Data Type	Unsigned32
Access	Read/Write
PDO Mapping	No
Default Value	0x0
Lower Limit	0x0
Upper Limit	0x167
Unit	-

Sub-Index	004
Description	Argument_3
Entry Category	Optional
Data Type	Unsigned32
Access	Read/Write
PDO Mapping	No
Default Value	0x0
Lower Limit	0x0
Upper Limit	0xFFFFFFFF
Unit	Position Units

205Dh – Harmonic Current ICMD Parameter 1

Object Description

Index	205D
Name	Harmonic current ICMD param 1 Write 0x01 to the Config sub-index to perform the parameter configuration
Object Code	Record
Data Type	HARMONIC_CURR_CORR_PARAM_T
Category	Optional

Entry Description

Sub-Index	000
Description	Number of entries
Entry Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	0x4
Lower Limit	0x0
Upper Limit	0x4
Unit	-

Sub-Index	001
Description	Config
Entry Category	Optional
Data Type	Unsigned8
Access	Read/Write
PDO Mapping	No
Default Value	0x0
Lower Limit	0x0
Upper Limit	0xFF
Unit	-

Sub-Index	002
Description	Argument_1
Entry Category	Optional
Data Type	Unsigned16
Access	Read/Write
PDO Mapping	No
Default Value	0x0
Lower Limit	0x0
Upper Limit	0x28
Unit	-

Sub-Index	003
Description	Argument_2
Entry Category	Optional
Data Type	Unsigned16
Access	Read/Write
PDO Mapping	No
Default Value	0x0
Lower Limit	0x0
Upper Limit	0x167
Unit	-

Sub-Index	004
Description	Argument_3
Entry Category	Optional
Data Type	REAL32
Access	Read/Write
PDO Mapping	No
Default Value	0.0
Lower Limit	-3.40282346639e+038
Upper Limit	3.40282346639e+038
Unit	-

205Eh – Harmonic Current ICMD Parameter 2

Object Description

Index	205E
Name	Harmonic current ICMD param 2 Write 0x01 to the Config sub-index to perform the parameter configuration
Object Code	Record
Data Type	HARMONIC_CURR_CORR_PARAM_T
Category	Optional

Entry Description

Sub-Index	000
Description	Number of entries
Entry Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	0x4
Lower Limit	0x4
Upper Limit	0x4
Unit	-

Sub-Index	001
Description	Config
Entry Category	Optional
Data Type	Unsigned8
Access	Read/Write
PDO Mapping	No
Default Value	0x0
Lower Limit	0x0
Upper Limit	0xFF
Unit	-

Sub-Index	002
Description	Argument_1
Entry Category	Optional
Data Type	Unsigned16
Access	Read/Write
PDO Mapping	No
Default Value	0x0
Lower Limit	0x0
Upper Limit	0x28
Unit	-

Sub-Index	003
Description	Argument_2
Entry Category	Optional
Data Type	Unsigned16
Access	Read/Write
PDO Mapping	No
Default Value	0x0
Lower Limit	0x0
Upper Limit	0x167
Unit	-

Sub-Index	004
Description	Argument_3
Entry Category	Optional
Data Type	Real32
Access	Read/Write
PDO Mapping	No
Default Value	0.0
Lower Limit	-3.40282346639e+038
Upper Limit	3.40282346639e+038
Unit	-

2060h – HD Current Filter Damping

Object Description

Index	2060
Description	HD current filter damping.
Object Code	Variable
Data Type	Integer16
Category	Optional
VarCom	NLFILTDAMPING

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 100
Units	percentage (%)

2061h – HD Current Notch Filter Center

Object Description

Index	2061
Description	HD current filter – notch filter center.
Object Code	Variable
Data Type	Integer16
Category	Optional
VarCom	NLNOTCHCENTER

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	100
Range	100 to 10000
Units	hertz (Hz)

2062h – HD Current Notch Filter Bandwidth

Object Description

Index	2062
Description	HD current filter – notch filter bandwidth.
Object Code	Variable
Data Type	Integer16
Category	Optional
VarCom	NLNOTCHBW

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 500
Units	hertz (Hz)

2063h – Hold Position Command

Object Description

Index	2063
Description	Instructs motor whether to maintain its position. 0 = Do not hold position 1 = Hold position
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	HOLD

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

2064h – Hardware Position External

Object Description

Index	2064
Description	The position as measured by an external feedback device.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	HWPEXT

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	counts

2065h – Hardware Position

Object Description

Index	2065
Description	The position (in counts) as measured by the feedback device.
Note	Valid only for CANopen.
Object Code	Variable
Data Type	Unsigned64
Category	Optional
VarCom	HWPOS

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	Not Applicable

2066h – Current D Axis

Object Description

Index	2066
Description	In vector control, indicates the value perpendicular to 2067h (IQ).
Object Code	Variable
Data Type	Integer16
Category	Optional
VarCom	ID

Entry Description

Access	Read Only
PDO Mapping	Yes
Default Value	0
Range	-32768 to 32767
Units	Current units

2067h – Current Q Axis

Object Description

Index	2067
Description	In vector control, indicates the current for the torque. This value is perpendicular to 2066h (ID).
Object Code	Variable
Data Type	Integer16
Category	Optional
VarCom	IQ

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	-32768 to 32767
Units	Current units

2068h – Current Feedforward LPF

Object Description

Index	2068
Description	The corner frequency of a first-order filter of the feedforward low pass filter.
Object Code	Variable
Data Type	Integer16
Category	Optional
VarCom	IFFLPFHZ

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	80
Range	10 to 1000
Units	hertz (Hz)

2069h – Drive Foldback Current Limit

Object Description

Index	2069
Description	The current limit derived from the foldback mechanism Foldback condition occurs when 2069h (IFOLD) goes below 6072h (ILIM).
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	IFOLD

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	Current units

206Ah – Drive Foldback Fault Threshold

Object Description

Index	206A
Description	The current threshold for declaring a fault due to foldback.
Object Code	Variable
Data Type	Unsigned32
Category	Optional
VarCom	IFOLDFTHRESH

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	Current units

206Bh – Drive Foldback Warning Threshold

Object Description

Index	206B
Description	The current threshold for declaring a warning due to foldback. Threshold warning is declared when 2069h (IFOLD) goes below 206Ah (IFOLDFTHRESH).
Object Code	Variable
Data Type	Unsigned32
Category	Optional
VarCom	IFOLDWTHRESH

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	Current units

206Ch – Gravity Compensation

Object Description

Index	206C
Description	Value added to the current loop command to compensate for gravity or similar constant interference.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	IGRAV

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	Current units

206Fh – Encoder Index Position Feedback

Object Description

Index	206F
Description	The position feedback value captured at the encoder index position.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	INDEXPFB

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	CAN user position units

2070h – Input Inversion

Object Description

Index	2070
Description	The inversion state of each digital input. The index should be written first. Then, writing the value executes the actual input inversion.
Object Code	Array
Data Type	Unsigned16
Category	Optional
VarCom	ININV

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	2
Range	2
Units	Not Applicable

Sub-Index	001
Description	Index
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	1 to 11
Units	Not Applicable

Sub-Index	002
Description	Value
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

2071h – Dynamic Brake Current

Object Description

Index	2071
Description	Maximum current for dynamic braking. Limited by 207Bh (DIPEAK).
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	ISTOP

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 150000
Units	milliampere (mA)

2072h – Phase U Actual Current

Object Description

Index	2072
Description	The actual current at phase U (of UVW).
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	IU

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	milliampere (mA)

2073h – Phase U Current Offset

Object Description

Index	2073
Description	The current offset of phase U (of UVW).
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	IUOFFSET

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	milliampere (mA)

2074h – Phase V Actual Current

Object Description

Index	2074
Description	The actual current at phase V (of UVW).
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	IV

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	Current units

2075h – Phase V Current Offset

Object Description

Index	2975
Description	The current offset of phase V (of UVW).
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	IVOFFSET

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	milliampere (mA)

2076h – Zero Procedure Current

Object Description

Index	2076
Description	The current for the Zero procedure.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	IZERO

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	100
Range	0 to 150000
Units	milliampere (mA)

2077h – Position Integral Input Saturation

Object Description

Index	2077
Description	Position Integral Input Saturation
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	KPISATIN

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0.0
Range	0.0 to 10000.0
Units	Not Applicable

2078h – Negative Limit Switch Status

Object Description

Index	2078
Description	The state of the hardware limit switches as configured by the digital inputs, in the negative direction.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	LIMSWITCHNEG

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

2079h – Positive Limit Switch Status

Object Description

Index	2079
Description	The state of the hardware limit switches as configured by the digital inputs, in the positive direction.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	LIMSWITCHPOS

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

207Ah – Load to Motor Inertia Ratio

Object Description

Index	207A
Description	The ratio of the load inertia to the motor inertia.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	LMJR

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0.0
Range	0.0 to 600.0
Units	Not Applicable

207Bh – Drive Peak Current

Object Description

Index	207B
Description	The peak rated current of the drive (sinusoidal peak).
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	DIPEAK

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	25455
Range	1 to 4294967295
Units	milliampere (mA)

207Ch – Drive Continuous Current

Object Description

Index	207C
Description	The continuous rated current for the drive (sinusoidal peak).
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	DICONT

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	8485
Range	1 to 4294967295
Units	milliampere (mA)

207Dh – Motor Pitch

Object Description

Index	207D
Description	The pitch of a linear motor.
Object Code	Variable
Data Type	Unsigned32
Category	Optional
VarCom	MPITCH

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	32
Range	1 to 100000
Units	millimeters (mm)

207Eh – Motor Poles

Object Description

Index	207E
Description	The number of individual poles (not pairs) in the motor.
Object Code	Variable
Data Type	Integer16
Category	Optional
VarCom	MPOLES

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	2
Range	2 to 80
Units	poles

207Fh – Motor Resistance

Object Description

Index	207F
Description	The motor resistance.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	MR

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0.0
Range	0.0 to 10.0
Units	Ohm (Ω)

2080h – Motor Resolver Poles

Object Description

Index	2080
Description	The number of individual poles in the resolver feedback device.
Object Code	Variable
Data Type	Integer16
Category	Optional
VarCom	MRESPOLES

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	2
Range	2 to 80
Units	poles

2081h – Motor Rated Torque

Object Description

Index	2081
Description	Motor rated torque.
Object Code	Variable
Data Type	Unsigned32
Category	Optional

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	2000
Range	1 to 4294967295
Units	millinewton meter (mNm)

2082h – Current KCFF Gain

Object Description

Index	2082
Description	The current controller feed-forward gain.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	KCFF

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0.0 to 100.0
Range	1.0
Units	Not Applicable

2083h – Torque Commutation Angle Advance at Motor Continuous Current

Object Description

Index	2083
Description	The torque-related commutation angle advance at motor continuous current rating.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	MTANGLC

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 45
Units	degrees (°)

2084h – Torque Commutation Angle Advance at Motor Peak Current

Object Description

Index	2084
Description	The torque-related commutation angle advance at motor peak current.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	MTANGLP

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 45
Units	degrees (°)

2085h – Velocity Commutation Angle Advance at Motor Maximum Speed

Object Description

Index	2085
Description	The velocity-related commutation angle advance at motor maximum speed.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	MVANGLF

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 90
Units	degrees (°)

2086h – Velocity Commutation Angle Advance at Motor Maximum Speed/2

Object Description

Index	2086
Description	The velocity-related commutation angle advance at motor maximum speed/2.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	MVANGLH

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 90
Units	degrees (°)

2087h – HD Spring Filter

Object Description

Index	2087
Description	HD spring filter.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	NLAFFLPFHZ

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	7000
Range	10 to 7000
Units	hertz (Hz)

2088h – PFB Backup

Object Description

Index	2088
Description	PFB backup. Reads the PFB values from non-volatile memory that were saved by the PFB backup process.
Object Code	Variable
Data Type	Integer 32
Category	Optional
VarCom	PFBBACKUP

Entry Description

Access	Read only
PDO Mapping	no
Default Value	0
Range	-2147483648 to 2147483647
Units	CAN user position units

2089h – PFB Backup Mode

Object Description

Index	2089
Description	PFB backup mode. Enables and disables the PFB backup process. In the event of an emergency stop, the PFB backup process saves PFB to non-volatile memory, and restores it at the next power up.
Object Code	Variable
Data Type	Unsigned integer 16
Category	Optional
VarCom	PFBBACKUPMODE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

208Ah – HD Maximum Adaptive Gain

Object Description

Index	208A
Description	HD maximum adaptive gain.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	NLMAXGAIN

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	1.0
Range	1.0 to 5.0
Units	Not Applicable

208Bh – HD Current Filter – Second Notch Filter Bandwidth

Object Description

Index	208B
Description	HD current filter – second notch filter bandwidth.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	NLNOTCH2BW

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 500
Units	hertz (Hz)

208Ch – HD Current Filter – Second Notch Filter Center

Object Description

Index	208C
Description	HD current filter – second notch filter center
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	NLNOTCH2CENTER

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	100
Range	100 to 10000
Units	hertz (Hz)

208Dh – Emergency or Controlled Stop Current Limit

Object Description

Index	208D
Description	The current limit during an emergency or controlled stop
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	MOVESMOOTHLPFHZ

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	1.0
Range	0.0010000000475 to 1.0
Units	Not Applicable

208Eh – Position Command

Object Description

Index	208E
Description	Position command.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	PCMD

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	CAN user position units

208Fh – HD Flexibility Compensation

Object Description

Index	208F
Description	HD spring gain.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	NLPEAFF

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 200000.0
Units	hertz (Hz)

2090h – Home Status

Object Description

Index	2090
Description	Homing status.
Object Code	Variable
Data Type	Unsigned8
Category	Optional
VarCom	HOMESTATE

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 255
Units	Not Applicable

2091h – HD Spring Deceleration Ratio

Object Description

Index	2091
Description	HD spring deceleration ratio.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	NLPEDFFRATIO

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	1.0
Range	0 to 1.99899995327
Units	Not Applicable

2095h – Position Feedback Offset

Object Description

Index	2095
Description	Position feedback offset.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	PBFOFFSET

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	Not Applicable

2096h – HD Anti Vibration Filter

Object Description

Index	2096
Description	HD anti-resonance center frequency.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	NLANTIVIBHZ

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	400.000030518
Range	5.0 to 400.0
Units	hertz (Hz)

2097h – HD Anti Vibration Filter 2

Object Description

Index	2097
Description	HD position error filter frequency.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	NLANTIVIBHZ2

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	400.000030518
Range	5.0 to 400.0
Units	hertz (Hz)

2099h – Current Level 1 for Digital Output Definition

Object Description

Index	2099
Description	The first current value for a condition that controls a digital output.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	OUTILVL1

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 150000
Units	milliampere (mA)

209Ah – Current Level 2 for Digital Output Definition

Object Description

Index	209A
Description	The second current value for a condition that controls a digital output.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	OUTILVL2

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 150000
Units	milliampere (mA)

209Bh – Output Inversion

Object Description

Index	209B
Description	The inversion state of each digital output. The index should be written first. Then, writing the value executes the actual output inversion.
Object Code	Array
Data Type	Unsigned16
Category	Optional
VarCom	OUTINV

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	2
Range	2
Units	Not Applicable

Sub-Index	001
Description	Index
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	1
Range	1 to 7
Units	Not Applicable

Sub-Index	002
Description	Value
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

209Ch – Output Mode

Object Description

Index	209C
	Defines the function of each digital output. The index should be written first. Then, writing the value assigns the actual function to the corresponding output index. **Function codes:** 0 = Idle 1 = Active (enabled) 2 = Brake 3 = Fault exists (alarm) 4 = In position 5 = Stopped 6 = Foldback 7 = Current level 8 = Current range 9 = Velocity level 10 = Velocity range 11 = Position level 12 = Position range 13 = Encoder battery low voltage fault 14 = Warning on 15 = Faults or disabled 16 = Encoder battery low voltage warning 17 = Wake No Shake succeeded.
Object Code	Array
Data Type	Unsigned16
Category	Optional
VarCom	OUTMODE

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	2
Range	2
Units	Not Applicable

Sub-Index	001
Description	Output index
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	1
Range	1
Units	Not Applicable

Sub-Index	002
Description	Function code
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0
Units	Not Applicable

209Dh – Position Level 1 for Digital Output Definition

Object Description

Index	209D
Description	The first position value for a condition that controls a digital output.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	OUTPLVL1

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	CAN user position units

209Eh – Position Level 2 for Digital Output Definition

Object Description

Index	209E
Description	The second position value for a condition that controls a digital output.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	OUTPLVL2

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	CAN user position units

209Fh – Velocity Level 1 for Digital Output Definition

Object Description

Index	209F
Description	The first velocity value for a condition that controls a digital output.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	OUTVLVL1

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	CAN user velocity units

20A0h – Velocity Level 2 for Digital Output Definition

Object Description

Index	20A0
Description	The second velocity value for a condition that controls a digital output.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	OUTVLVL2

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	-2147483648to 2147483647
Units	CAN user velocity units

20A1h – Over-Voltage Threshold

Object Description

Index	20A1
Description	The level for detection of a bus over-voltage condition.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	OVTHRESH

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	volt (V)

20A2h – Software Enable Status

Object Description

Index	20A2
Description	Software enable status.
Object Code	Variable
Data Type	Unsigned8
Category	Optional
VarCom	SWEN

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

20A3h – Position Loop Position Error

Object Description

Index	20A3
Description	Position error value used by the position loop.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	PELOOP

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	CAN user position units

20A4h – Phase Find Command

Object Description

Index	20A4
Description	Starts a procedure that initializes commutation for incremental encoder systems. Writing 1 initiates the Phase Find command.
Object Code	Variable
Data Type	Unsigned8
Category	Optional
VarCom	PHASEFIND

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

20A5h – Forced Electrical Position

Object Description

Index	20A5
Description	The position in one revolution.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	PHASEFINDANGLE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	65536/electrical cycle

20A6h – Phase Find Gain

Object Description

Index	20A6
Description	Adjusts the gain of the phase finding mechanism.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	PHASEFINDGAIN

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	1.0
Range	0.0 to 10.0
Units	Not Applicable

20A7h – Phase Find Current

Object Description

Index	20A7
Description	Adjusts the current of the phase finding mechanism. Limited by 6073h (IMAX).
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	PHASEFINDI

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	150000
Units	milliampere (mA)

20A8h – Phase Find Mode

Object Description

Index	20A8
Description	Defines commutation for phase finding. 0 = Injects test signals and analyzes motor behavior to initialize commutation. 2 = Soft start – increases current at a known commutation angle (wake-no-shake). 11 = Manual commutation offset. Commutation offset is defined by the value of 20A5h (PHASEFINDANGLE).
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	PHASEFINDMODE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 11
Units	Not Applicable

20A9h – Phase Find Status

Object Description

Index	20A9
Description	The state of the phase finding procedure for incremental encoders. 0 = Not started 1 = Running 2 = Succeeded 3 = Failed
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	PHASEFINDST

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

20AAh – Phase Find Duration

Object Description

Index	20AA
Description	Limits the duration of phase finding 20A8h (PHASEFINDMODE) in soft start mode (input 2).
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	PHASEFINDTIME

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	100
Range	0 to 10000
Units	milliseconds (ms)

20ABh – Position Loop Controller Mode

Object Description

Index	20AB
Description	Defines the type of position loop controller. 0 = Standard cascaded position controller. 1 = HD position controller.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	POSCONTROLMODE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

20ACh – Software Position Limit Mode

Object Description

Index	20AC
Description	Enables/disables software position limits.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	POSLIMMODE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

20ADh – PRB Generator Frequency

Object Description

Index	20AD
Description	Defines the frequency for PRB excitation. For pseudo binary noise (208Fh sub-index 1 = 0, 1), this object has no effect. For sine and square wave generators (208Fh sub-index 1 = 2 or 208Fh sub-index 1 = 3), this object defines the frequency of the sine and square wave generator, respectively.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	PRBFRQ

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	100.0
Range	0.0 to 5000.0
Units	hertz (Hz)

20AEh – PRB Generator Mode

Object Description

Index	20AE
Description	Defines if and how the PRB signal generator is activated: 0 = PRB generator not activated 1 = PRB generator activated only during recording 2 = PRB generator activated continuously
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	PRBMODE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 2
Units	Not Applicable

20AFh – PRB Generator Configuration

Object Description

Index	20AF
Description	PRB generator configuration. Signal Type: 0 – 8 bit random noise 1 – 10 bit random noise 2 – sine wave 3 – square wave Current Amplitude is limited with the Max Current (6073h). Velocity Amplitude is limited with the Max Profile Velocity (607Fh). Counter Period is relative to current loop update rate.
Object Code	Record
Data Type	PRB_PAR
Category	Optional
VarCom	PRBPARAM

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	5
Range	5
Units	Not Applicable

Sub-Index	001
Description	Signal type
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 3
Units	Not Applicable

Sub-Index	002
Description	Current Amplitude
Object Code	Variable
Data Type	Integer32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	-2147483648to 2147483647
Units	Amp I

Sub-Index	003
Description	Velocity amplitude
Object Code	Variable
Data Type	Integer32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	-2147483648to 2147483647
Units	Amp V

Sub-Index	004
Description	Counter period
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

Sub-Index	005
Description	Configuration
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

20B0h – PTP Generator Target Error

Object Description

Index	20B0
Description	The target error during a motion profile (the distance remaining to the destination in a point-to-point move).
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	PTPTE

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	CAN user position units

20B1h – PTP Generator Velocity Command

Object Description

Index	20B1
Description	The derivative of the position command profile, in velocity units.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	PTPVCMD

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	CAN user velocity units

20B2h – PWM Frequency

Object Description

Index	20B2
Description	The frequency of the PWM signals.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	PWMFRQ

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0.0
Range	-3.40282346639e+038 to 3.40282346639e+038
Units	kilohertz (kHz)

20B3h – Gear Mode

Object Description

Index	20B3
Description	Gear operation mode
Object Code	Variable
Data Type	Unsigned8
Category	Optional
VarCom	GEARMODE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 4
Units	Not Applicable

20B5h – Position Error in Position Flag

Object Description

Index	20B5
Description	Position error in position flag
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	INPOS

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

20B6h – Machine Hardware Position External (DSP)

Object Description

Index	20B6
Description	Returns the raw value of HWPEXTMACHN, which is the gearing input reading from the machine interface connector.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	HWPEXTMACHN

Entry Description

Access	Read Only
PDO Mapping	Yes
Default Value	0
Range	-2147483648 to 2147483647
Units	Not Applicable

20B8h – Fault Relay Status

Object Description

Index	20B8
Description	The state of the fault relay. 0 = Relay open 1 = Relay closed
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	RELAY

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

20B9h – Fault Relay Mode

Object Description

Index	20B9
Description	Defines how the fault relay operates. 0 = Relay opens upon fault. 1 = Relay opens upon disable.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	RELAYMODE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

20BAh – Remote Hardware Enable Status

Object Description

Index	20BA
Description	Indicates the state of the external hardware enable input. 0 = Remote enable input off. 1 = Remote enable input on.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	REMOTE

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

20BBh – Resolver Amplitude Range

Object Description

Index	20BB
Description	The acceptable range of deviation of resolver sine/cosine signals (as a percentage).
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	RESAMPLRANGE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	35
Range	0 to 100
Units	percentage (%)

20BCh – Resolver Conversion Bandwidth

Object Description

Index	20BC
Description	Resolver conversion bandwidth.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	RESBW

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	300
Range	200 to 800
Units	hertz (Hz)

20BDh – Save/Load Status

Object Description

Index	20BD
Description	Save/load status
Object Code	Variable
Data Type	Unsigned8
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 255
Units	Not Applicable

20BEh – Sine/Cosine Calibration Command

Object Description

Index	20BE
Description	Activates a procedure that calibrates the resolver sine/cosine signals.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	SININIT

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

20BFh – Sine/Cosine Calibration Mode

Object Description

Index	20BF
Description	Enables/disables automatic calibration of sine/cosine signals.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	SININITMODE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

20C0h – Sine/Cosine Calibration Status

Object Description

Index	20C0
Description	The state of resolver calibration procedure.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	SININITST

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

20C1h – Sine/Cosine Calibration Parameters

Object Description

Index	20C1
Description	Returns the parameters for calibration of the resolver sine and cosine signals.
Note	Valid only for CANopen.
Object Code	Variable
Data Type	Visible_String
Category	Optional
VarCom	SINPARAM

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	Not Applicable
Units	Not Applicable

20C2h – Synchronization Mode

Object Description

Index	20C2
Description	Defines the method used to synchronize the drive clock to an external sync signal: 0 = Disabled; no sync 1 = Sync drive clock to controller based on fast digital input 5 2 = Sync drive clock to controller based on fast digital input 6 3 = Sync drive clock based on pulse differential input (Pulse & Direction)
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	SYNCSOURCE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 5
Units	Not Applicable

20C3h – Tracking Factor

Object Description

Index	20C3
Description	The derivative factor for tracking with PDFF velocity controller.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	TF

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	100
Range	0 to 200
Units	percentage (%)

20C4h – Motor Over-Temperature

Object Description

Index	20C4
Description	The state of the motor thermostat input that indicates an over-temperature condition: 0 = Thermostat input closed (normal) or ignored, when 20C6h (THERMODE) = 3 1 = Thermostat input open, indicating overheating
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	THERM

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

20C5h – Motor Over-Temperature Clear Fault Level

Object Description

Index	20C5
Description	The level at which a motor over-temperature fault is cleared.
Object Code	Variable
Data Type	Unsigned32
Category	Optional
VarCom	THERMCLEARLEVEL

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	100
Range	0 to 1000000
Units	Ohm (Ω)

20C6h – Motor Over-Temperature Mode

Object Description

Index	20C6
Description	Defines how the drive will respond to an over-temperature fault: 0 = Disable drive immediately. 3 = Ignore thermostat input. 4 = Issue warning only. 5 = Issue warning; if condition persists after 20C8h (THERMTIME), issue fault.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	THERMODE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 5
Units	Not Applicable

20C7h – Motor Temperature

Object Description

Index	20C7
Description	The motor temperature.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	THERMREADOUT

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	Ohm (Ω)

20C8h – Motor Over-Temperature Time

Object Description

Index	20C8
Description	The number of seconds after detection of motor over-temperature until the drive opens the fault relay.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	THERMTIME

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	30
Range	0 to 300
Units	seconds (s)

20C9h – Motor Over-Temperature Fault Level

Object Description

Index	20C9
Description	The motor over-temperature fault level.
Object Code	Variable
Data Type	Unsigned32
Category	Optional
VarCom	THERMTRIPLEVEL

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	150
Range	0 to 1000000
Units	Ohm (Ω)

20CAh – Motor Over-Temperature Type

Object Description

Index	20CA
Description	The type of motor temperature sensor: 0 = Positive temperature coefficient (PTC) 1 = Negative temperature coefficient (NTC)
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	THERMTYPE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

20CBh – Tamagawa Multi-Turn Reset

Object Description

Index	20CB
Description	Resets the counter of a Tamagawa multi-turn encoder. Writing 01 initiates the command.
Object Code	Variable
Data Type	Unsigned8
Category	Optional
VarCom	TMTURNRESET

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

20CCh – Run Time

Object Description

Index	20CC
Description	The total elapsed run time of the drive since production (cannot be reset).
Note	Valid only for CANopen.
Object Code	Variable
Data Type	Visible_String
Category	Optional
VarCom	TRUN

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	Not Applicable
Units	Not Applicable

20CDh – Under-Voltage Mode

Object Description

Index	20CD
Description	Defines how the drive will respond to an under-voltage fault: 0 = Latches fault immediately. 1 = Shows warning only (when disabled, does not display warning). 2 = Shows warning, then waits 20D0h (UVTIME) before the fault is latched (when disabled, does not display warning). 3 = Fault only if under-voltage exists and drive is enabled.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	UVMODE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 3
Units	Not Applicable

20CEh – Under-Voltage Recovery Mode

Object Description

Index	20CE
Description	Defines how the drive will recover from an under-voltage fault: 0 = Recovers by toggling drive from disable to enable condition after the under-voltage condition clears. 1 = Automatically recovers when the under-voltage condition clears.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	UVRECOVER

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

20CFh – Under-Voltage Threshold

Object Description

Index	20CF
Description	The level for detection of an under-voltage condition.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	UVTHRESH

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 1000
Units	volt (V)

20D0h – Under-Voltage Time

Object Description

Index	20D0
Description	The length of time an under-voltage warning is displayed before it is latched in 20CDh (UVMODE) = 2.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	UVTIME

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	30
Range	0 to 300
Units	seconds (s)

20D1h – Bus Voltage (DC)

Object Description

Index	20D1
Description	Drive bus voltage used for current controller design.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	VBUS

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	320
Range	10 to 850
Units	volt (V)

20D3h – Velocity Error

Object Description

Index	20D3
Description	The velocity error of velocity loop.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	VE

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	CAN user velocity units

20D4h – Velocity Loop Controller

Object Description

Index	20D4
Description	Defines the type of velocity loop controller: 0 = PI controller: uses 2026h (KVP), 2027h (KVI) 1 = PDFF controller: uses 2025h (KVP), 2026h (KVI), 2027h (KVFR) 2 = Standard pole placement controller: uses 2037h (MJ), 2039h (MKT), 2010h (BW), 207Ah (LMJR), 20C3h (TF) 3 = Extended polynomial controller: uses 20DBh (VR), 20DAh (VH), 20D8h (VF), and VarCom VD. – *Still in development.* 4 = High frequency pole placement controller: (uses 2037h (MJ), 2039h (MKT), 2010h (BW), 207Ah (LMJR), 20C3h (TF) 5 = HD velocity control with integrator: 2018h (KNLI), 2019h (KNLIV) 6 = HD velocity control without integrator
Object Code	Variable
Data Type	Unsigned8
Category	Optional
VarCom	VELCONTROLMODE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 6
Units	Not Applicable

20D5h – Velocity Design Structure

Object Description

Index	20D5
Description	Velocity design structure. Returns a conversion of the internal velocity controller as set by one of the standard velocity control modes to a general extended polynomial controller structure. Applicable only to standard cascaded position controller: Position Loop Controller Mode (20ABh) = 0.
Note	Valid only for CANopen.
Object Code	Variable
Data Type	Visible_String
Category	Optional
VarCom	VELDESIGN

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	Not Applicable
Units	Not Applicable

20D6h – Velocity Filter Mode

Object Description

Index	20D6
Description	Defines the type of filter for extracting a velocity signal from the position feedback: 0 = No filter 1 = First order filter 2 = Observer type I 3 = Observer type II
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	VELFILTMODE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	1
Range	0, 1, 2, 3
Units	Not Applicable

20D7h – Drive Version

Object Description

Index	20D7
Description	The drive's firmware version.
Note	Valid only for CANopen.
Object Code	Variable
Data Type	Visible_String
Category	Optional
VarCom	VER

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	Not Applicable
Units	Not Applicable

20D8h – Velocity Loop Output Filter

Object Description

Index	20D8
Description	User defined velocity loop output filter.
Object Code	Array
Data Type	Unsigned16
Category	Optional
VarCom	VF

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	8
Range	0 to 65535
Units	Not Applicable

Sub-Index	001
Description	Velocity loop output filter parameter 1
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

Sub-Index	002
Description	Velocity loop output filter parameter 2
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

Sub-Index	003
Description	Velocity loop output filter parameter 3
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

Sub-Index	004
Description	Velocity loop output filter parameter 4
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

Sub-Index	005
Description	Velocity loop output filter parameter 5
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

Sub-Index	006
Description	Velocity loop output filter parameter 6
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

Sub-Index	007
Description	Velocity loop output filter parameter 7
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

Sub-Index	008
Description	Configuration
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

20D9h – Velocity Loop Input Filter

Object Description

Index	20D9
Description	User defined velocity loop input filter.
Object Code	Array
Data Type	Unsigned16
Category	Optional
VarCom	VFI

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	8
Range	0 to 65535
Units	Not Applicable

Sub-Index	001
Description	User defined velocity loop input filter parameter 1
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

Sub-Index	002
Description	User defined velocity loop input filter parameter 2
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

Sub-Index	003
Description	User defined velocity loop input filter parameter 3
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

Sub-Index	004
Description	User defined velocity loop input filter parameter 4
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

Sub-Index	005
Description	User defined velocity loop input filter parameter 5
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

Sub-Index	006
Description	User defined velocity loop input filter parameter 6
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

Sub-Index	007
Description	User defined velocity loop input filter parameter 7
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

Sub-Index	008
Description	Configuration
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

20DAh – Advanced Pole Placement H Polynomial

Object Description

Index	20DA
Description	Advanced Pole Placement H Polynomial
Object Code	Array
Data Type	Unsigned16
Category	Optional
VarCom	VH

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	13
Range	0 to 65535
Units	Not Applicable

Sub-Index	001
Description	Advanced pole placement H polynomial parameter 1
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

Sub-Index	002
Description	Advanced pole placement H polynomial parameter 2
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

Sub-Index	003
Description	Advanced pole placement H polynomial parameter 3
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

Sub-Index	004
Description	Advanced pole placement H polynomial parameter 4
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

Sub-Index	005
Description	Advanced pole placement H polynomial parameter 5
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

Sub-Index	006
Description	Advanced pole placement H polynomial parameter 6
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

Sub-Index	007
Description	Advanced pole placement H polynomial parameter 7
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

Sub-Index	008
Description	Advanced pole placement H polynomial parameter 8
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

Sub-Index	009
Description	Advanced pole placement H polynomial parameter 9
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

Sub-Index	010
Description	Advanced pole placement H polynomial parameter 10
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

Sub-Index	011
Description	Advanced pole placement H polynomial parameter 11
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

Sub-Index	012
Description	Advanced pole placement H polynomial parameter 12
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

Sub-Index	013
Description	Configuration
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

20DBh – Advanced Pole Placement R Polynomial

Object Description

Index	20DB
Description	Advanced Pole Placement R Polynomial
Object Code	Array
Data Type	Unsigned16
Category	Optional
VarCom	VR

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	11
Range	0 to 65535
Units	Not Applicable

Sub-Index	001
Description	Advanced pole placement R polynomial parameter 1
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

Sub-Index	002
Description	Advanced pole placement R polynomial parameter 2
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

Sub-Index	003
Description	Advanced pole placement R polynomial parameter 3
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

Sub-Index	004
Description	Advanced pole placement R polynomial parameter 4
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

Sub-Index	005
Description	Advanced pole placement R polynomial parameter 5
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

Sub-Index	006
Description	Advanced pole placement R polynomial parameter 6
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

Sub-Index	007
Description	Advanced pole placement R polynomial parameter 7
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

Sub-Index	008
Description	Advanced pole placement R polynomial parameter 8
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

Sub-Index	009
Description	Advanced pole placement R polynomial parameter 9
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

Sub-Index	010
Description	Advanced pole placement R polynomial parameter 10
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

Sub-Index	011
Description	Configuration
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

20DCh – Wake No Shake Status

Object Description

Index	20DC
Description	Wake No Shake Status.
Note	Valid only for CANopen.
Object Code	Variable
Data Type	Visible_String
Category	Optional
VarCom	WNSERR

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	Not Applicable
Units	Not Applicable

20DDh – Display Warnings

Object Description

Index	20DD
Description	Lists all warnings, in strings, that have occurred since buffer was cleared.
Note	Valid only for CANopen.
Object Code	Variable
Data Type	Visible_String
Category	Optional
VarCom	WRN

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	Not Applicable
Units	Not Applicable

20DEh – External Encoder Resolution

Object Description

Index	20DE
Description	The resolution of the external encoder.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	XENCRES

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	Not Applicable

20DFh – Zeroing Command

Object Description

Index	20DF
Description	Enables/disables the resolver/encoder Zeroing mode.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	ZERO

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	65535

20E0h – Input Mode

Object Description

Index	20E0
Description	Defines the function of each digital input. The index should be written first. Then, writing the value assigns the actual function to the corresponding input index. Refer to VarCom INMODE for the complete list of modes.
Object Code	Array
Data Type	Unsigned16
Category	Optional
VarCom	INMODE

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	2
Range	2
Units	Not Applicable

Sub-Index	001
Description	Input Index
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	1
Range	1 to 11
Units	Not Applicable

Sub-Index	002
Description	Function Code
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	1
Range	0 to 19
Units	Not Applicable

20E1h – Rotary Address Switch

Object Description

Index	20E1
Description	The rotary switch position that defines the drive communication address
Object Code	Variable
Data Type	Visible_String
Category	Optional
VarCom	ADDR

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	Not Applicable
Units	Not Applicable

20E2h – Test 7-Segment Display

Object Description

Index	20E2
Description	Tests the 7-segment display on drive front panel
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	DISPLAYTEST

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

20E3h – Encoder Simulation Mode

Object Description

Index	20E3
Description	Defines whether encoder simulation is active.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	ENCOUTMODE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

20E4h – Encoder Simulation Resolution

Object Description

Index	20E4
Description	The resolution of the encoder simulation output (in number of lines).
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	ENCOUTRES

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	2048
Range	±10,000,000, but not 0
Units	number of lines

20E5h – Encoder Simulation Index Position

Object Description

Index	20E5
Description	The index offset value of the encoder simulation output.
Object Code	Variable
Data Type	Unsigned32
Category	Optional
VarCom	ENCOUTZPOS

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 40000000
Units	counts

20E6h – Record Done Indicator

Object Description

Index	20E6
Description	Indicates whether the recording is complete and data is available.
Object Code	Variable
Data Type	Unsigned8
Category	Optional
VarCom	RECDONE

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

20E7h – Get Recorded Data

Object Description

Index	20E7
Description	Get recorded data
Note	Valid only for CANopen.
Object Code	Record
Data Type	Not Applicable
Category	Optional
VarCom	GET

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	6
Range	0 to 255
Units	Not Applicable

Sub-Index	001
Description	PacketSelect
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 255
Units	Not Applicable

Sub-Index	002
Description	Domain
Object Code	Variable
Data Type	Domain
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	0
Range	Not Applicable
Units	Not Applicable

Sub-Index	003
Description	Data length
Object Code	Variable
Data Type	Integer16
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 32768
Units	Not Applicable

Sub-Index	004
Description	Data status
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

Sub-Index	005
Description	RT Data Ack
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

Sub-Index	006
Description	Number of channels
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

20E8h – Trigger Recording

Object Description

Index	20E8
Description	Trigger recording
Note	Valid only for CANopen.
Object Code	Record
Data Type	Not Applicable
Category	Optional
VarCom	RECTRIG

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	5
Range	0 to 255
Units	Not Applicable

Sub-Index	001
Description	Variable
Object Code	Variable
Data Type	Visible_String
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	Not Applicable
Units	Not Applicable

Sub-Index	002
Description	Domain
Object Code	Variable
Data Type	Domain
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	Not Applicable
Units	Not Applicable

Sub-Index	003
Description	Pre-trig
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

Sub-Index	004
Description	EdgePlr
Object Code	Variable
Data Type	Optional
Category	Unsigned8
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 255
Units	Not Applicable

Sub-Index	005
Description	Activate
Object Code	Variable
Data Type	Optional
Category	Unsigned8
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 255
Units	Not Applicable

20E9h – Stop Recording

Object Description

Index	20E9
Description	Record Off
Object Code	Variable
Data Type	Optional
Category	Unsigned8
VarCom	RECOFF

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	Not Applicable
Units	Not Applicable

20EAh – Record

Object Description

Index	20EA
Description	Record command
Note	Valid only for CANopen.
Object Code	Record
Data Type	Not Applicable
Category	Optional
VarCom	RECORD

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Not Applicable
Data Type	Unsigned8
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	9
Range	0 to 255
Units	Not Applicable

Sub-Index	001
Description	Sample time
Object Code	Not Applicable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

Sub-Index	002
Description	Number of points
Object Code	Not Applicable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	1
Range	1 to 65535
Units	Not Applicable

Sub-Index	003 – 004 – 005 – 006 – 007 – 008
Description	Var1 – Var2 – Var3 – Var4 – Var5 – Var6
Object Code	Not Applicable
Data Type	Visible_String
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	Not Applicable
Units	Not Applicable

Sub-Index	009
Description	Activate
Object Code	Not Applicable
Data Type	Unsigned8
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 255
Units	Not Applicable

20EBh – Recording Status

Object Description

Index	20EB
Description	Recording status
Object Code	Variable
Data Type	Unsigned8
Category	Optional
VarCom	RECING

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 255
Units	Not Applicable

20ECh – Ready to Record

Object Description

Index	20EC
Description	Ready to record
Object Code	Variable
Data Type	Integer16
Category	Optional
VarCom	RECRDY

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	-32768 to 32767
Units	Not Applicable

20EEh – Drive and Motor Maximum Velocity

Object Description

Index	20EE
Description	Maximum velocity for a drive and motor
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	VMAX

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	Not Applicable

20EFh – Dead Time Compensation Minimal Level

Object Description

Index	20EF
Description	Minimal current level to start compensating for dead time effect.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	KCD

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	1.0
Range	0 to 10
Units	Not Applicable

20F0h – Drive and Motor Maximum Current

Object Description

Index	20F0
Description	Maximum current for a drive and motor combination.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	IMAX

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	150000
Units	milliampere (mA)

20F2h – Analog Input 1

Object Description

Index	20F2
Description	The value of analog input 1.
Object Code	Variable
Data Type	Integer16
Category	Optional
VarCom	ANIN1

Entry Description

Access	Read Only
PDO Mapping	Yes
Default Value	0
Range	-32768 to 32767
Units	volt (V)

20F3h – Analog Input 1 Deadband

Object Description

Index	20F3
Description	The deadband range of analog input 1
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	ANIN1DB

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	-32768 to 32767
Units	volt (V)

20F4h – Analog Input 1 Current Scaling

Object Description

Index	20F4
Description	The scaling value of the analog current command from input 1.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	ANIN1ISCALE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	volt (V)

20F5h – Analog Input 1 Low Pass Filter

Object Description

Index	20F5
Description	The corner frequency of a first order filter that is applied to analog input 1.
Object Code	Variable
Data Type	Integer16
Category	Optional
VarCom	ANIN1LPFHZ

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	-32768 to 32767
Units	hertz (Hz)

20F6h – Analog Input 1 Offset

Object Description

Index	20F6
Description	The offset voltage for analog input 1.
Object Code	Variable
Data Type	Integer16
Category	Optional
VarCom	ANIN1OFFSET

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	-32768 to 32767
Units	volt (V)

20F7h – Analog Input 1 Velocity Scaling

Object Description

Index	20F7
Description	The scaling value of the analog velocity command from input 1
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	ANIN1VSCALE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	volt (V)

20F8h – Analog Input 1 Zeroing

Object Description

Index	20F8
Description	Zeroes the value of analog input 1 by modifying the analog offset value.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	ANIN1ZERO

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

20F9h – Analog Input 2

Object Description

Index	20F9
Description	The value of analog input 2
Object Code	Variable
Data Type	Integer16
Category	Optional
VarCom	ANIN2

Entry Description

Access	Read Only
PDO Mapping	Yes
Default Value	0
Range	-32768 to 32767
Units	volt (V)

20FAh – Analog Input 2 Deadband

Object Description

Index	20FA
Description	The deadband range of analog input 2
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	ANIN2DB

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	-32768 to 32767
Units	volt (V)

20FBh – Analog Input 2 Current Scaling

Object Description

Index	20FB
Description	The scaling value of the analog current command from input 2.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	ANIN2ISCALE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	volt (V)

20FCh – Analog Input 2 Low Pass Filter

Object Description

Index	20F
Description	The corner frequency of a first order filter that is applied to analog input 1.
Object Code	Variable
Data Type	Integer16
Category	Optional
VarCom	ANIN2LPFHZ

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	-32768 to 32767
Units	hertz (Hz)

20FDh – Analog Input 2 Offset

Object Description

Index	20FD
Description	The offset voltage for analog input 2.
Object Code	Variable
Data Type	Integer16
Category	Optional
VarCom	ANIN2OFFSET

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	-32768 to 32767
Units	volt (V)

20FFh – Analog Input 2 Zeroing

Object Description

Index	20FF
Description	Zeroes the value of analog input 1 by modifying the analog offset value.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	ANIN2ZERO

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

2100h – Analog Input 2 Mode

Object Description

Index	2100
Description	Analog input 2 mode
Object Code	Variable
Data Type	Integer16
Category	Optional
VarCom	ANIN2MODE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	-1 to 2
Units	Not Applicable

2103h – Homing Command

Object Description

Index	2013
Description	Start homing
Object Code	Variable
Data Type	Unsigned8
Category	Optional
VarCom	HOMECMD

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 255
Units	Not Applicable

2104h – Current Level for Homing on Hard Stop

Object Description

Index	2104
Description	Current level for homing on hard stop
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	HOMEIHARDSTOP

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	Not Applicable
Units	Not Applicable

2106h – Current Loop Compatibility Mode

Object Description

Index	2106
Description	Current loop compatibility mode
Object Code	Variable
Data Type	Integer16
Category	Optional
VarCom	KCMODE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	Not Applicable
Units	Not Applicable

2108h – Point-to-Point Move Average

Object Description

Index	2108
Description	Point-to-point move averaging number
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	MOVESMOOTHAVG

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	Not Applicable
Units	Not Applicable

2109h – Point-to-Point Move Smoothing Mode

Object Description

Index	2109
Description	Point-to-point move smoothing mode
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	MOVESMOOTHMODE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	Not Applicable
Units	Not Applicable

210Bh – Load to Motor Inertia Ratio for Anti-Vibration Only

Object Description

Index	210B
Description	Load to motor inertia ratio for anti-vibration only
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	NLANTIVIBLMJR

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	Not Applicable
Units	Not Applicable

210Ch – HD Anti-Resonance Filter Divider

Object Description

Index	210C
Description	HD anti-resonance filter divider
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	NLANTIVIBN

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	Not Applicable
Units	Not Applicable

210Dh – HD Current Filter Low Pass Filter Rise Time

Object Description

Index	210D
Description	HD current filter low pass filter rise time
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	NLFILTT1

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	Not Applicable
Units	Not Applicable

2113h – Drive Ready

Object Description

Index	2113
Description	Drive ready
Object Code	Variable
Data Type	Unsigned8
Category	Optional
VarCom	READY

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	Not Applicable
Units	Not Applicable

2114h – Drive Status

Object Description

Index	2114
Description	Drive status message
Note	Valid only for CANopen.
Object Code	Record
Data Type	Not Applicable
Category	Optional
VarCom	ST

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Unsigned8
Data Type	Not Applicable
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	2
Range	0 to 255
Units	Not Applicable

Sub-Index	001
Description	Status select
Object Code	Unsigned8
Data Type	Not Applicable
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 255
Units	Not Applicable

Sub-Index	002
Description	Domain
Object Code	Not Applicable
Data Type	Not Applicable
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	Not Applicable
Units	Not Applicable

2115h – Step Command

Object Description

Index	2115
Description	Step command
Object Code	Record
Data Type	Not Applicable
Category	Optional
VarCom	Not Applicable

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	6
Range	0 to 255
Units	Not Applicable

Sub-Index	001
Description	Duration1
Object Code	Variable
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	-32768 to 32767
Units	Not Applicable

Sub-Index	002
Description	Velocity1
Object Code	Variable
Data Type	Integer32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	Not Applicable

Sub-Index	003
Description	Duration2
Object Code	Variable
Data Type	Integer16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	-32768 to 32767
Units	Not Applicable

Sub-Index	004
Description	Velocity2
Object Code	Variable
Data Type	Integer32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	Not Applicable

Sub-Index	005
Description	Activate
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

Sub-Index	006
Description	Select
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

2116h – Position Motion Ended

Object Description

Index	2116
Description	Position Motion Ended
Object Code	Variable
Data Type	Unsigned8
Category	Optional
VarCom	STOPPED

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	Not Applicable
Units	Not Applicable

2117h – Units Linear Acc/Dec

Object Description

Index	2117
Description	Units Linear Acc/Dec
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	UNITSLINACC

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	Not Applicable
Units	Not Applicable

2118h – Units Linear Position

Object Description

Index	2118
Description	Units Linear Position
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	UNITSLINPOS

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	Not Applicable
Units	Not Applicable

2119h – Units Linear Velocity

Object Description

Index	2119
Description	Units Linear Velocity
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	UNITSLINVEL

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

211Ah – Units Rotary Acc/Dec

Object Description

Index	211A
Description	Units Rotary Acc/Dec
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	UNITSROTACC

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

211Bh – Units Rotary Position

Object Description

Index	211B
Description	Units Rotary Position
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	UNITSROTPOS

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	Not Applicable
Units	Not Applicable

211Ch – Units Rotary Velocity

Object Description

Index	211C
Description	Units Rotary Velocity
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	UNITSROTVEL

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

211Dh – Velocity Filter Pole Frequency

Object Description

Index	211D
Description	Velocity filter pole frequency
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	VELFILTFRQ

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	Not Applicable
Units	Not Applicable

211Eh – Gear

Object Description

Index	211E
Description	Engages and disengages gearing
Object Code	Variable
Data Type	Unsigned8
Category	Optional
VarCom	GEAR

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	Not Applicable
Units	Not Applicable

2120h – Gear Acceleration Threshold

Object Description

Index	2120
Description	Maximum acceleration for gearing
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	GEARACCTHRESH

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	Not Applicable
Units	Not Applicable

2121h – Gear Filter Acceleration Feedforward

Object Description

Index	2121
Description	Gear filter acceleration feedforward
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	GEARFILTAFF

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	Not Applicable
Units	Not Applicable

2122h – Gear Filter Mode

Object Description

Index	2122
Description	Defines whether gear filter is activated
Object Code	Variable
Data Type	Unsigned8
Category	Optional
VarCom	GEARFILTMODE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	Not Applicable
Units	Not Applicable

2123h – Gear Filter Depth

Object Description

Index	2123
Description	Gear filter depth (in 0.25 ms quanta)
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	GEARFILTT1

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	Not Applicable
Units	Not Applicable

2124h – Gear Filter Velocity and Acceleration Depth

Object Description

Index	2124
Description	Gear filter velocity and acceleration filter depth (in 0.25 ms quanta)
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	GEARFILTT2

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	Not Applicable
Units	Not Applicable

2125h – Gear Filter Velocity Feedforward

Object Description

Index	2125
Description	Gear filter velocity feedforward
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	GEARFILTVELFF

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	Not Applicable
Units	Not Applicable

2126h – Gear Ratio Multiplier

Object Description

Index	2126
Description	Gear command multiplier value
Object Code	Variable
Data Type	Integer16
Category	Optional
VarCom	GEARIN

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	1
Range	-32769 to 32767
Units	Not Applicable

2127h – Gearing Input Interpolation Mode

Object Description

Index	2127
Description	Defines the type of limits for gear following
Object Code	Variable
Data Type	Unsigned8
Category	Optional
VarCom	GEARINMODE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	Not Applicable
Units	Not Applicable

2128h – Gear Following Limits Mode

Object Description

Index	2128
Description	Defines the type of limits for gear following
Object Code	Variable
Data Type	Unsigned8
Category	Optional
VarCom	GEARLIMITSMODE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	Not Applicable
Units	Not Applicable

2129h – Gear Ratio Divider

Object Description

Index	2129
Description	Gear command divider value
Object Code	Variable
Data Type	Integer16
Category	Optional
VarCom	GEAROUT

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	1
Range	1 to 32767
Units	Not Applicable

212Ah – Drive Info

Object Description

Index	212A
Description	Returns information about the drive
Note	Valid only for CANopen.
Object Code	Record
Data Type	Not Applicable
Category	Optional
VarCom	Not Applicable

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	2
Range	0 to 255
Units	Not Applicable

Sub-Index	001
Description	Status Select
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	2
Range	0 to 255
Units	Not Applicable

Sub-Index	002
Description	Domain
Object Code	Not Applicable
Data Type	Not Applicable
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	0
Range	Not Applicable
Units	Not Applicable

212Bh – Torque Window

Object Description

Index	212B
Description	Torque window
Object Code	Variable
Data Type	Unsigned32
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	254
Range	0 to 4294967295
Units	Not Applicable

212Ch – Block Control Word

Object Description

Index	212C
Description	Blocks bit 4 (enable) in the control word (6040h). 0 = bit 4 in control word can be written in operational state only. 1234 = bit 4 in control word can be written in all communication states.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

212Dh – HD Anti-Vibration Sharpness2

Object Description

Index	212D
Description	HD position error filter sharpness
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	NLANTIVIBSHARP2

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0.5
Range	0.00999999977648 to 10.0
Units	Not Applicable

212Eh – HD KIDV Gain

Object Description

Index	2123
Description	HD KIDV gain
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0.0
Range	0.0 to 1.0
Units	Not Applicable

212Fh – HD KPI Gain

Object Description

Index	212F
Description	HD KPI gain
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0.0
Range	0.0 to 2000.0
Units	Hz

2130h – Torque Slope Enable

Index	2130
Description	Activation of the torque slope. Applicable only in Profile Torque mode, and when the drive is disabled.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0, 1
Units	Hz

2131h – Touch Probe Event Counter

Object Description

Index	2131
Description	Probe event counter.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	PROBECOUNTER

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 255
Units	Not Applicable

2133h – Analog Output

Object Description

Index	2133
Description	Indicates the analog output value, in volts, as set by ANOUTMODE. The analog output capability of the drive is ±12V.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	ANOUT

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	-12.0 to 12.0
Units	volts (V)

2134h – Analog Output Command

Object Description

Index	2134
Description	The analog output value set by user. Requires ANOUTMODE 6.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	ANOUTCMD

Entry Description

Access	**SDO**: Read/Write **PDO**: Write
PDO Mapping	Yes
Default Value	0
Range	-2147483648 to 2147483647
Units	mV

2135h – Analog Output Current Scaling

Object Description

Index	2135
Description	Gets/sets the scaling of the analog output voltage that represents the motor current (I) or the current command (ICMD). For example, if ANOUTMODE=4 (current command monitoring): ANOUT [V] = ICMD [A] ÷ ANOUTISCALE [A/V]
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	ANOUTISCALE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 400.0
Units	A/V

2136h – Analog Output Limit

Object Description

Index	2136
Description	Analog Output Limit Gets/sets the maximum voltage of the analog output command for all modes.
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	ANOUTLIM

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	10
Range	1 to 12.0
Units	volts (V)

2137h – Analog Output Mode

Object Description

Index	2137
Description	Gets/sets a value that defines the function of the analog output. Known Limitation: For the first 3 seconds after power-up, DAC will output 12V. 0 = User command. Uses value set by ANOUTCMD. 1 = Tachometer mode. For velocity feedback. 2 = Equivalent current monitoring. 3 = Velocity error monitoring. 4 = Current command monitoring. 5 = Triangle wave at low frequency (~1Hz). For testing. 6 = Current in-phase component (IQ) monitoring. 7 = Position error monitoring. 8 = Position feedback monitoring. 9 = Reserved (output 0). 10 = Reserved (output 0).
Object Code	Variable
Data Type	Unsigned8
Category	Optional
VarCom	ANOUTMODE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 10
Units	Not Applicable

2138h – Analog Output Velocity Scaling

Object Description

Index	2138
Description	Gets/sets the scaling of the analog output voltage that represents the actual velocity (V) or the velocity error (VE).
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	ANOUTVSCALE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0.0
Range	-239999.9375 to 239999.9375
Units	Not Applicable

2139h – Secondary Feedback Mode

Object Description

Index	2139
Description	Secondary feedback mode
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	SFBMODE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

213Ah – Secondary Feedback Type

Object Description

Index	213A
Description	Secondary feedback type
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	SFBTYPE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	1
Range	1
Units	Not Applicable

213Bh – Secondary Feedback Scaling Numerator

Object Description

Index	213B
Description	Secondary feedback scaling numerator
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	SFB2MOTORNUM

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	2147483647
Range	1 to 2147483649
Units	Not Applicable

213Ch – Secondary Feedback Scaling Denominator

Object Description

Index	213C
Description	Secondary feedback scaling denominator
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	SFB2MOTORDEN

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	1
Range	1 to 2147483647
Units	Not Applicable

213Dh – Secondary Feedback Unit Numerator

Object Description

Index	213D
Description	Secondary feedback unit numerator
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	SFBUNITSNUM

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	1
Range	-2147483649 to 2147483647
Units	Not Applicable

213Eh – Secondary Feedback Unit Denominator

Object Description

Index	213E
Description	Secondary feedback unit denominator
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	SFBUNITSDEN

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	1
Range	1 to 2147483647
Units	Not Applicable

213Fh – Secondary Feedback Offset

Object Description

Index	213F
Description	Secondary feedback offset
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	1
Range	2147483649 to 2147483647
Units	Not Applicable

2140h – Secondary Feedback Position Actual Value

Object Description

Index	2140
Description	The actual position, according to the secondary feedback device.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	1
Range	-2147483648 to 2147483647
Units	Not Applicable

2141h – Secondary Feedback Velocity Actual Value

Object Description

Index	2141
Description	The actual velocity, according to the secondary feedback device.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	SFBVEL

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	Not Applicable

2142h – Primary Position Actual Value

Object Description

Index	2142
Description	The actual position, according to the primary feedback device.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read Only
PDO Mapping	Yes
Default Value	0
Range	-2147483648 to 2147483647
Units	Not Applicable

2143h – Primary Velocity Actual Value

Object Description

Index	2143
Description	The actual velocity, according to the primary feedback device.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read Only
PDO Mapping	Yes
Default Value	0
Range	-2147483648 to 2147483647
Units	Not Applicable

2144h – Secondary Feedback Position Error Max

Object Description

Index	2144
Description	Secondary feedback maximum position error.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read/Write
PDO Mapping	Yes
Default Value	0
Range	-2147483648 to 2147483647
Units	Not Applicable

2145h – Secondary Feedback Position Error Threshold

Object Description

Index	2145
Description	Secondary feedback position error threshold.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read/Write
PDO Mapping	Yes
Default Value	0
Range	-2147483648 to 2147483647
Units	Not Applicable

2146h – Secondary Feedback Position Error Time

Object Description

Index	2146
Description	Secondary feedback position error time.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	SFBPETIME

Entry Description

Access	Read/Write
PDO Mapping	Yes
Default Value	0
Range	0 to 20000
Units	Not Applicable

2147h – Probe Data Rise

Object Description

Index	2147
Description	This object provides interpolated values of three variables of touch probe 1 at the positive edge.
Object Code	Record
Data Type	Array
Category	Optional
VarCom	PROBEDATARISE

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Integer32
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	3
Range	0 to 255
Units	Not Applicable

Sub-Index	001
Description	Position error interpolation
Object Code	Variable
Data Type	Integer32
Category	Optional
Access	Read Only
PDO Mapping	Yes
Default Value	0
Range	-2147483648 to 2147483647
Units	Not Applicable

Sub-Index	002
Description	Velocity interpolation
Object Code	Variable
Data Type	Integer32
Category	Optional
Access	Read Only
PDO Mapping	Yes
Default Value	0
Range	-2147483648 to 2147483647
Units	Not Applicable

Sub-Index	003
Description	Torque interpolation
Object Code	Variable
Data Type	Integer16
Category	Optional
Access	Read Only
PDO Mapping	Yes
Default Value	0
Range	-32768 to 32767
Units	Not Applicable

2148h – Probe Data Fall

Object Description

Index	2148
Description	This object provides interpolated values of three variables of touch probe 1 at the negative edge.
Object Code	Record
Data Type	Array
Category	Optional
VarCom	PROBEDATAFALL

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Integer32
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	3
Range	0 to 255
Units	Not Applicable

Sub-Index	001
Description	Position error interpolation
Object Code	Variable
Data Type	Integer32
Category	Optional
Access	Read Only
PDO Mapping	Yes
Default Value	0
Range	-2147483648 to 2147483647
Units	Not Applicable

Sub-Index	002
Description	Velocity interpolation
Object Code	Variable
Data Type	Integer32
Category	Optional
Access	Read Only
PDO Mapping	Yes
Default Value	0
Range	-2147483648 to 2147483647
Units	Not Applicable

Sub-Index	003
Description	Torque interpolation
Object Code	Variable
Data Type	Integer16
Category	Optional
Access	Read Only
PDO Mapping	Yes
Default Value	0
Range	-32768 to 32767
Units	Not Applicable

2149h – Probe Variable Select

Object Description

Index	2149
Description	This object configures the variables to be probed (bit-wise). All combinations are supported. Default variable is position. bit 0 – position bit 1 – position error bit 2 – velocity bit 3 – current
Object Code	Variable
Data Type	Integer16
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	-32768 to 32767
Units	Not Applicable

214Ah – Software Position Limit Hysteresis Value

Object Description

Index	214A
Description	Software position limit hysteresis value.
Object Code	Variable
Data Type	Unsigned32
Category	Optional
VarCom	POSLIMHYST

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	Not Applicable

214Bh – Probe Level Period

Object Description

Index	214B
Description	Probe #1 level period for stabilization
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	PROBELEVELPRD

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	5
Range	1 to 32
Units	Not Applicable

214Ch – SensAR Info

Object Description

Index	214C
Description	Returns information about the SensAR encoder.
Note	Valid only for CANopen.
Object Code	Record
Data Type	Array
Category	Optional
VarCom	SRVSNSINFO

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	2
Range	0 to 255
Units	Not Applicable

Sub-Index	001
Description	Status
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 255
Units	Not Applicable

Sub-Index	002
Description	Domain
Object Code	Variable
Data Type	Domain
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	0
Range	Not Applicable
Units	Not Applicable

214Eh – Modulo Mode

Object Description

Index	214E
Description	0 – Normal operation 1 – Modulo operation
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	MODMODE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

214Fh – Modulo Limits

Object Description

Index	214E
Description	Specifies the lower and higher limits of the modulo.
Object Code	Array
Data Type	Integer32
Category	Optional
VarCom	

Entry Description

Sub-Index	000
Description	Number of entries
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	2
Range	2
Units	Not Applicable

Sub-Index	001
Description	Lower limit
Data Type	Integer32
Category	Optional
Access	Read/Write
PDO Mapping	Yes
Default Value	0
Range	-2147483648 to 2147483647
Units	Not Applicable

Sub-Index	002
Description	Upper limit
Data Type	Integer32
Category	Optional
Access	Read/Write
PDO Mapping	Yes
Default Value	0
Range	-2147483648 to 2147483647
Units	Not Applicable

2150h – Counts Per Revolution

Object Description

Index	2150
Description	Counts Per Revolution
Object Code	Variable
Data Type	Unsigned32
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	2048
Range	1 to 4294967295
Units	Not Applicable

2151h – Start SFB Voltage Correction Calibration

Object Description

Index	2151
Description	Start secondary feedback voltage correction calibration
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	SFBVCMOVE

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

2152h – SFB Voltage Correct Number of Sectors

Object Description

Index	2152
Description	Number of sectors for the voltage correction feature of analog input 1
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	SFBVCSECT

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 10
Units	Not Applicable

2153h – SFB Slow Movement Lower Voltage

Object Description

Index	2153
Description	Defines the lower voltage level at which the calibration changes the speed in order to speed up the process.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	SFBVCVLOW

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	-32768 to 32767
Units	V

2154h – SFB Slow Movement Upper Voltage

Object Description

Index	2154
Description	Defines the upper voltage level at which the calibration changes the speed in order to speed up the process.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	SFBVCVUP

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	-32768 to 32767
Units	V

2155h – Voltage Correction Number of Sectors for Analog Input 2

Object Description

Index	2155
Description	Number of sectors into which the voltage range is divided for calibrating the analog voltage correction in analog input 2.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	SFBVCSECT2

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 10
Units	Not Applicable

2156h – Voltage Correction Result for Analog Input 2

Object Description

Index	2156
Description	Voltage correction result in analog input 2.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	-32768 to 32767
Units	Not Applicable

2157h – SFB Manual Calibration Process Activation

Object Description

Index	2157
Description	Activates manual calibration of the voltage correction.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	SFBVCMANUAL

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

2158h – Digital Outputs After Fault

Object Description

Index	2158
Description	Digital output forced state after fault.
Object Code	Variable
Data Type	Unsigned32
Category	Optional
VarCom	OUTFLTLVL

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	Not Applicable

2159h – Heartbeat Tolerance

Object Description

Index	2159
Description	The tolerance allowed for a heartbeat, defined as a percentage. Also applied to Busoff and Node Guarding faults. Example: Assuming that a heartbeat is 200 ms (as set by object 1016): ■ A value of 0 in object 2159h will show an effective value of 200 ms ■ A value of 50 in object 2159h will show effective value of 300 ms ■ A value of 1000 in object 2159h will show effective value of 400 ms
Note:	Heartbeats are counted in integers only. Example: Assuming a heartbeat is 1 ms: ■ A value of 0 in object 2159h will show an effective value of 1 ms ■ A value of 50 in object 2159h will show an effective value of 1 ms ■ A value of 100 in object 2159h will produce a change (2 ms)
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 100
Units	% (percentage)

215Ah – Sankyo Multi-Turn Reset

Object Description

Index	215A
Description	Resets the counter of a Sankyo multi-turn encoder. Write 01 to initiate the command.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	SKTURNRESET

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0, 1
Units	Not Applicable

215Bh – Voltage State

Object Description

Index	215B
Description	Voltage state. Automatic calibration process status.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	V

215Ch – Voltage Non-Volatile State

Object Description

Index	215C
Description	Voltage non-volatile state. Automatic calibration process status.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	Not applicable

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	V

215Dh – Voltage Backlash Position

Object Description

Index	215D
Description	A position value for a backlash movement.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	SFBVCBLDIST

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	Position units

215Eh – Voltage Correction Current Limit

Object Description

Index	215E
Description	User-defined maximum current for the motor during the calibration of the voltage correction.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	SFBVCILIM

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	A

215Fh – Voltage Fast Speed

Object Description

Index	215F
Description	Defines the speed between the voltage levels to be used during calibration process.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	SFBVCSPDFAST

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	Velocity Out-of-Loop User Units

2160h – Voltage Slow Speed

Object Description

Index	2160
Description	Defines the speed outside the voltage levels to be used during calibration process.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	SFBVCSPDSLOW

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	Velocity Out-of-Loop User Units

2161h – Secondary Feedback Position Actual Value - User Units

Object Description

Index	2161
Description	Secondary feedback position, in SFB user units (not in CAN units).
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	SFB

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	1.0
Range	-3.40282346639e+038 to 3.40282346639e+038
Units	Not Applicable

2162h – Secondary Feedback Offset - User Units

Object Description

Index	2162
Description	Secondary feedback offset added to SFB. in user units (not CAN units).
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	SFBOFFSET

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	1.0
Range	-3.40282346639e+038 to 3.40282346639e+038
Units	Not Applicable

2163h – Secondary Feedback Position Error Max - User Units

Object Description

Index	2163
Description	Maximum position error without producing a fault for the SFB. In user units (not CAN units).
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	SFBPEMAX

Entry Description

Access	Read/Write
PDO Mapping	Yes
Default Value	0.0
Range	0.0 to 3.40282346639e+038
Units	Not Applicable

2164h – Secondary Feedback Position Error Threshold - User Units

Object Description

Index	2164
Description	Threshold for a position error between load and motor. In user units (not CAN units).
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	SFBPETHRESH

Entry Description

Access	Read/Write
PDO Mapping	Yes
Default Value	0.0
Range	0.0 to 3.40282346639e+038
Units	Not Applicable

2165h – Secondary Feedback Position Command - User Units

Object Description

Index	2165
Description	The value of the position command, displayed in SFB units (not CAN units).
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	SFBCMD

Entry Description

Access	Read Only
PDO Mapping	Yes
Default Value	0.0
Range	-3.40282346639e+038 to 3.40282346639e+038
Units	Not Applicable

2166h – Secondary Feedback Position Error - User Units

Object Description

Index	2166
Description	Secondary feedback position error. In user units (not CAN units).
Object Code	Variable
Data Type	Real32
Category	Optional
VarCom	SFBPFBPE

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0.0
Range	-3.40282346639e+038 to 3.40282346639e+038
Units	Not Applicable

2167h – Secondary Feedback Voltage Dwell Time

Object Description

Index	2167
Description	Dwell time before execution of a voltage measurement during the calibration process. The dwell time ensures the motor has stopped before the voltage is measured.
Object Code	Variable
Data Type	Integer16
Category	Optional
VarCom	SFBVCDWELLTIME

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	100
Range	0 to 20000
Units	ms

2168h – Secondary Feedback Position Error

Object Description

Index	2168
Description	Secondary feedback position error.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read Only
PDO Mapping	Yes
Default Value	0
Range	-2147483648 to 2147483647
Units	CAN position user units

2169h – Voltage Correction Array

Object Description

Index	2169
Description	Voltage correction array
Object Code	Array
Data Type	Integer32
Category	Optional
VarCom	Not Applicable

Entry Description

Sub-Index	000
Description	Number of entries
Entry Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	11
Range	11
Unit	Not Applicable

Sub-Index	001
Description	Voltage correction array A
Entry Category	Optional
Data Type	Integer32
Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Unit	0.1 mV

Sub-Index	002
Description	Voltage correction array B
Entry Category	Optional
Data Type	Integer32
Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Unit	0.1 mV

Sub-Index	003
Description	Voltage correction array C
Entry Category	Optional
Data Type	Integer32
Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Unit	0.1 mV

Sub-Index	004
Description	Voltage correction array D
Entry Category	Optional
Data Type	Integer32
Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Unit	0.1 mV

Sub-Index	005
Description	Voltage correction array E
Entry Category	Optional
Data Type	Integer32
Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Unit	0.1 mV

Sub-Index	006
Description	Voltage correction array F
Entry Category	Optional
Data Type	Integer32
Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Unit	0.1 mV

Sub-Index	007
Description	Voltage correction array G
Entry Category	Optional
Data Type	Integer32
Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Unit	0.1 mV

Sub-Index	008
Description	Voltage correction array H
Entry Category	Optional
Data Type	Integer32
Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Unit	0.1 mV

Sub-Index	009
Description	Voltage correction array I
Entry Category	Optional
Data Type	Integer32
Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Unit	0.1 mV

Sub-Index	010
Description	Voltage correction array J
Entry Category	Optional
Data Type	Integer32
Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Unit	0.1 mV

Sub-Index	011
Description	Voltage correction array K
Entry Category	Optional
Data Type	Integer32
Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Unit	0.1 mV

216Ah – Voltage Correction Array 2

Object Description

Index	216A
Description	Voltage Correct Array 2
Object Code	Array
Data Type	Integer32
Category	Optional

Entry Description

Sub-Index	000
Description	Number of entries
Entry Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	11
Range	-2147483648 to 2147483647
Unit	Not Applicable

Sub-Index	001
Description	Voltage correction array 2 A
Entry Category	Optional
Data Type	Integer32
Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Unit	0.1 mV

Sub-Index	002
Description	Voltage correction array 2 B
Entry Category	Optional
Data Type	Integer32
Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Unit	0.1 mV

Sub-Index	003
Description	Voltage correction array 2 C
Entry Category	Optional
Data Type	Integer32
Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Unit	0.1 mV

Sub-Index	004
Description	Voltage correction array 2 D
Entry Category	Optional
Data Type	Integer32
Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Unit	0.1 mV

Sub-Index	005
Description	Voltage correction array 2 E
Entry Category	Optional
Data Type	Integer32
Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Unit	0.1 mV

Sub-Index	006
Description	Voltage correction array 2 F
Entry Category	Optional
Data Type	Integer32
Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Unit	0.1 mV

Sub-Index	007
Description	Voltage correction array 2 G
Entry Category	Optional
Data Type	Integer32
Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Unit	0.1 mV

Sub-Index	008
Description	Voltage correction array 2 H
Entry Category	Optional
Data Type	Integer32
Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Unit	0.1 mV

Sub-Index	009
Description	Voltage correction array 2 I
Entry Category	Optional
Data Type	Integer32
Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Unit	0.1 mV

Sub-Index	010
Description	Voltage correction array 2 J
Entry Category	Optional
Data Type	Integer32
Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Unit	0.1 mV

Sub-Index	011
Description	Voltage correction array 2 K
Entry Category	Optional
Data Type	Integer32
Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Unit	0.1 mV

216Bh – Probe 2 Level Period for Stabilization

Object Description

Index	216B
Description	Probe 2 level period for stabilization
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	5
Range	1 to 32
Units	Not Applicable

216Ch – CANopen Manufacturer-Specific SDO Abort Code

Object Description

Index	216C
Description	CANopen Manufacturer Specific SDO Abort Code
Note	Valid only for CANopen.
Object Code	Variable
Data Type	Unsigned32
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	Not Applicable

216Dh – Analog Input 2 User Command

Object Description

Index	216D
Description	This command returns the second analog input voltage, converted into a user-unit, which can be user-defined. The conversion for ANIN2USER is defined as follows: $ANIN2USER = ANIN2 \times (\frac{ANIN2USERNUM}{ANIN2USERDEN}) + ANIN2USEROFFSET$
Object Code	Array
Data Type	Unsigned32
Category	Optional
VarCom	Not Applicable

Entry Description

Sub-Index	000
Description	Number of entries
Entry Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	2
Range	2
Unit	-

Sub-Index	001
Description	Analog Input 2 User Command – high bits
Entry Category	Optional
Data Type	Unsigned32
Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Unit	Not Applicable

Sub-Index	002
Description	Analog Input 2 User Command – low bits
Entry Category	Optional
Data Type	Unsigned32
Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Unit	Not Applicable

216Eh – Analog Input 2 User Denominator

Object Description

Index	216E
Description	Defines the denominator value in the following equation: $ANIN2USER = ANIN2 \times (\frac{ANIN2USERNUM}{ANIN2USERDEN}) + ANIN2USEROFFSET$
Object Code	Variable
Data Type	Unsigned32
Category	Optional
VarCom	ANIN2USERDEN

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	1
Range	1 to 2147483647
Units	V

216Fh – Analog Input 2 User Numerator

Object Description

Index	216F
Description	Defines the numerator value in the following equation: $ANIN2USER = ANIN2 \times (\frac{ANIN2USERNUM}{ANIN2USERDEN}) + ANIN2USEROFFSET$ This command defines the number of counts represented in ANIN2USER per ANIN2USERDEN volts.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	ANIN2USERNUM

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	100
Range	-2147483649 to 2147483647
Units	Not Applicable

2170h – Analog Input 2 User Offset

Object Description

Index	2170
Description	Defines the offset value in the following equation: $ANIN2USER = ANIN2 \times (\frac{ANIN2USERNUM}{ANIN2USERDEN}) + ANIN2USEROFFSET$
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	ANIN2USEROFFSET

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	-2147483649 to 2147483647
Units	Not Applicable

2171h – Secondary Feedback Voltage Correction 1

Object Description

Index	2171
Description	Secondary feedback voltage correction array 1
Object Code	Array
Data Type	Integer32
Category	Optional
VarCom	SFBVCINFO

Entry Description

Sub-Index	000
Description	Number of entries
Entry Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	4
Range	-2147483648 to 2147483647
Unit	Not Applicable

Sub-Index	001
Description	Sanity check
Entry Category	Optional
Data Type	Integer32
Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Unit	Not Applicable

Sub-Index	002
Description	Feature
Entry Category	Optional
Data Type	Integer32
Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Unit	Not Applicable

Sub-Index	003
Description	Secondary feedback negative
Entry Category	Optional
Data Type	Integer32
Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Unit	CAN user position units

Sub-Index	004
Description	Secondary feedback positive
Entry Category	Optional
Data Type	Integer32
Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Unit	CAN user position units

2172h – Secondary Feedback Voltage Correction 2

Object Description

Index	2172
Description	Secondary feedback voltage correction array 2
Object Code	Array
Data Type	Integer32
Category	Optional
VarCom	SFBVCINFO2

Entry Description

Sub-Index	000
Description	Number of entries
Entry Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	3
Range	-2147483648 to 2147483647
Unit	Not Applicable

Sub-Index	001
Description	Sanity check
Entry Category	Optional
Data Type	Integer32
Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Unit	Not Applicable

Sub-Index	002
Description	Feature
Entry Category	Optional
Data Type	Integer32
Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Unit	Not Applicable

Sub-Index	003
Description	Non-volatile save
Entry Category	Optional
Data Type	Integer32
Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Unit	Not Applicable

Sub-Index	004
Description	N
Entry Category	Optional
Data Type	Integer32
Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Unit	Not Applicable

2173h – Motor Pitch High Resolution

Object Description

Index	2173
Description	Linear motor pitch, high resolution
Object Code	Variable
Data Type	Unsigned32
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	-2147483649 to 2147483647
Units	Not Applicable

2176h – BiSS-C Fields

Object Description

Index	2176
Description	ASCII command: BISSCFIELDS
Object Code	Array
Data Type	unsigned16
Category	Optional
VarCom	BISSCFIELDS

Entry Description

Sub-Index	000
Description	Number of entries
Entry Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	4
Range	4
Unit	Not Applicable

Sub-Index	001
Description	Field 1
Entry Category	Optional
Data Type	Unsigned16
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 72
Unit	Not Applicable

Sub-Index	002
Description	Field 2
Entry Category	Optional
Data Type	Unsigned16
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 72
Unit	Not Applicable

Sub-Index	003
Description	Field 3
Entry Category	Optional
Data Type	Unsigned16
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 72
Unit	Not Applicable

Sub-Index	004
Description	Field 4
Entry Category	Optional
Data Type	Unsigned16
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 72
Unit	Not Applicable

2179h – Halls Only Communication

Object Description

Index	2179
Description	0 = Default (backward compatible) behavior. 1 = Allows sine commutation when using Halls-only feedback; this is done by relying on extrapolated position instead of six-step commutation derived from Halls states. In this mode sine commutation goes into effect when the velocity causes more than 40 Halls switches per second, and reverts to six-step when the velocity falls below 30 Halls switches-per-second. Reverting to default (six-step) mode also occurs if HALLSONLYCOMM is set to 0.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	HALLSONLYCOMM

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

217Ah – Debug Position Command

Object Description

Index	217A
Description	A debug object for reading the Position command from master (object 607Ah).
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	

Entry Description

Access	Read Only
PDO Mapping	Yes
Default Value	0
Range	-2147483648 to 2147483647
Units	Fieldbus position user units

217Bh – Zero Motor Phase Degree

Object Description

Index	217B
Description	Returns the motor phase degree after a successful zeroing command. -1 = Zeroing did not succeed.
Object Code	Variable
Data Type	Integer16
Category	Optional
VarCom	ZEROST

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	degree

217Ch – Reference Offset Value

Object Description

Index	217C
Description	Reference Offset Value
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	REFOFFSETVAL

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	CANopen position units

217Dh – Hardware Version

Object Description

Index	217D
Description	Hardware version.
Object Code	Array
Data Type	Unsigned16
Category	Optional
VarCom	Not Applicable

Entry Description

Sub-Index	000
Description	Number of entries
Entry Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	2
Range	2
Unit	-

Sub-Index	001
Description	Control board version
Entry Category	Optional
Data Type	Unsigned16
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Unit	Not Applicable

Sub-Index	002
Description	Power board version
Entry Category	Optional
Data Type	Unsigned16
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Unit	Not Applicable

217Eh – Machine Hardware Position External (FPGA)

Object Description

Index	217E
Description	Returns the raw value of HWPEXTCNTRLR, which is the gearing input reading on control interface connector.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	HWPEXTCNTRLR

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	Not Applicable

11 Standard Servo Drive Objects

The following standard device profile objects are implemented in the CDHD servo drives.

For more information, refer to the relevant CAN documentation.

603Fh – Error Code

Object Description

Index	603F
Description	Indicates the error code of the last error that occurred in the drive device.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	FLT

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

6040h – Controlword

Object Description

Index	6040
Description	Sets the operating states and modes of the state machine. This object is organized bit-wise. The bits have the following meaning: **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
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read/Write
PDO Mapping	Yes
Default Value	0
Range	0 to 65535
Units	Not Applicable

6041h – Statusword

Object Description

Index	6041
Description	Indicates the current state of the FSA, the operation mode and manufacturer-specific entities. This object is organized bit-wise. The bits have the following meaning: **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
*** Note**	Bit 10 = Target reached in Profile Position mode. Bit 10 = Reserved in Cyclic Synchronous Position mode, per CiA standard.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read Only
PDO Mapping	Yes
Default Value	0
Range	0 to 65535
Units	Not Applicable

605Bh – Shutdown Option Code

Object Description

Index	605B
Description	This object indicates the action to be performed upon a transition from Operation Enabled state to the Ready To Switch On state. Ramp down is the deceleration value of the operation mode in use. The following value definitions are valid: 0 = Disables the drive, then switches off the drive power stage. 1 = Slows down with ramp down, then disables the drive. -1 =According to ASCII command DISMODE
Object Code	Variable
Data Type	Integer16
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	-1
Range	-1 to 1
Units	Not Applicable

605Ch – Disable Operation Option Code

Object Description

Index	605C
Description	This object indicates the action to be performed upon a transition from Operation Enabled state to the Switched On state. Ramp down is the deceleration value of the operation mode in use. The following value definitions are valid: 0 = Disables the drive, then switches off the drive power stage. 1 = Slows down with ramp down, then disables the drive. -1 =According to ASCII command DISMODE
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	-1
Range	-1 to 1
Units	Not Applicable

605Dh – Halt Option Code

Object Description

Index	605D
Description	Indicates the action to be performed when the halt function is executed. Ramp down is the deceleration value of the operation mode in use. The following value definitions are valid: 1 = Slow down on ramp down and remain in Operation Enabled 2 = Slow down on quick stop ramp and remain in Operation Enabled 3 = Slow down on the current limit and remain in Operation Enabled
Object Code	Variable
Data Type	Integer16
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	1
Range	1 to 3
Units	Not Applicable

605Eh – Fault Reaction Option Code

Object Description

Index	605E
Description	Indicates the action to be performed when a fault (excluding communication faults) causes the drive to switch to Fault Reaction Active (see object 6007h). Ramp down is the deceleration value of the operation mode in use. The following value definitions are valid: 0 = Disable drive, motor is free to rotate 1 = Slow down on ramp down -1 = According to ASCII command DISMODE
Object Code	Variable
Data Type	Integer16
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	-1
Range	-1 to 1
Units	Not Applicable

6060h – Modes of Operation

Object Description

Index	6060
Description	The requested operational mode. The following values are valid: 0 = no mode change / no mode assigned 1 = profile position mode 3 = profile velocity mode 4 = profile torque mode 5 = reserved 6 = homing mode 7 = interpolated position mode 8 = cyclic synchronous position mode 9 = cyclic synchronous velocity mode 10 = cyclic synchronous torque mode -x = manufacturer-specific -2= gear mode -5= calibration mode* The actual operation mode is reflected in the Modes of Operation Display object.
*** Note**	Opmode -5 is essentially identical to the profile position mode but no motion is triggered via the controlword. In this manufacturer-specific opmode, the SDO that handles SFBVCMOVE will start the calibration process when called. In opmode -5 motion is autonomous – meaning the motion is executed internally in the drive (calibration process) and is not affected by an external command from the fieldbus master; hence controlword motion requests are ignored).
Object Code	Variable
Data Type	Integer8
Category	Optional
VarCom	Not Applicable

Entry Description

Access	**SDO**: Read/Write **PDO**: Write
PDO Mapping	Yes
Default Value	0
Range	Values listed in Description, above
Units	Not Applicable

6061h – Modes of Operation Display

Object Description

Index	6061
Description	Indicates the actual operation mode. The following values are valid: 0 = no mode change / no mode assigned 1 = profile Position mode 2 = velocity mode 3 = profile velocity mode 4 = profile torque mode 5 = reserved 6 = homing mode 7 = interpolated position mode 8 = cyclic synchronous position mode 9 = cyclic synchronous velocity mode 10 = cyclic synchronous torque mode -x = manufacturer-specific -1= gear mode
Object Code	Variable
Data Type	Integer8
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read Only
PDO Mapping	Yes
Default Value	0
Range	Values listed in Description, above
Units	Not Applicable

6062h – Position Demand Value

Object Description

Index	6062
Description	Indicates the demanded position value
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	CAN user position units

6063h – Position Actual Internal Value

Object Description

Index	6063
Description	The actual value of the position measurement device.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read Only
PDO Mapping	Yes
Default Value	0
Range	-2147483648 to 2147483647
Units	CAN user position units

6064h – Position Actual Value

Object Description

Index	6064
Description	Indicates the actual value of the position measurement device.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	PFB

Entry Description

Access	Read Only
PDO Mapping	Yes
Default Value	0
Range	-2147483648 to 2147483647
Units	CAN user position units

6065h – Following Error Window

Object Description

Index	6065
Description	Maximum allowed position error without producing a fault. This object defines the range of tolerated position values symmetrical to the target position. If the position actual value is outside the following error window, a following error occurs. A following error may occur when a drive is blocked, an unreachable profile velocity occurs, or if closed-loop coefficients are wrong. If the value of the following error window is 4294967295, the following control is disabled.
Object Code	Variable
Data Type	Unsigned32
Category	Optional
VarCom	PEMAX (Maximum Position Error)

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	1
Range	0 to 4294967295
Units	CAN user position units

6066h – Following Error Time Out

Object Description

Index	6066
Description	The time for a following error condition, after which bit 13 of the status word is set to 1 in the profile position mode and in the cyclic synchronous position mode. The reaction of the drive when a following error occurs is manufacturer-specific.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	millisecond (ms)

6067h – Position Window

Object Description

Index	6067
Description	The symmetrical range of accepted positions relative to the target position. If the actual value of the position encoder is within the position window, this target position is considered to be reached. If the value of the position window is 4294967295, the position window control is switched off.
Object Code	Variable
Data Type	Unsigned32
Category	Optional
VarCom	PEINPOS

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	CAN user position units

6068h – Position Window Time

Object Description

Index	6068
Description	Indicates the time, during which the actual position within the position window is measured.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	PEINPOSTIME

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	10
Range	0 to 65535
Units	millisecond (ms)

606Bh – Velocity Demand Value

Object Description

Index	606B
Description	The output value of the trajectory generator
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	VCMD

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	CAN user velocity units

606Ch – Velocity Actual Value

Object Description

Index	606C
Description	The actual velocity value derived either from the velocity sensor or the position sensor.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	V

Entry Description

Access	Read Only
PDO Mapping	Yes
Default Value	0
Range	-2147483648 to 2147483647
Units	CAN user velocity units

606Dh – Velocity Window

Object Description

Index	606D
Description	The velocity window.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	CAN user velocity units

606Eh – Velocity Window Time

Object Description

Index	606E
Description	The velocity window time.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	milliseconds (ms)

606Fh – Velocity Threshold

Object Description

Index	606F
Description	The velocity threshold.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	CAN user velocity units

6070h – Velocity Threshold Time

Object Description

Index	6070
Description	The velocity threshold time.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	millisecond (ms)

6071h – Target Torque

Object Description

Index	6071
Description	The input value for the torque controller in profile torque mode.
Object Code	Variable
Data Type	Integer16
Category	Optional
VarCom	T (Current Command)

Entry Description

Access	**SDO**: Read/Write **PDO**: Write
PDO Mapping	Yes
Default Value	0
Range	-32768 to 32767
Units	0.001 x MICONT (one-thousandth of rated torque)

6073h – Maximum Current

Object Description

Index	6073
Description	The configured maximum permissible torque creating current in the motor.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	ILIM

Entry Description

Access	**SDO**: Read/Write **PDO**: Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	MICONT/1000
Example	If MICONT = 10A: A value of 100 for 6073h means 1A A value of 500 for 6073h means 5A A value of 1000 for 6073h means 10A A value of 2000 for 6073h means 20A

6074h – Torque Demand Value

Object Description

Index	6074
Description	The output value of torque limit function.
Object Code	Variable
Data Type	Integer16
Category	Optional
VarCom	ICMD

Entry Description

Access	Read Only
PDO Mapping	Yes
Default Value	0
Range	-32768 to 32767
Units	millinewton meter (mNm)

6075h – Motor Rated Current

Object Description

Index	6075
Description	The motor rated current. It is taken from the motor nameplate. Depending on the motor and drive technology this current is DC, peak or rms (root-mean-square) current. All relative current data refers to this value.
Object Code	Variable
Data Type	Unsigned32
Category	Optional
VarCom	MICONT

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	mA

6076h – Motor Rated Torque

Object Description

Index	6076
Description	Indicates the motor rated torque. It is obtained from the motor nameplate. All related torque data must refer to this value. For linear motors, the object name is not changed, but the motor rated force value must be entered as multiples of mN.
Object Code	Variable
Data Type	Unsigned32
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	mNm

6077h – Torque Actual Value

Object Description

Index	6077
Description	This object provides the actual value of the torque. It corresponds to the torque in the motor.
Object Code	Variable
Data Type	Integer16
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read Only
PDO Mapping	Yes
Default Value	0
Range	-32768 to 32767
Units	CAN user current units

6078h – Current Actual Value

Object Description

Index	6078
Description	Indicates the actual value of the current. It corresponds to the current in the motor.
Object Code	Variable
Data Type	Integer16
Category	Optional
VarCom	I (Motor Current)

Entry Description

Access	Read Only
PDO Mapping	Yes
Default Value	0
Range	-32768 to 32767
Units	CAN user current units

6079h – DC Link Circuit Voltage

Object Description

Index	6079
Description	The bus voltage measured by sensors on the power module. Indicates the instantaneous DC link current voltage at the drive device.
Object Code	Variable
Data Type	Unsigned32
Category	Optional
VarCom	VBUSREADOUT (Bus Voltage Measured)

Entry Description

Access	Read Only
PDO Mapping	Yes
Default Value	0
Range	0 to 4294967295
Units	millivolt (mV)

607Ah – Target Position

Object Description

Index	607A
Description	The commanded position the drive will move to in position profile mode or cyclic synchronous position mode. The value of this object can be interpreted as absolute or relative depending on bit 6 of the Controlword.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	Not Applicable

Entry Description

Access	**SDO**: Read/Write **PDO**: Write
PDO Mapping	Yes
Default Value	0
Range	-2147483648 to 2147483647
Units	CAN user position units

607Ch – Home Offset

Object Description

Index	607C
Description	The configured difference between the zero position for the application and the machine home position (found during homing). During homing the machine home position is found and once the homing is completed the zero position is offset from the home position by adding the home offset to the home position. All subsequent absolute moves are taken relative to this new zero position. If this object is not implemented then the home offset is regarded as zero. The value of this object is in CAN position user units. Negative values indicate the opposite direction.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	HOMEOFFSET

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	CAN user position units

607Dh – Software Position Limit

Object Description

Index	607D
Description	The configured maximal and minimal software position limits. These parameters define the absolute position limits for the position demand value and the position actual value. Every new target position is checked against these limits. The limit positions is always relative to the machine home position. Before being compared with the target position they are corrected internally by the home offset as follows: *Corrected min position limit = min position limit – home offset* *Corrected max position limit = max position limit – home offset*
Object Code	Array
Data Type	Integer32
Category	Optional
VarCom	Sub-index 1: POSLIMNEG Sub-index 2: POSLIMPOS

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	2
Range	2
Units	Not Applicable

Sub-Index	001
Description	Minimum software position limit
Object Code	Variable
Data Type	Integer32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	CAN user position units

Sub-Index	002
Description	Maximum software position limit
Object Code	Variable
Data Type	Integer32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	CAN user position units

607Eh – Polarity

Object Description

Index	607E
Description	Determines the sign of the position demand value or the velocity demand value. This object is organized bit-wise. The bits have the following meaning: 7 = position polarity is affected 6 = velocity polarity is affected The bit values have the following meaning: 0 = multiply the demand value by 1 1 = multiply the demand value by -1
Object Code	Variable
Data Type	Unsigned8
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 192
Units	Not Applicable

607Fh – Max Profile Velocity

Object Description

Index	607F
Description	The maximum velocity allowed in either direction during a profiled motion.
Object Code	Variable
Data Type	Unsigned32
Category	Optional
VarCom	VLIM (User Velocity Limit)

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	10
Range	10 to 4294967295
Units	CAN user velocity units

6080h – Max Motor Speed

Object Description

Index	6080
Description	The maximum speed allowed for the motor in either direction. It is used to protect the motor and is taken from the motor data sheet.
Object Code	Variable
Data Type	Unsigned32
Category	Optional
VarCom	MSPEED

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	rpm

6081h – Profile Velocity in Profile Position Mode

Object Description

Index	6081
Description	The configured velocity normally attained at the end of the acceleration ramp during a profiled motion. It is valid for both directions of motion. This object is used in the profile position mode and interpolated position mode.
Object Code	Variable
Data Type	Unsigned32
Category	Optional
VarCom	Not Applicable

Entry Description

Access	**SDO**: Read/Write **PDO**: Write
PDO Mapping	Yes
Default Value	0
Range	0 to 4294967295
Units	CAN user velocity units

6083h – Profile Acceleration

Object Description

Index	6083
Description	The configured acceleration.
Object Code	Variable
Data Type	Unsigned32
Category	Optional
VarCom	ACC

Entry Description

Access	**SDO**: Read/Write **PDO**: Write
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	CAN user acceleration/deceleration units

6084h – Profile Deceleration

Object Description

Index	6084
Description	The configured deceleration value. This object is used in the profile position mode, profile velocity mode, and interpolated position mode.
Object Code	Variable
Data Type	Unsigned32
Category	Optional
VarCom	DEC

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	CAN user acceleration/deceleration units

6085h – Quick Stop Deceleration

Object Description

Index	6085
Description	The deceleration rate for an Active Disable/emergency stop. The configured deceleration used to stop the motor when the quick stop function is activated. This object indicates the deceleration used to stop the motor when the quick stop function is activated and the quick stop option code is set to 2 or 6. The quick stop deceleration is also used if the fault reaction option code is 2 and the halt option code is 2.
Object Code	Variable
Data Type	Unsigned32
Category	Optional
VarCom	DECSTOP

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	CAN user acceleration/deceleration units

6087h – Torque Slope

Object Description

Index	6087
Description	The rate of change of torque.
Object Code	Variable
Data Type	Unsigned32
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	100000
Range	1 to 30000000
Units	mNm/s

608Fh – Position Encoder Resolution

Object Description

Index	608F
Description	The resolution of the motor encoder in number of lines per revolution of the motor. The position encoder resolution is calculated by the following: *position encoder resolution = encoder increments ÷ motor revolutions* The drive must be configured whenever this object is modified.
Object Code	Array
Data Type	Unsigned32
Category	Optional
VarCom	Not Applicable

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	2
Range	2
Units	Not Applicable

Sub-Index	001
Description	Encoder increments
Object Code	Unsigned32
Data Type	Variable
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	2048
Range	1 to 10000000
Units	Lines per Revolutions

Sub-Index	002
Description	Motor revolutions
Object Code	Unsigned32
Data Type	Variable
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	1
Range	1
Units	Not Applicable

6091h – Gear Ratio

Object Description

Index	6091
Description	The configured number of motor shaft revolutions and number of driving shaft revolutions. The gear ratio is calculated by the following: *gear ratio = motor shaft revolutions ÷ driving shaft revolutions*
Object Code	Array
Data Type	Unsigned32
Category	Optional
VarCom	Sub-index 1: FBGMS Sub-index 2: FBGDS

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	2
Range	2
Units	Not Applicable

Sub-Index	001
Description	Motor revolutions
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	1
Range	1 to 4294967295
Units	Not Applicable

Sub-Index	002
Description	Shaft revolutions
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	1
Range	1 to 4294967295
Units	Not Applicable

6092h – Feed Constant

Object Description

Index	6092
Description	The configured feed constant, which is the measurement distance per one revolution of the output shaft of the gearbox. The feed constant is calculated by the following: *feed constant = feed ÷ driving shaft revolutions*
Object Code	Array
Data Type	Unsigned32
Category	Optional
VarCom	Sub-index 1: PNUM Sub-index 2: PDEN

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	2
Range	2
Units	Not Applicable

Sub-Index	001
Description	Feed. The unit conversion numerator and fieldbus CANopen feed constant feed scaling factor.)
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	1
Range	1 to 4294967295
Units	Not Applicable

Sub-Index	002
Description	Shaft revolutions. The unit conversion denominator and fieldbus CANopen feed constant driving shaft scaling factor.
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	1
Range	1 to 4294967295
Units	Not Applicable

6098h – Homing Mode

Object Description

Index	6098
Description	The homing method to be used. The following value definition is valid: 0 = no homing method assigned 1 = homing method 1 to be used . . 36 = homing method 36 to be used -x = manufacturer-specific
Object Code	Variable
Data Type	Integer8
Category	Optional
VarCom	HOMETYPE

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	1
Range	-192 to 36
Units	Not Applicable

6099h – Homing Speeds

Object Description

Index	6099
Description	The commanded speeds used during homing procedure.
Object Code	Array
Data Type	Unsigned32
Category	Optional
VarCom	Sub-index 1: HOMESPEED1 Sub-index 2: HOMESPEED2

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	2
Range	2
Units	Not Applicable

Sub-Index	001
Description	Fast homing speed. Switch search.
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	CAN user velocity units

Sub-Index	002
Description	Slow homing speed. Index search.
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	CAN user velocity units

609Ah – Homing Acceleration

Object Description

Index	609A
Description	The acceleration and deceleration to be used during homing operation.
Object Code	Variable
Data Type	Unsigned32
Category	Optional
VarCom	HOMEACC

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 4294967295
Units	CAN user acceleration/deceleration units

60B0h – Position Offset

Object Description

Index	60B0
Description	The offset of the target position. The value itself is absolute and thus independent of how often it is transmitted over the communication system; for example, transmitting twice does not double the value. Since the additive position value represents an offset to the target position, it can be also used to control the drive with relative values in regard to the target position. This object is used in the cyclic synchronous position mode.
Object Code	Variable
Data Type	Integer32
Category	Optional

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	- 2147483648 to 2147483647
Units	CAN user position units

60B1h – Velocity Offset

Object Description

Index	60B1
Description	Velocity offset value. Takes a commanded velocity value from the host controller and adds it to the velocity command entering the velocity loop. In Cyclic Synchronous Position mode this object contains the input value for velocity feed forward. In Cyclic Synchronous Velocity mode it contains the commanded offset of the drive device. The value itself is absolute and thus independent of how often it is transmitted over the communication system; that is, twice transmitted does not mean double value. Since the additive velocity value represents an offset to the target velocity, it can be also used to control the drive with relative values in regard to the target velocity.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	EXTADDITIVEVCMD

Entry Description

Access	**SDO**: Read/Write **PDO**: Write
PDO Mapping	Yes
Default Value	0
Range	-2147483648 to 2147483647
Units	CAN user velocity units

60B2h – Torque Offset

Object Description

Index	60B2
Description	Torque offset value. Takes a commanded current value from the host controller and adds it to the current command entering the current loop. In Cyclic Synchronous Position mode and Cyclic Synchronous Velocity mode, this object contains the input value for torque feed forward. In Cyclic Synchronous Torque mode, it contains the commanded additive torque of the drive, which is added to the target torque value. The value itself is absolute and thus independent of how often it is transmitted over the communication system; that is, twice transmitted does not mean double value.
Object Code	Variable
Data Type	Integer16
Category	Optional
VarCom	EXTADDITIVEICMD

Entry Description

Access	**SDO**: Read/Write **PDO**: Write
PDO Mapping	Yes
Default Value	0
Range	-32768 to 32767
Units	Not Applicable

60B8h – Touch Probe Function

Object Description

Index	60B8
Description	Indicates the configured function of the touch probe. This object is organized bit-wise. The bits have the following meaning: **Bit 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 1 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) 8: 0 = switch off touch probe 2 1 = enable touch probe 2 9: 0 = trigger first event 1 = continuous 10: 0 = trigger with touch probe 2 input 1 = trigger with zero pulse signal or position encoder 11: reserved 12: 0 = switch off sampling at positive edge of touch probe 2 1 = enable sampling at positive edge of touch probe 2 13: 0 = switch off sampling on negative edge of touch probe 2 1 =enable sampling at negative edge of touch probe 2 14,15: user-defined (e.g., for testing)
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	PROBECONFIG

Entry Description

Access	**SDO**: Read/Write **PDO**: Write
PDO Mapping	Yes
Default Value	0
Range	0 to 65535
Units	CAN user velocity units

60B9h – Touch Probe Status

Object Description

Index	60B9
Description	Indicates the status of the touch probe. This object is organized bit-wise. The bits have the following meaning: **Bit 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 positive edge position stored 2: 0 = touch probe 1 no negative edge value stored 1 = touch probe 1 negative edge position stored 3-5: reserved 6,7: user-defined (e.g. for testing) 8: 0 = touch probe 2 is switched off 1 = touch probe 2 is enabled 9: 0 = touch probe 2 no positive edge value stored 1 = touch probe 2 positive edge position stored 10: 0 = touch probe 2 no negative edge value stored 1 = touch probe 2 negative edge position stored 11-13: reserved 14,15: user-defined (e.g. for testing)
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	PROBESTATUS

Entry Description

Access	Read Only
PDO Mapping	Yes
Default Value	0
Range	0 to 65535
Units	Not Applicable

60BAh – Touch Probe 1 Position Positive Edge

Object Description

Index	60BA
Description	The position value of touch probe 1 at the positive edge.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read Only
PDO Mapping	Yes
Default Value	0
Range	-2147483648 to 2147483647
Units	user-defined position

60BBh – Touch Probe 1 Position Negative Edge

Object Description

Index	60BB
Description	The position value of touch probe 1 at the negative edge.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read Only
PDO Mapping	Yes
Default Value	0
Range	-2147483648 to 2147483647
Units	user-defined position

60BCh – Touch Probe 2 Position Positive Edge

Object Description

Index	60BC
Description	The position value of touch probe 2 at the positive edge.
Note	Valid only for CANopen.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read Only
PDO Mapping	Yes
Default Value	0
Range	-2147483648 to 2147483647
Units	user-defined position

60BDh – Touch Probe 2 Position Negative Edge

Object Description

Index	60BD
Description	The position value of touch probe 2 at the negative edge.
Note	Valid only for CANopen.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read Only
PDO Mapping	Yes
Default Value	0
Range	-2147483648 to 2147483647
Units	user-defined position

60C0h – Interpolation Submode

Object Description

Index	
Description	The selected interpolation mode. The bit values have the following meaning: 0 = Linear interpolation. 1= Cubic interpolation with position and velocity. 2= Cubic interpolation with position only – strict. Forces the interpolated path to pass via the original position commands sent by the controller. This may cause an abrupt velocity profile when velocity changes. 3= Cubic interpolation with position only – soft. Does not force the interpolated path to pass via the original position commands sent by the controller, thus resulting in a smoother velocity profile. If linear interpolation is the only algorithm available, then it is not necessary to implement this object. If the linear interpolation mode is selected, the interpolation data given in the interpolation data record is used. If a manufacturer-specific interpolation mode is selected, the corresponding interpolation data record must be implemented in the manufacturer-specific profile area of the object dictionary. When operating in cyclic synchronous position mode, the interpolation mode value can be 0, 1, 2 or 3. When operating in cyclic synchronous velocity mode or cyclic synchronous torque modes, the interpolation mode value is always 0 (linear).
Object Code	Variable
Data Type	Integer16
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 3
Units	Not Applicable

60C1h – Interpolation Data Record

Object Description

Index	60C1
Description	Commands are received in object 60C1h and 60C4h. This object indicates the number of data words, which are needed for execution of the interpolation algorithm. The interpretation of the data words in the interpolation data record may vary due to the various possible modes and submodes that can be selected. For the linear interpolation mode, each interpolation data record simply is regarded as a new position set-point.
Object Code	Array
Data Type	Integer32
Category	Optional
VarCom	Not Applicable

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	
Data Type	
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	4
Range	1 to 254
Units	Not Applicable

Sub-Index	001
Description	Data Record 1
Object Code	
Data Type	Integer32
Category	Optional
Access	**SDO**: Read/Write **PDO**: Write
PDO Mapping	Yes
Default Value	0
Range	-2147483648 to 2147483647
Units	Not Applicable

Sub-Index	002
Description	Data Record 1
Object Code	
Data Type	Integer32
Category	Optional
Access	**SDO**: Read/Write **PDO**: Write
PDO Mapping	Yes
Default Value	0
Range	-2147483648 to 2147483647
Units	Not Applicable

Sub-Index	003
Description	Data Record 3
Object Code	
Data Type	Integer32
Category	Optional
Access	**SDO**: Read/Write **PDO**: Write
PDO Mapping	Yes
Default Value	0
Range	-2147483648 to 2147483647
Units	Not Applicable

Sub-Index	004
Description	Data Record 4
Object Code	
Data Type	Integer32
Category	Optional
Access	**SDO**: Read/Write **PDO**: Write
PDO Mapping	Yes
Default Value	0
Range	-2147483648 to 2147483647
Units	Not Applicable

60C2h – Interpolation Time Period

Object Description

Index	60C2
Description	The configured interpolation cycle time. This object includes the following sub-indices: sub-index 1: value of the time sub-index 2: dimension index of the time value in sub-index 1 The EtherCAT/CANopen Master must set the interpolated time period, and must use the time period to send the SYNC message for clock synchronization.
Note	The cycle time of the controller must be equal to the cycle of the drive. This object is used to set the cycle time of the drive. Make sure this object is set to the same cycle time value as the controller.
Object Code	Record
Data Type	Interpolation time period record (0080)
Category	Optional
VarCom	Sub-index 1: FBITPRD Sub-index 2: FBITIDX

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	2
Range	2
Units	Not Applicable

Sub-Index	001
Description	Interpolation time period value
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	1
Range	1 to 255
Units	$10^{(\text{interpolation time index})}$ [second]

Sub-Index	002
Description	Interpolation time index
Object Code	Variable
Data Type	Integer8
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	-3
Range	-128 to 63
Units	Not Applicable

60C4h – Interpolation Data Configuration

Index	60C4
Description	Commands are received in object 60C1h and 60C4h. This object configures and handles the buffer for the data records, and configures the data records.
Object Code	Record
Data Type	P402_IP_CONFIG_T
Category	Optional
VarCom	Not Applicable

Entry Description

Sub-Index	000
Description	Number of entries. Defined as a number of interpolation data records.
Object Code	
Data Type	
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	6
Range	6
Units	Not Applicable

Sub-Index	001
Description	Maximum buffer size. Defined as a number of interpolation data record
Object Code	
Data Type	Integer32
Category	Optional
Access	Read Only
PDO Mapping	Yes
Default Value	1
Range	1
Units	Not Applicable

Sub-Index	002
Description	Actual buffer size.
Object Code	
Data Type	Integer32
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	1
Range	1
Units	Not Applicable

Sub-Index	003
Description	Buffer organization 0 = FIFO 1 = ring
Object Code	
Data Type	Unsigned8
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

Sub-Index	004
Description	Buffer position. Indicates the next free buffer entry point.
Object Code	
Data Type	Unsigned16
Category	Optional
Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0
Units	Not Applicable

Sub-Index	005
Description	Size of data record
Object Code	
Data Type	Unsigned8
Category	Optional
Access	Write Only
PDO Mapping	No
Default Value	4
Range	4
Units	Not Applicable

Sub-Index	006
Description	Buffer clear. Writing 0 to sub-index 6 clears the buffer inputs, disables access, and clears all IP data records. Writing 1 to sub-index 6 enables access to the input buffers.
Object Code	
Data Type	Unsigned8
Category	Optional
Access	Write Only
PDO Mapping	No
Default Value	0
Range	0 to 1
Units	Not Applicable

60C5h – Max Acceleration

Object Description

Index	60C5
Description	The maximum acceleration. It is used to limit the acceleration to an acceptable value in order to prevent the motor and the moved mechanics from being damaged.
Object Code	Variable
Data Type	Unsigned32
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	4294967295
Range	0 to 4294967295
Units	CAN user acceleration/deceleration units

60C6h – Max Deceleration

Object Description

Index	60C6
Description	The maximum deceleration. It is used to limit the deceleration to an acceptable value in order to prevent the motor and the moved mechanics from being damaged.
Object Code	Variable
Data Type	Unsigned32
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	4294967295
Range	0 to 4294967295
Units	CAN user acceleration/deceleration units

60D5h – Touch Probe 1 Positive Edge Counter

Object Description

Index	60D5
Description	Touch probe 1 positive edge counter
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read Only
PDO Mapping	Yes
Default Value	0
Range	0 to 65535
Units	Not Applicable

60D6h – Touch Probe 1 Negative Edge Counter

Object Description

Index	60D6
Description	Touch probe 1 negative edge counter
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read Only
PDO Mapping	Yes
Default Value	0
Range	0 to 65535
Units	Not Applicable

60D7h – Touch Probe 2 Positive Edge Counter

Object Description

Index	60D7
Description	Touch probe 2 positive edge counter
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read Only
PDO Mapping	Yes
Default Value	0
Range	0 to 65535
Units	Not Applicable

60D8h – Touch Probe 2 Negative Edge Counter

Index	60D8
Description	Touch probe 2 negative edge counter
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read Only
PDO Mapping	Yes
Default Value	0
Range	0 to 65535
Units	Not Applicable

60F2h – Positioning Option Code

Object Description

Index	60F2
Description	The configured positioning behavior, as described by the profile positioning mode or the interpolated positioning mode.
Object Code	Variable
Data Type	Unsigned16
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read/Write
PDO Mapping	No
Default Value	0
Range	0 to 65535
Units	Not Applicable

60F4h – Following Error Actual Value

Object Description

Index	60F4
Description	The actual value of the following error.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	PE

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	CAN user position units

60FCh – Position Demand Internal Value

Object Description

Index	60FC
Description	The output of the trajectory generator in profile position mode.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	0
Range	-2147483648 to 2147483647
Units	increments

60FDh – Digital Inputs

Object Description

Index	60FD
Description	Indicates the state of the digital inputs. The digital inputs object has 32 bits. The first 16 bits (bits 0-15) indicate the status of various types of switches. Those switches are functions assigned to some of the digital inputs. **bit 0** = negative limit switch ■ If bit is 0 on, the digital input assigned to the negative limit switch is on. ■ If bit 0 is off, the digital input assigned to the negative limit switch is off. **bit 1** = positive limit switch ■ If bit 1 is on, the digital input assigned to the positive limit switch is on. ■ If bit 1 is off, the digital input assigned to the positive limit switch is off. **bit 2** = home switch ■ If bit 2 is on, the digital input assigned to the home switch is on. ■ If bit 2 is off, the digital input assigned to the home switch is off. **bit 4** = STO status ■ If bit 4 is on, 24V is not supplied to drive STO; drive is in Safe Torque Off state. ■ If bit 4 is off, 24V is supplied to drive STO. The last 16 bits indicate the status of each digital input, regardless of the input's functionality. **bit 16** = digital input 1 **bit 17** = digital input 2 ... bit 25 = digital input 10 bit 26 = digital input 11 The bit values have the following meaning: 0 = switch is off 1 = switch is on Thus, for example: ■ If digital input 1 is on, bit 16 is set. ■ If digital input 2 is on, bit 17 is set. ■ If digital input 3 is on, bit 18 is set.
Object Code	Variable
Data Type	Unsigned32
Category	Optional
VarCom	IN

Entry Description

Access	Read Only
PDO Mapping	Yes
Default Value	0
Range	0 to 4294967295
Units	Not Applicable

60FEh – Digital Outputs

Object Description

Index	60FE
Description	Indicates the state of the digital outputs. Sub-index 1 of this object indicates the state of the digital outputs. This sub-index has 32 bits. The bits in the first word (bits 0-15) indicates the status of the brake. **bit 0** = brake***** ■ If bit 0 is on, the digital output assigned to the brake is on. ■ If bit 0 is off, the digital output assigned to the brake is off. The bits in the second word (bits 16-31) indicate the state of each digital output, regardless of the output's functionality. **bit 16** = digital output 1 **bit 17** = digital output 2 **bit 18** = digital output 3 ... The bit values have the following meaning: 0 = off 1 = on For example, to read the status of digital output 1 (regardless of its functionality; it can be idle), read bit 16.
*** Note:**	CDHD drives do not support this bit. See the description for sub-index 1.
Object Code	Unsigned32
Data Type	Array
Category	Optional
VarCom	OUT

Entry Description

Sub-Index	000
Description	Number of entries
Object Code	Variable
Data Type	Unsigned8
Category	Optional
Access	Read Only
PDO Mapping	No
Default Value	2
Range	2
Units	Not Applicable

Sub-Index	001
Description	Physical outputs The CANopen standard specifies a bit in the digital outputs that allows the master to control the brake (bit 0 in object 60FEh sub-index 1). CDHD drives do not support this bit. Therefore, even if a master defines one of the digital outputs as brake, via object 209Ch, the master cannot write to this output and the drive will control the brake. For a master to write to the bit and thus control the brake, the designated output function must be defined as idle mode (OUTMODE 0). The bit values for sub-index 1 have the following meaning: 0 = output is off, brake is not set 1 = output is on, brake is set
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	Yes
Default Value	0
Range	0 to 4294967295
Units	Not Applicable

Sub-Index	002
Description	Output mask The bit values for sub-index 2 have the following meaning: 0 = output disabled; output will not change 1 = output enabled; output will change according to the controller command or defined functionality (OUTMODE)
Object Code	Variable
Data Type	Unsigned32
Category	Optional
Access	Read/Write
PDO Mapping	Yes
Default Value	1
Range	0 to 4294967295
Units	Not Applicable

60FFh – Target Velocity

Object Description

Index	60FF
Description	The configured target velocity and is used as input for the trajectory generator.
Object Code	Variable
Data Type	Integer32
Category	Optional
VarCom	Not Applicable

Entry Description

Access	**SDO**: Read/Write **PDO**: Write
PDO Mapping	Yes
Default Value	0
Range	-2147483648 to 2147483647
Units	CAN user velocity units

6502h – Supported Drive Modes

Object Description

Index	6502
Description	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 have the following meaning: 0 = mode is not supported 1 = mode is supported
Object Code	Variable
Data Type	Unsigned32
Category	Optional
VarCom	Not Applicable

Entry Description

Access	Read Only
PDO Mapping	No
Default Value	477
Range	477
Units	Not Applicable

12 CANopen and EtherCAT Troubleshooting

12.1 Warning Codes

CDHD drive warnings are reported in object **2011h**.

Since CDHD warnings are 64 bits, they have two 32-bit segments.

Table 12-1. Warning Codes

Warning Code	Warning Message/Description (*click description for more info*)	WRN #
00000000 00000001h	STO Warning	WRN 1
00000000 00000002h	Drive Foldback Warning	WRN 2
00000000 00000004h	Motor Foldback Warning	WRN 3
00000000 00000008h	Under-Voltage	WRN 4
00000000 00000010h	Power Stage Over-Temperature	WRN 5
00000000 00000020h	Motor Over-Temperature	WRN 6
00000000 00000100h	Control Board Over-Temperature	WRN 9
00000000 00000200h	Phase Find Required.	WRN 10
00000000 00000400h	PLL Not Synchronized.	WRN 11
00000000 00004000h	Hardware Positive Limit Switch is Open	WRN 15
00000000 00008000h	Hardware Negative Limit Switch is Open	WRN 16
00000000 00010000h	Hardware Positive and Negative Limit Switches are Open	WRN 17
00000000 00020000h	Software Positive Limit Switch is Tripped	WRN 18
00000000 00040000h	Software Negative Limit Switch is Tripped	WRN 19
00000000 00080000h	Software Limit Switches are Tripped	WRN 20
00000000 00100000h	HIPERFACE Encoder Resolution Mismatch.	WRN 21
00000000 00200000h	Encoder Battery Low-Voltage	WRN 22
00000000 00800000h	EnDat Encoder Resolution Mismatch.	WRN 24
00000000 01000000h	PFB Backup Not Read.	WRN 25
00000000 04000000h	Offset and/or Gain Adjustment Values Detected After SININIT	WRN 27
00000000 80000000h	Bus AC Supply Line Disconnected	WRN 32
00000002 00000000h	Regen Resistor Overload	WRN 34
00000004 00000000h	SensAR: Encoder Warning.	WRN 35
00000008 00000000h	Realtime Overload Warning	WRN 36

Warning Code	Warning Message/Description (*click description for more info*)	WRN #
00000010 00000000h	Cannot Use SFBTYPE 1 with Analog OPMODE	WRN 37
00000020 00000000h	Integrated Power Module Over-Temperature	WRN 38
00000080 00000000h	Online LMJR Estimation Active.	WRN 40
00000100 00000000h	PDO Packet is Not the Expected Length (too long).	WRN 41
00000200 00000000h	Data in RPDO is Out of Range.	WRN 42
00000400 00000000h	Data Cannot Be Written When Drive is Enabled.	WRN 43
00000800 00000000h	Command is toward positive software limit.	WRN 44
00001000 00000000h	Command is toward negative software limit.	WRN 45
00004000 00000000h	CAN Communication entered passive state.	WRN 47
00008000 00000000h	Default Drive Configuration.	WRN 48
00010000 00000000h	Fieldbus Target Command Lost.	WRN 49
00020000 00000000h	I2C failed to read temperature sensor.	WRN 50
00040000 00000000h	BiSS-C encoder indicates an internal warning.	WRN 51
00080000 00000000h	Motor compatibility warning.	WRN 52
00100000 00000000h	Conflicting digital inputs on.	WRN 53

12.2 Error and Fault Codes

Service Request Error (Abort) Codes

An SDO operation may return one of the SDO abort codes specified in the CANopen standard, listed in Table 12-2.

If an SDO fails due to a manufacturer-specific error, the SDO abort code will be 08000000h (general error) and the detailed error code will be available in object **216Ch**.

Table 12-3 lists the service request error (abort) codes that the drive sends to the master device when the master issues an invalid SDO request to the drive.

Table 12-2. CANopen Standard SDO Abort Codes

Abort Code	Description
0503 0000h	Toggle bit not alternated.
0504 0000h	SDO protocol timed out.
0504 0001h	Client/server command specifier not valid or unknown.
0504 0002h	Invalid block size (block mode only).
0504 0003h	Invalid sequence number (block mode only).
0504 0004h	CRC error (block mode only).
0504 0005h	Out of memory.
0601 0000h	Unsupported access to an object.
0601 0001h	Attempt to read a write only object.

Abort Code	Description
0601 0002h	Attempt to write a read only object.
0602 0000h	Object does not exist in the object dictionary.
0604 0041h	Object cannot be mapped to the PDO.
0604 0042h	The number and length of the objects to be mapped would exceed PDO length.
0604 0043h	General parameter incompatibility reason.
0604 0047h	General internal incompatibility in the device.
0606 0000h	Access failed due to an hardware error.
0607 0010h	Data type does not match, length of service parameter does not match
0607 0012h	Data type does not match, length of service parameter too high
0607 0013h	Data type does not match, length of service parameter too low
0609 0011h	Sub-index does not exist.
0609 0030h	Invalid value for parameter (download only).
0609 0031h	Value of parameter written too high (download only).
0609 0032h	Value of parameter written too low (download only).
0609 0036h	Maximum value is less than minimum value.
060A 0023h	Resource not available: SDO connection
0800 0000h	General error
0800 0020h	Data cannot be transferred or stored to the application.
0800 0021h	Data cannot be transferred or stored to the application because of local control.
0800 0022h	Data cannot be transferred or stored to the application because of the present device state.
0800 0023h	Object dictionary dynamic generation fails or no object dictionary is present (e.g. object dictionary is generated from file and generation fails because of an file error).
0800 0024h	No data available

Table 12-3. Manufacturer-Specific Error Codes

Error Code	Message/Description	ERR #
0h	No error	ERR 0
0504 0004h	TM communication CRC failed	ERR 68
0601 0002h	Not programmable	ERR 36
0602 0000h	CANopen: object index not found	ERR 299
0606 0000h	Flash invalid	ERR 42
0606 0000h	Not available	ERR 51
0606 0000h	TM Write to EEPROM Failed	ERR 67

Error Code	Message/Description	ERR #
0607 0010h	CANopen: objecct size incorrect	ERR 301
0609 0011h	CANopen: object sub-index not found	ERR 300
0609 0030h	Value out of range	ERR 25
0609 0030h	Value is not allowed	ERR 224
0609 0031h	Value too high	ERR 29
0609 0032h	Value too low	ERR 26
0800 0000h	Unknown command	ERR 20
0800 0000h	Unknown variable	ERR 21
0800 0000h	Checksum error	ERR 22
0800 0000h	Drive active	ERR 23
0800 0000h	Drive inactive	ERR 24
0800 0000h	OPMODE invalid	ERR 27
0800 0000h	Syntax error	ERR 28
0800 0000h	Not Configured	ERR 37
0800 0000h	N/A	ERR 38
0800 0000h	Recording active	ERR 43
0800 0000h	Recorded data not available	ERR 44
0800 0000h	NVRAM empty	ERR 45
0800 0000h	Value must be an even number	ERR 46
0800 0000h	Value must be a multiple of 0.25	ERR 49
0800 0000h	SAVE to flash failed	ERR 50
0800 0000h	Command towards limit switch	ERR 54
0800 0000h	Zeroing mode active	ERR 55
0800 0000h	Motor in motion	ERR 60
0800 0000h	Communication error	ERR 62
0800 0000h	EnDat not ready	ERR 63
0800 0000h	EnDat CRC error	ERR 64
0800 0000h	EnDat busy	ERR 65
0800 0000h	Password protected	ERR 66
0800 0000h	Homing type not in use	ERR 71
0800 0000h	Homing type invalid	ERR 72
0800 0000h	Homing trigger input not set	ERR 73
0800 0000h	Homing already in Progress	ERR 74
0800 0000h	Homing direction input not set	ERR 75
0800 0000h	Functionality already defined	ERR 82
0800 0000h	Command exceeds software limits	ERR 94

Error Code	Message/Description	ERR #
0800 0000h	Feedback invalid	ERR 95
0800 0000h	Variable is not recordable	ERR 96
0800 0000h	Value must be an integer	ERR 97
0800 0000h	I/O Not supported	ERR 98
0800 0000h	Active Disable in progress	ERR 99
0800 0000h	I2C bus is busy	ERR 100
0800 0000h	Another procedure is running	ERR 102
0800 0000h	Clear faults before procedure	ERR 103
0800 0000h	Motion pending	ERR 104
0800 0000h	Invalid PTP mode	ERR 105
0800 0000h	Checksum Invalid	ERR 106
0800 0000h	Analog output mode invalid	ERR 107
0800 0000h	Hold mode active	ERR 108
0800 0000h	Motor commutation type invalid	ERR 109
0800 0000h	HCICMD value out of range	ERR 112
0800 0000h	HC actual velocity out of range	ERR 113
0800 0000h	Not supported on this hardware	ERR 114
0800 0000h	Value must be a multiple of 0.125	ERR 115
0800 0000h	Fieldbus mode (COMMODE=1) active	ERR 116
0800 0000h	Current loop design failed	ERR 201
0800 0000h	MENCRES out of range	ERR 202
0800 0000h	MSPEED out of range	ERR 204
0800 0000h	MVANGLF out of range	ERR 206
0800 0000h	VLIM out of range	ERR 210
0800 0000h	MVANGLH out of range	ERR 212
0800 0000h	DICONT greater than DIPEAK	ERR 213
0800 0000h	MENCTYPE Mismatch	ERR 214
0800 0000h	DIPEAK out of range	ERR 215
0800 0000h	MIPEAK out of range	ERR 216
0800 0000h	MICONT greater than MIPEAK	ERR 217
0800 0000h	VBUS out of range	ERR 218
0800 0000h	ML out of range	ERR 219
0800 0000h	MPOLES out of range	ERR 220
0800 0000h	Velocity loop design failed	ERR 221
0800 0000h	Internal dual gain present	ERR 222
0800 0000h	PHASEFIND required	ERR 223
0800 0000h	Internal dual gain not present	ERR 225

Error Code	Message/Description	ERR #
0800 0000h	MENCTYPE invalid for linear motor	ERR 226
0800 0000h	ENCOUTRES too high	ERR 227
0800 0000h	Function invalid for this input	ERR 228
0800 0000h	MJ out of range	ERR 229
0800 0000h	MMASS out of range	ERR 230
0800 0000h	Autotuning active	ERR 232
0800 0000h	Internal config failed	ERR 233
0800 0000h	Feedback type mismatch	ERR 234
0800 0000h	Velocity config failed	ERR 250
0800 0000h	Cycle identification active	ERR 254
0800 0000h	Phase find mode invalid	ERR 255
0800 0000h	Feedback device disconnected	ERR 256
0800 0000h	Feedback device initializing	ERR 257
0800 0000h	No input assigned to touch probe	ERR 260
0800 0000h	COMMERRVTHRESH exceeds VLIM	ERR 261
0800 0000h	Other HDTUNEREFERENCE is active	ERR 262
0800 0000h	SensAR: The device is busy	ERR 263
0800 0000h	SensAR: Request timeout	ERR 264
0800 0000h	SensAR: Flash save failed	ERR 265
0800 0000h	SensAR: Protocol error	ERR 266
0800 0000h	SensAR: Illegal request	ERR 267
0800 0000h	SensAR: Address not aligned	ERR 268
0800 0000h	Cannot read motor nameplate data	ERR 269
0800 0000h	Cannot be set when MTPMODE>0	ERR 270
0800 0000h	Cannot be set when COMMODE>0	ERR 271
0800 0000h	POSCONTROLMODE not supported	ERR 272
0800 0000h	Cannot be issued when SFBMODE>0	ERR 274
0800 0000h	HDTUNE Profile is not trapezoidal	ERR 275
0800 0000h	Not supported on this feedback	ERR 276
0800 0000h	Feedback returned too much data	ERR 277
0800 0000h	HDTUNEAVMODE invalid	ERR 278
0800 0000h	SensAR: Internal request error	ERR 279
0800 0000h	SensAR driver is occupied	ERR 280
0800 0000h	SensAR driver failed	ERR 281
0800 0000h	SensAR driver acquire timeout	ERR 282
0800 0000h	Drive is not homed	ERR 283

Error Code	Message/Description	ERR #
0800 0000h	SensAR address is out of range	ERR 284
0800 0000h	SensAR CRC error occurred	ERR 285
0800 0000h	Autotune activation failed	ERR 286
0800 0000h	Zero failed. Cannot zero if ILIM=0	ERR 287
0800 0000h	Comm feedback defaults undefined	ERR 288
0800 0000h	Feedback memory not partitioned	ERR 289
0800 0000h	Cannot change in modulo mode	ERR 290
0800 0000h	Mismatch in EnDat stamp value	ERR 291
0800 0000h	EnDat 2.X not supported	ERR 292
0800 0000h	MENCRES too high for this drive	ERR 293
0800 0000h	HDTUNE Vcruise too low	ERR 294
0800 0000h	HDTUNE distances not equal	ERR 295
0800 0000h	Failed to store data on flash	ERR 296
0800 0000h	Failed to read data from flash	ERR 297
0800 0000h	CANopen internal error	ERR 298
0800 0000h	CANopen: Drive in wrong NMT state	ERR 302
0800 0000h	Unsupported SFBMODE in non linear	ERR 303
0800 0000h	Use different sign for Pos and Neg	ERR 304
0800 0000h	Use same sign for Pos and Neg	ERR 305
0800 0000h	PHASEFINDMODE=4 with old KCMODE	ERR 306
0800 0000h	Positive limit switch is active	ERR 308
0800 0000h	Negative limit switch is active	ERR 309
0800 0000h	Opposite state home switch expected	ERR 310
0800 0000h	Motion stopped abruptly	ERR 311
0800 0000h	BiSS-C: address out of range	ERR 312
0800 0000h	BiSS-C: the device is busy	ERR 313
0800 0000h	BiSS-C: illegal request	ERR 314
0800 0000h	BiSS-C: EEPROM save failed	ERR 315
0800 0000h	BiSS-C: busy timeout	ERR 316
0800 0000h	BiSS-C: internal error	ERR 317
0800 0000h	BiSS-C: protocol error	ERR 318
0800 0000h	BiSS-C: driver error	ERR 319
0800 0000h	BiSS-C: driver acquisition timeout	ERR 320
0800 0000h	BiSS-C: driver is occupied	ERR 321
0800 0000h	HIPERFACE data error. Use HSAVE 1	ERR 324
0800 0000h	Predefined and set automatically	ERR 325
0800 0000h	Not allowed in DDHD	ERR 326

Error Code	Message/Description	ERR #
0800 0001h	BiSS-C: request CRC error	ERR 322
0800 0020h	CANopen: Cannot transfer data	ERR 307
0800 0050h	No serial Enable in COMMODE=1	ERR 328

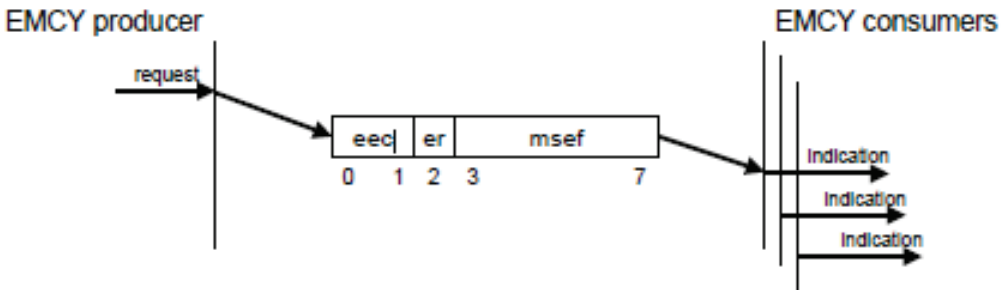
Emergency Error (Fault) Codes

Unlike the synchronous service request error (abort) codes which are always sent as response to a request, the emergency error (fault) codes are asynchronous. These events can occur at any time regardless of the user command (for example, temperature is too high).

Upon detection of internal device errors, the drive 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 12-4. Emergency Message Frame

Byte	0	1	2	3	4	5	6	7
Description	Emergency error code		Error register	Manufacturer-specific				



When an illegal state occurs in the drive, the drive sends the code to the master device as object 603Fh (Error Code).

Whenever the value of 603Fh is not zero, there is a fault in the drive. The CANopen state machine enters Fault mode, and the drive cannot be enabled. If, for example, the Motor Feedback interface cable is disconnected from the drive, the motion control of the drive will not function; the drive will send the code 7383h (A/B line break fault) to the master device as object 603Fh (Error Code).

Table 12-5. Emergency Error Codes (Faults)

Fault Code	Fault Message/Description	7-segment	FLT #
2189h	Secondary Encoder 5V Over-Current	r19	FLT 31
2214h	Over-Current	P	FLT 3
2310h	Motor Foldback	F2	FLT 17
2311h	Drive Foldback	F1	FLT 16

Fault Code	Fault Message/Description	7-segment	FLT #
2380h	Current Sensors Offset Invalid	e109	FLT 43
2381h	Motor Phase Disconnection	r27	FLT 51
2382h	Output overcurrent detected	e127	FLT 96
3110h	Over-Voltage	o	FLT 9
3120h	Under-Voltage	u	FLT 11
3180h	Regen Over-Current	n1	FLT 29
3181h	STO Fault	n	FLT 4
3182h	Vbus Measure Circuit Failed	e108	FLT 8
3183h	Bus AC supply line disconnect	o7	FLT 78
3199h	Regen Resistor Overload	o8	FLT 83
4080h	Power Module Over-Temperature	t2	FLT 39
4081h	Control Board Over-Temperature	t3	FLT 40
4096h	Temperature Sensor Failure	t4	FLT 73
4310h	Power Stage Over-Temperature	t1	FLT 10
4410h	Motor Over-Temperature	H	FLT 23
5111h	Plus 15V Out of Range	o15	FLT 36
5111h	Minus 15V Out of Range	o-15	FLT 37
5180h	5V Out of Range	o5	FLT 52
5530h	Power EEPROM Fault	e107	FLT 7
5581h	Control EEPROM Fault	e106	FLT 6
5582h	CAN Supply Fault	A4	FLT 32
5583h	Self Test Failed	e105	FLT 33
5585h	Parameter Memory Checksum Failure	e	FLT 2
5586h	Failure Writing to Flash Memory	E	FLT 13
6380h	Fieldbus Velocity Limit Exceeded	Fb1	FLT 30
6381h	Not Configured	-1	FLT 12
6581h	FPGA Config Failed	e101	FLT 5
7081h	Motor Setup Failed	-5	FLT 44
7082h	Phase Find Failed	r23	FLT 41
7090h	FPGA Version Mismatch	e120	FLT 47
7091h	Emergency Stop Issued	n3	FLT 57
7093h	Fieldbus Version Mismatch	e125	FLT 93
7094h	ESI Version Mismatch	e126	FLT 94
7097h	BiSS-C Encoder Internal Fault.	r42	FLT 102
7098h	HIPERFACE Data Error.	r43	FLT 103
7099h	ESI Vendor Mismatch	e134	FLT 110

Fault Code	Fault Message/Description	7-segment	FLT #
7111h	Index Line Break	r5	FLT 20
7112h	Power Brake Open Load	n41	FLT 63
7113h	Power Brake Short	n42	FLT 64
7121h	Stall Fault	F3	FLT 59
7180h	Secondary Feedback Index Break	r17	FLT 27
7181h	Secondary Feedback A/B Line Break	r18	FLT 28
7182h	Pulse and Direcion Input Line Break	r25	FLT 46
718Fh	Power Brake Fault	n45	FLT 98
7198h	Motor runaway condition detected	J4	FLT 77
7380h	Feedback Communication Error	r20	FLT 34
7381h	Nikon Encoder Operational Fault	r21	FLT 35
7382h	Tamagawa Init Failed	r24	FLT 42
7383h	A/B Line Break	r4	FLT 18
7384h	Invalid Halls	r6	FLT 19
7385h	Encoder Battery Low-Voltage	r29	FLT 56
7386h	PLL Synchronization Failed	b1	FLT 48
7387h	Encoder Simul. Frequency Too High	r9	FLT 15
7388h	Tamagawa Abs Operational Fault	r26	FLT 49
7389h	Custom Absolute Encoder Operational Fault	r33	FLT 95
738Ah	Differential Halls Line Break	r38	FLT 71
738Bh	Encoder phase error	r37	FLT 68
738Ch	AqB Commutation fault	r39	FLT 80
738Dh	sensAR Encoder Fault	r40	FLT 82
738Eh	Sine Feedback Communication Fail	r10	FLT 21
738Fh	A/B Out of Range	r8	FLT 22
7390h	SANKYO Abs Operational Fault	r41	FLT 99
7391h	Sine Encoder Quadrature Fault	r14	FLT 24
7392h	Sin/Cos Calibration Invalid	r15	FLT 25
7393h	Feedback 5V Over-Current	r16	FLT 26
7394h	Resolver Initialization Failed	r28	FLT 55
7395h	Endat2X Feedback Faults	r32	FLT 58
7580h	FieldBus Cable Disconnected	Fb3	FLT 65
7582h	Fieldbus target command lost	Fb4	FLT 69
8130h	CAN Heartbeat Lost	C1	FLT 50
8180h	Drive Locked	b	FLT 1
818Dh	EtherCAT Packets Lost	Fb8	FLT 91

Fault Code	Fault Message/Description	7-segment	FLT #
8311h	Torque Feedback Exceeded Limit	P1	FLT 74
8380h	Unstable Current Loop	P2	FLT 100
8481h	Velocity Over-Speed Exceeded	J	FLT 14
8482h	Exceeded Maximum Velocity Error	J2	FLT 67
8611h	Exceeded Maximum Position Error	J1	FLT 45
8688h	SFB Position Mismatch	J5	FLT 90
8689h	PE reached software numerical limit	J3	FLT 87
F080h	CAN/EtherCAT State Not Operational	Fb9	FLT 92
FF01h	Internal Error	e121	FLT 70
FF02h	MTP Read Failure	e123	FLT 85
FF03h	SAVE and Power Cycle Required	e124	FLT 86
FF04h	RT Overload Fault	_	FLT 89
FF8Dh	PFB Off Checksum Invalid	r34	FLT 60
FF8Eh	PFB Off Data Mismatch	r35	FLT 61
FF8Fh	No PFB Off Data	r36	FLT 62
FF97h	Pulse Train Frequency Too High	F2H	FLT 76

12.3 Common Communication Problems

The following error codes indicate the most common issues related to CANopen and EtherCAT communication protocols.

Causes and corrective actions for these issues are described in the following sections.

The fault codes appear on the drive's 7-segment LED display.

b1 – PLL synchronization failed

- Sync time or interpolation time (object 60C2h) do not match in controller and drive configuration.

C1 – CANopen cable disconnected, heartbeat lost

Relevant for Horner controller.

- Incorrect heartbeat configuration in the **Cscape** software. Configure as shown in the figure below.

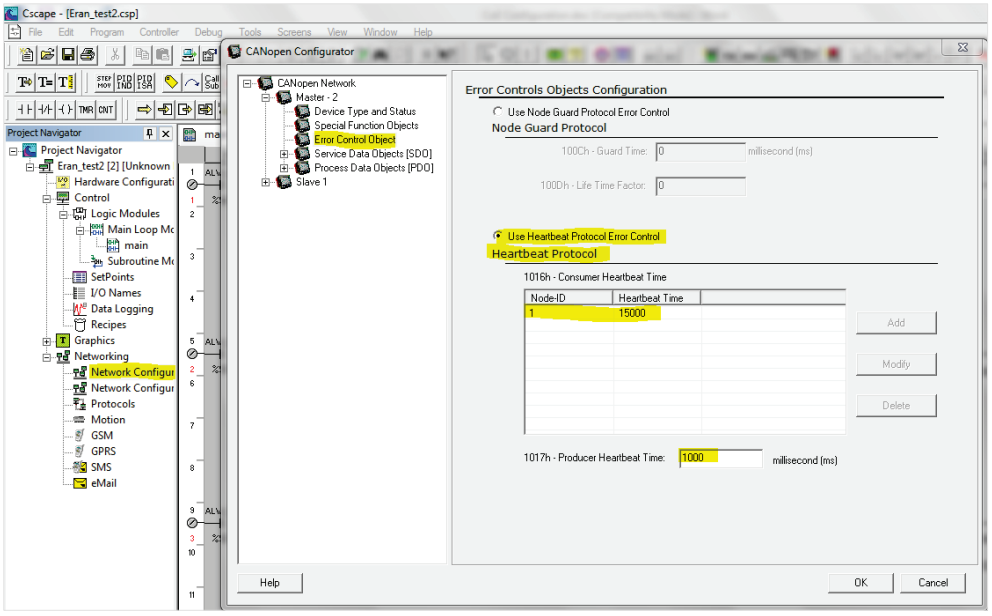


Figure 12-1.

- Make sure the CANopen cable is connected properly to the CDHD and to the Controller CANopen port.
- Make sure that the 120 ohm resistor switch is properly set.
- Make sure that the 120 ohm resistor is located at the CANopen connector on the controller side.

Fb1 – Fieldbus – Target position exceeds velocity limit

- This error is common when using the Cyclic Synchronous Position mode (in EtherCAT). Decrease the value of the target position.

Fb3 – EtherCAT cable disconnected

- Make sure the EtherCAT cable is connected properly to the drive and to the controller EtherCAT port.
- Mismatch of sync time or interpolation time (object 60C2h) in controller and drive configurations.
- Power cycle the drive to clear the fault.

Fb4 – Fieldbus target command lost

- Problem with the firmware version.
- Problem with the EDS file on CANopen.

  or problem with the XML file on EtherCAT.
- Synchronization lost.
- Power cycle the drive to clear the fault.

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