

EPOS P
Programmable Positioning Controllers
Firmware Specification

Document ID: rel2718

PLEASE READ THIS FIRST



These instructions are intended for qualified technical personnel. Prior commencing with any activities ...

- *you must carefully read and understand this manual and*
- *you must follow the instructions given therein.*

We have tried to provide you with all information necessary to install and commission the equipment in a **secure, safe and time-saving** manner. Our main focus is ...

- to familiarize you with all relevant technical aspects,
- to let you know the easiest way of doing,
- to alert you of any possibly dangerous situation you might encounter or that you might cause if you do not follow the description,
- to **write as little** and to **say as much** as possible and
- not to bore you with things you already know.

Likewise, we tried to skip repetitive information! Thus, you will find things **mentioned just once**. If, for example, an earlier mentioned action fits other occasions you then will be directed to that text passage with a respective reference.



Follow any stated reference – observe respective information – then go back and continue with the task!

PREREQUISITES FOR PERMISSION TO COMMENCE INSTALLATION

The **EPOS P Programmable Positioning Controllers** are considered as partly completed machinery according to EU's directive 2006/42/EC, Article 2, Clause (g) and therefore **are intended to be incorporated into or assembled with other machinery or other partly completed machinery or equipment**.



You must not put the device into service, ...

- *unless you have made completely sure that the other machinery – the surrounding system the device is intended to be incorporated to – fully complies with the requirements stated in the EU directive 2006/42/EC!*
- *unless the surrounding system fulfills all relevant health and safety aspects!*
- *unless all respective interfaces have been established and fulfill the stated requirements!*

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1 About this Document

1.1 Intended Purpose

The purpose of the present document is to familiarize you with the described equipment and the tasks on safe and adequate installation and/or commissioning.

Observing the described instructions in this document will help you ...

- to avoid dangerous situations,
- to keep installation and/or commissioning time at a minimum and
- to increase reliability and service life of the described equipment.

Use for other and/or additional purposes is not permitted. maxon motor, the manufacturer of the equipment described, does not assume any liability for loss or damage that may arise from any other and/or additional use than the intended purpose.

1.2 Target Audience

This document is meant for trained and skilled personnel working with the equipment described. It conveys information on how to understand and fulfill the respective work and duties.

This document is a reference book. It does require particular knowledge and expertise specific to the equipment described.

1.3 How to use

Take note of the following notations and codes which will be used throughout the document.

Notation	Explanation
→	denotes "see", "see also", "take note of" or "go to"

Table 1-1 Notations used in this Document

1.4 Sources for additional Information

For further details and additional information, please refer to below listed sources:

#	Reference
[1]	CiA DS-301 Communication Profile for Industrial Systems www.can-cia.org
[2]	CiA DSP-302 Framework for CANopen Managers and Programmable CANopen Devices www.can-cia.org (section accessible for CiA members only)
[3]	CiA DS-405 Interface and Device Profile for IEC 61131-3 Programmable Devices www.can-cia.org
[4]	DS-306 Electronic Data Sheet Specification www.can-cia.org
[5]	Konrad Etschberger: Controller Area Network ISBN 3-446-21776-2
[6]	maxon motor: EPOS Firmware Specification (Document #798675) EPOS P CD-ROM or www.maxonmotor.com

Table 1-2 Sources for additional Information

1.5 Copyright

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2 Introduction

The present document provides you with the firmware details on the EPOS P Firmware Programmable Positioning Controllers. It contains descriptions of the architecture, error handling and object dictionary.

maxon motor control's EPOS P Firmware is a small-sized, full digital and free programmable positioning control unit. Due to its flexible and high efficient power stage, the EPOS P Firmware drives brushed DC motors with digital encoder as well as brushless EC motors with digital Hall sensors and encoder.

The sinusoidal current commutation by space vector control offers to drive brushless EC motors with minimal torque ripple and low noise. The integrated position, velocity and current control functionality allows sophisticated positioning applications. The EPOS P Firmware is programmable with a very efficient software tool. The programming languages are according to IEC 61131-3 standard. The built-in CANopen interface allows the design of an easy-to-use standalone multiple axis system, particularly with standard maxon EPOS controllers. In addition, the unit can be operated via any RS232 communication port.

Find the latest edition of the present document, as well as additional documentation and software to the EPOS P Firmware Programmable Positioning Controllers also on the internet: → www.maxonmotor.com

2.1 Documentation Structure

The present document is part of a documentation set. Please find below an overview on the documentation hierarchy and the interrelationship of its individual parts:

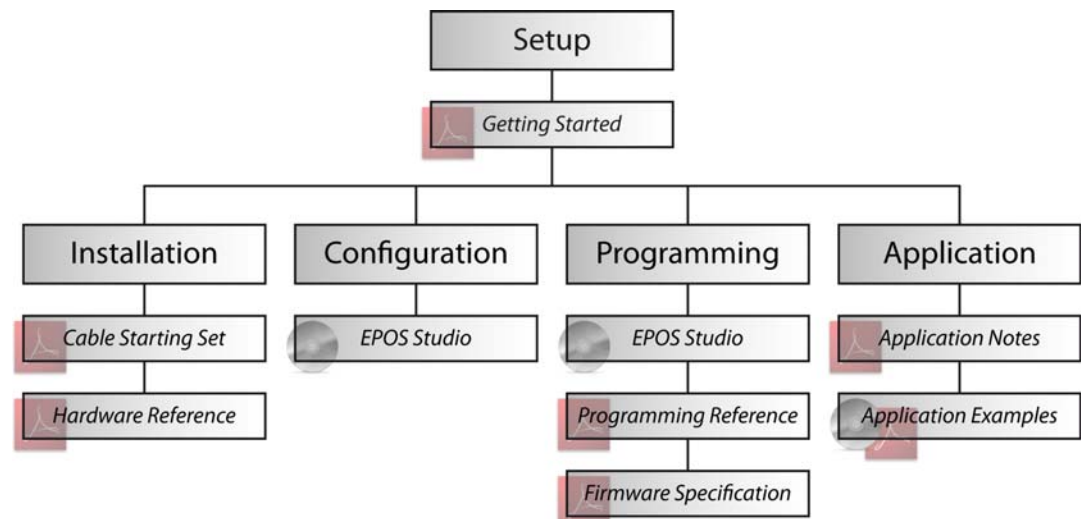


Figure 2-1 Documentation Structure

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3 Architecture

3.1 Device Architecture

The communication interface of the EPOS P follows the CiA CANopen specifications. Note that numbers in brackets refer to respective items listed on page 1-6:

- DS-301 V4.02
Application Layer and Communication Profile (→ [1])
- DSP-302 V3.3
Framework for CANopen Managers and Programmable CANopen Devices (→ [2])
- DS-405 V2.0
Interface and Device Profile or IEC 61131-3 Programmable Devices (→ [3]).
- DS-306 V1.3
Electronic Data Sheet Specification (→ [4])

The communication interface and the behavior of the EPOS [Internal] is described in separate document «EPOS Firmware Specification», edition July 2006 or later (→ [6]).

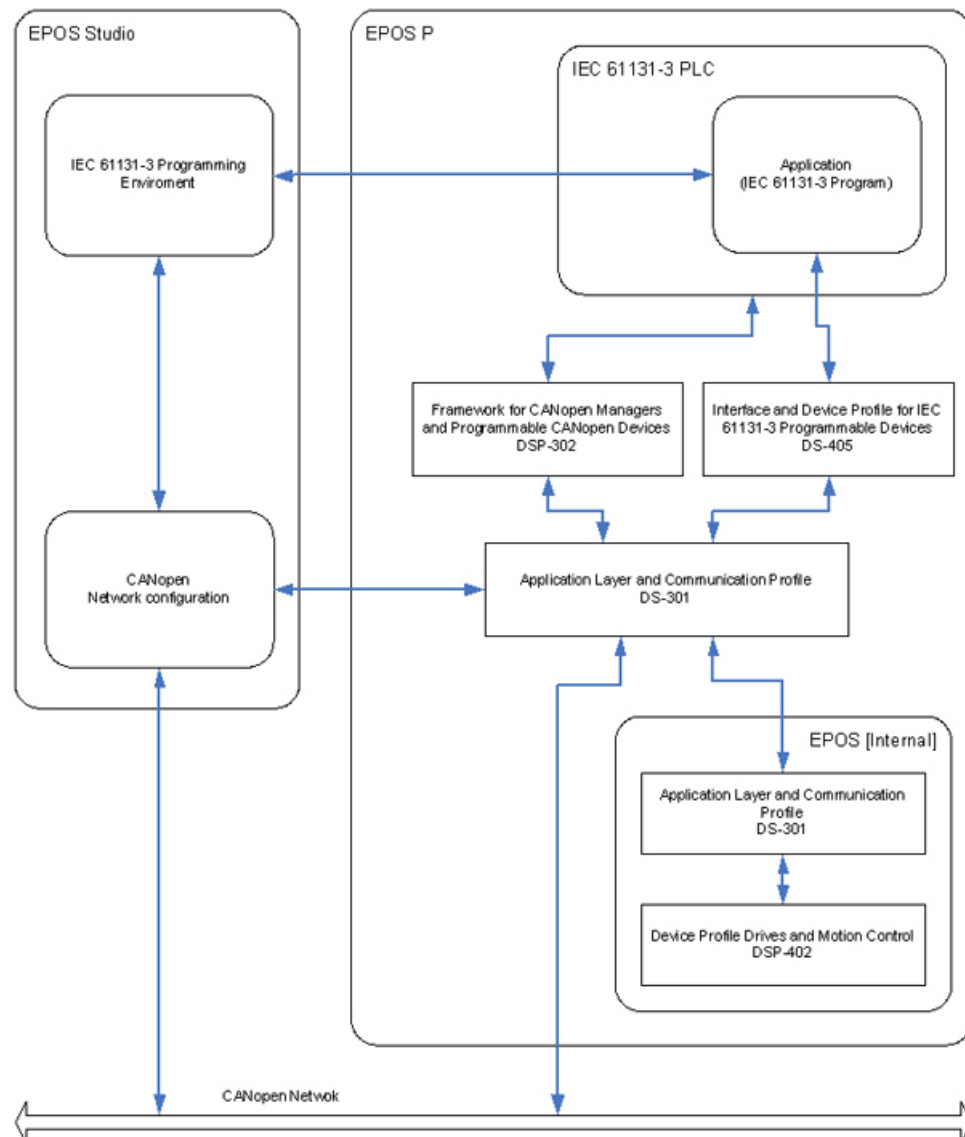


Figure 3-2 Communication Architecture

3.2 System Architecture

3.2.1 Functionalities

The EPOS P is designed as a CANopen manager. Therefore, the following functionalities have been implemented:

- **Configuration Manger**
The functionality that provides mechanisms for checking the configuration of nodes in a system during boot-up.
- **Nmt Master**
The network management (Nmt) provides services for controlling the network behavior of the nodes as defined in DS-301.
- **SYNC Producer**
A functionality responsible for transmitting the SYNC object.

3.2.2 Boot-Up Procedure

The Configuration Manager has the task of booting all assigned slaves and checking their configuration. At each cold or warm start of the application program, the CANopen boot-up procedure will be executed before the EPOS P switches the state from Pre-Operational to Operational. The main flow resumes in figure below.

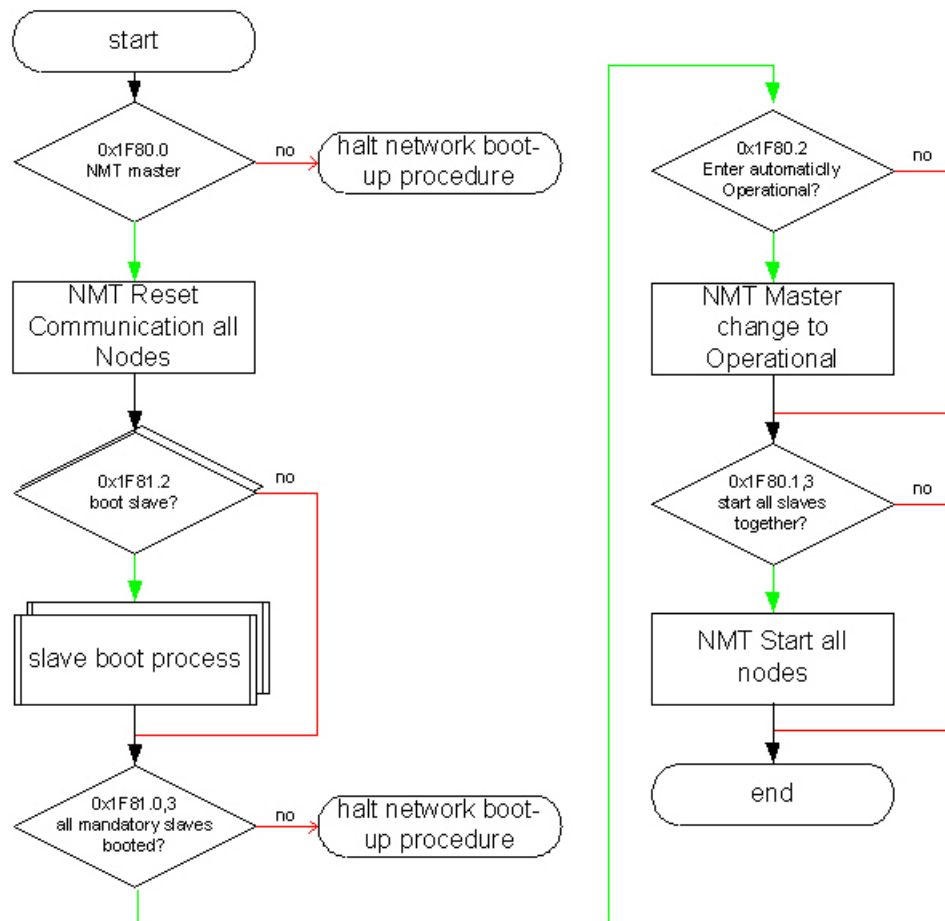


Figure 3-3 CANopen Boot-up Procedure – Main Flow

The slave boot process is given by figure below. Checks the stored slave configurations in the objects 0x1F84 to 0x1F89, 0x1F26 and 0x1F27 and produces an error if a mandatory slave does not match.

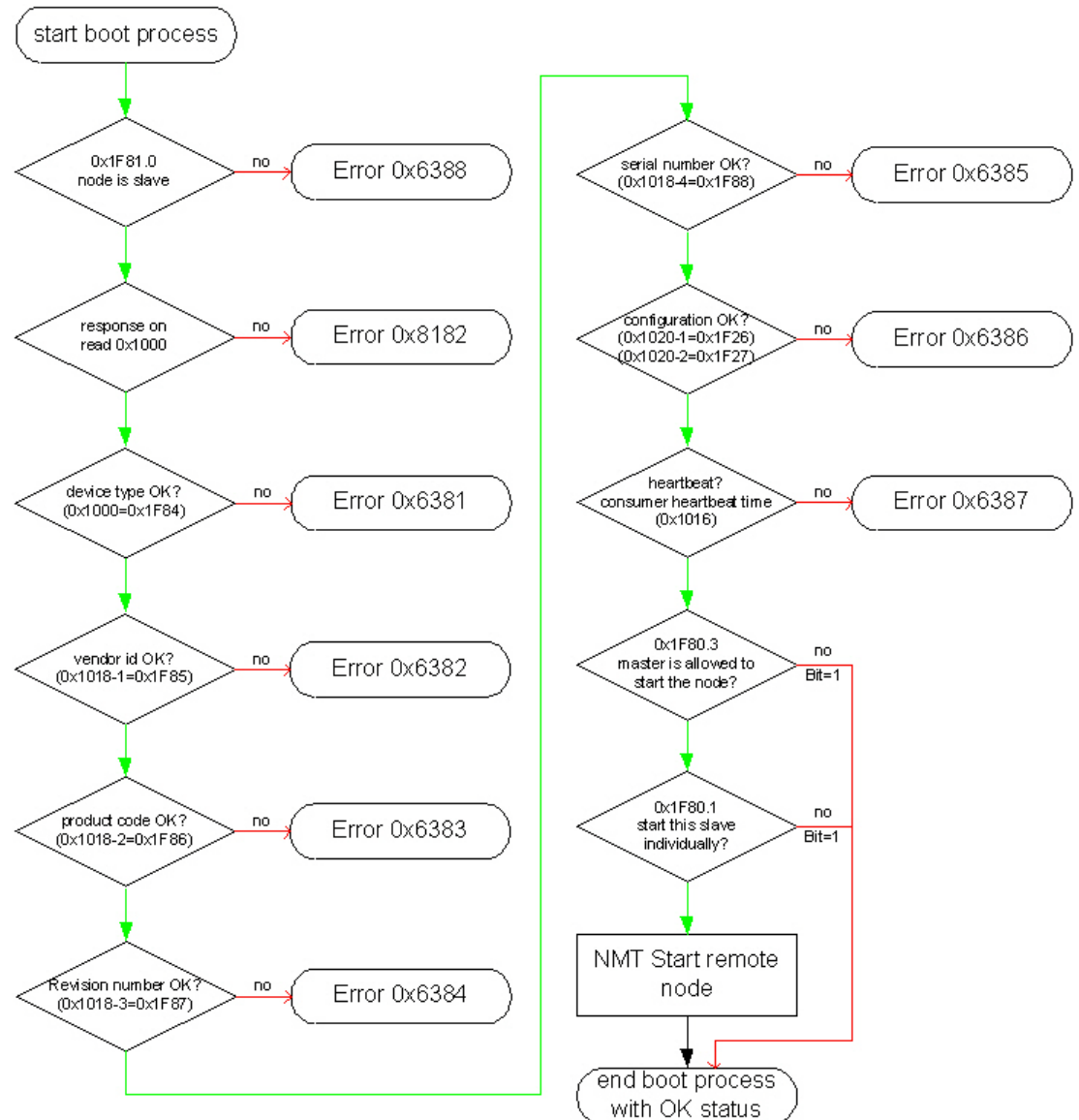


Figure 3-4 CANopen Boot-up Procedure – Slave Boot Process

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4 Error Handling

4.1 CAN Master Error Codes

The error detected by the CAN master due to controlling the CAN ports will be stored in the Error History (→page 5-17).

Error Code	Description	Comment
0x5530	Eeprom Error	Hardware error by accessing nonvolatile memory
0x6181	Interpreter Error	Error occurred at interpreting code
0x6182	Native Code Error	Error occurred at executing native code
0x6183	Timer Task Error	Error occurred at starting a timer task
0x6184	Interrupt Task Error	Error occurred at starting a interrupt / event task
0x6185	Data Access Error	Data or program access exception detected
0x6310	Retain Variable Error	Error occurred at saving or restoring retain variables
0x6381	Device Type Error	Failed network bootup! Bad device type detected
0x6382	Vendor-Id Error	Failed network bootup! Bad vendor-Id detected
0x6383	Product Code Error	Failed network bootup! Bad product code detected
0x6384	Revision Number Error	Failed network bootup! Bad revision number detected
0x6385	Serial Number Error	Failed network bootup! Bad serial number detected
0x6386	Configuration Time and Date Error	Failed network bootup! Bad configuration date or time detected
0x6387	Error Control Error	Failed network bootup! No heartbeat received
0x6388	Node is not Slave Error	Failed network bootup! Mandatory Node is not defined as slave
0x8110	CAN Overrun Error	CAN frames lost
0x8120	CAN Passive Error	Port changed to state passive
0x8130	CAN Lifeguard Error	Life guarding (heartbeat) time out
0x8181	CAN Controller Error	Error occurred at configuring of embedded CAN controller
0x8182	CAN No Answer Error	Configured Node does not answer / is not present
0x81FC	CAN Warning	Frame error warning level detected
0x81FD	CAN Bus Off Error	Port changed to state bus off
0x8210	CAN PDO Length Error	Too short PDO received

Table 4-3 CAN Master Error Codes

••page intentionally left blank••

5 Object Dictionary

5.1 Device Type

Description

This object describes the device type. The lower word of the device type stands for the supported device profile number. The value 0x0195 (405) mean that device follows the CiA Draft Standard 405, Interface and Device Profile or IEC 61131-3 Programmable Devices.

Name	Device Type	
Index	0x1000	
Subindex	0x00	
Type	UNSIGNED32	
Access	RO	
Default Value	0x00000195	
Value Range	–	–

5.2 Error Register

Description

This object is an error register for the device. The device maps internal errors in this register.

Name	Error Register	
Index	0x1001	
Subindex	0x00	
Type	UNSIGNED8	
Access	RO	
Default Value	0	
Value Range	–	–

Bit	Description
0	Generic
1	Current (not used)
2	Voltage (not used)
3	Temperature (not used)
4	Communication
5	Device Profile Specific (not used)
6	reserved (not used)
7	manufacturer-specific

Table 5-4 Error Register – Description

5.3 Manufacturer Status Register

Description

This object is an overview of all Error Register Flags of the connected slaves and the Master Errors and Warnings. A set bit means error/warning.

Name	Manufacturer Status Register	
Index	0x1002	
Subindex	0x00	
Type	UNSIGNED32	
Access	RO	
Default Value	0	
Value Range	–	–

Bit	Description
0	one of the connected slaves signals a Generic Error Bit in Error Register
1	one of the connected slaves signals a Current Error Bit in Error Register
2	one of the connected slaves signals a Voltage Error Bit in Error Register
3	one of the connected slaves signals a Temperature Error Bit in Error Register
4	one of the connected slaves signals a Communication Error Bit in Error Register
5	one of the connected slaves signals a Device Profile Specific Error Bit in Error Register
6	reserved
7	one of the connected slaves signals a Manufacturer Specific Error Bit in Error Register
8...15	copy of Error Register (→ page 5-15)
16	Master Generic Warning
17...19	not used
20	Master Communication Warning
21...22	not used
23	Master Manufacturer Specific Warning
24...31	not used

Table 5-5 Manufacturer Status Register – Description

5.4 Error History

Description

This object holds the errors that have been occurred on the device.

Name	Error History
Index	0x1003
Number of entries	0x10

Description

This entry contains the number of actual errors that are recorded in the array starting at sub-index 1. Writing a "0" deletes the error history (empties the array). Writing a value higher than zero is not allowed.

Name	Number of Errors	
Index	0x1003	
Subindex	0x00	
Type	UNSIGNED32	
Access	RW	
Default Value	0	
Value Range	–	–

Description

Every new error code is stored at sub-index 1, the older ones move down the list. The error entry contains the CAN error code of the detected error (or warning), the port number and the node-id if it is identifiable.

Name	Error History (1) to (16)	
Index	0x1003	
Subindex	0x01...0x10	
Type	UNSIGNED32	
Access	RO	
Default Value	0	
Value Range	–	–

Bit 31	Bit 30...28	Bit 27...24	Bit 23...16	Bit 15...0
warning	reserved	port code	node-id	error code

Table 5-6 Error History – Structure

Bit		Description
warning	0	Error
	1	Warning only
port code	1	CAN port number 1 (internal)
	2	CAN port number 2
node-Id	0	Unknown / master
	1...127	Slave node identification
error code		CAN Master Error Codes (→page 4-13)

Table 5-7 Error History – Description

5.5 COB-ID SYNC

Description

Communication Object Identifier of synchronization object SYNC messages will be produced in the interval defined by →“Communication Cycle Time” on page 5-19 if the generate flag (bit 30) is set.

Name	COB-ID SYNC Message	
Index	0x1005	
Subindex	0x00	
Type	UNSIGNED32	
Access	RW	
Default Value	0x00000080	
Value Range	–	–

Bit 31	Bit 30	Bit 29...11	Bit 10...0
do not care	generate	0 (CAN base frame)	11-bit CAN-ID = 0x80

Table 5-8 COB-ID SYNC – Structure

5.6 Communication Cycle Time

Description

This object provides the communication cycle period, which defines the SYNC interval. The value is given in multiple of microseconds (μs). The value 0 disables the SYNC messages.

Remarks

It is in the responsibility of the system or network designer to choose a communication cycle time, which allows transmitting all cyclic data together with the communication base load. The communication cycle period should be balanced to the cycle time used by the application software.

For the correlation of →“Communication Cycle Time” and →“Synchronous Window Length”
→Figure 5-5.

Related Objects

- →“COB-ID SYNC” on page 5-18
- →“Synchronous Window Length” on page 5-20

Name	Communication Cycle Time	
Index	0x1006	
Subindex	0x00	
Type	UNSIGNED32	
Access	RW	
Default Value	0x00000000	
Value Range	1000	MAX_UINT32

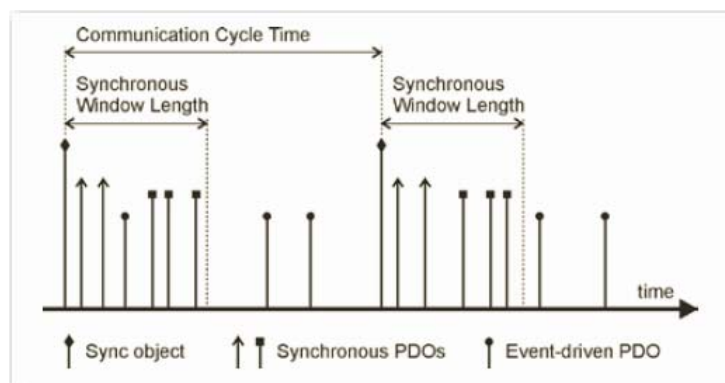


Figure 5-5 Synchronous Communication Cycle

5.7 Synchronous Window Length

Description

This object indicates the configured length of the time window for the synchronous PDOs. The value is given in multiple of microseconds (μ s).

Remarks

For the correlation of →“Synchronous Window Length” and →“Communication Cycle Time” →Figure 5-5.

Related Objects

- →“COB-ID SYNC” on page 5-18
- →“Communication Cycle Time” on page 5-19

Name	Synchronous Window Length	
Index	0x1007	
Subindex	0x00	
Type	UNSIGNED32	
Access	RW	
Default Value	0x00000000	
Value Range	500	MAX_UINT32

5.8 Device Name

Description

The name of the device is “EPOS P”.

Name	Device Name	
Index	0x1008	
Subindex	0x00	
Type	VISIBLE_STRING	
Access	CONST	
Default Value	“EPOS P”	
Value Range	–	–

5.9 Store Parameters**Description**

All parameters of the device will be stored in non-volatile memory, if the signature “save” is written to this object.

Name	Store Parameters
Index	0x1010
Subindex	0x01

Name	Save all Parameters
Index	0x1010
Subindex	0x01
Type	UNSIGNED32
Access	RW
Default Value	–
Value Range	–

Byte	MSB			LSB
Character	'e'	'v'	'a'	's'
Hex value	0x65	0x76	0x61	0x73

Table 5-9 Storage Write Access Signature

5.10 Restore Default Parameters

Description

All parameters of the device will be restored with default values, if the signature "load" is written to this object.

Name	Restore Default Parameters		
Index	0x1011		
Subindex	0x02		

Name	Restore all Default Parameters		
Index	0x1011		
Subindex	0x01		
Type	UNSIGNED32		
Access	RW		
Default Value	–		
Value Range	–		–

Byte	MSB			LSB
Character	'd'	'a'	'o'	'l'
Hex value	0x64	0x61	0x6F	0x6C

Table 5-10 Restore Default Write Access Signature

Description

The application program will be deleted by writing the signature "eras" to this object.

Name	Erase Application Program		
Index	0x1011		
Subindex	0x02		
Type	UNSIGNED32		
Access	RW		
Default Value	–		
Value Range	–		–

Byte	MSB			LSB
Character	's'	'a'	'r'	'e'
Hex value	0x73	0x61	0x72	0x65

Table 5-11 Erase Application Program Write Access Signature

5.11 Consumer Heartbeat Time

Description

The consumer heartbeat time provides the expected heartbeat cycle times. They are higher than the corresponding producer heartbeat times configured on the CAN device producing this heartbeat.

The heartbeat time is given in milliseconds (ms).

If the heartbeat time is zero or the node-Id is zero the corresponding object entry is not used.

Remarks

Sub-indexes 1...127 are used for the devices with Node-Id 1...127 connected to the (external accessible) CAN port number 2. Sub-index 128 (0x80) is used for the EPOS [Internal] with node-Id 1.

Name	Consumer Heartbeat Time
Index	0x1016
Subindex	0x80

Name	Consumer Heartbeat Time Node 1 to 128	
Index	0x1016	
Subindex	0x01...0x80	
Type	UNSIGNED32	
Access	RW	
Default Value	0x00000000	
Value Range	–	–

Bit 31...24	Bit 23...16	Bit 15...0
port code	node-Id	heartbeat time

Table 5-12 Consumer Heartbeat Time – Structure

Bits		Description
port code	01	CAN port number 1 (internal)
	02	CAN port number 2
node-Id	1...127	producer node-Id
heartbeat time		maximal expected heartbeat time [ms]

Table 5-13 Consumer Heartbeat Time – Description

5.12 Producer Heartbeat Time

Description

The producer heartbeat time shall indicate the configured cycle time of the heartbeat. The value is given in multiples of 1 ms. The value 0 disables the heartbeat producer.

Name	Producer Heartbeat Time	
Index	0x1017	
Subindex	0x01	

Name	Producer Heartbeat Time	
Index	0x1017	
Subindex	0x00	
Type	UNSIGNED16	
Access	RW	
Default Value	0x0000	
Value Range	–	–

5.13 Identity Object

Description

The CANopen vendor identification of “maxon motor ag” defined by CiA is 0x000000FB.

Name	Identity Object	
Index	0x1018	
Subindex	0x04	

Name	Vendor ID	
Index	0x1018	
Subindex	0x01	
Type	UNSIGNED32	
Access	RO	
Default Value	0x000000FB	
Value Range	–	–

Description

This object contains the hardware specific type of the CANopen device.

Related Objects

- → “EPOS P Version” on page 5-43

Name	Product Code	
Index	0x1018	
Subindex	0x02	
Type	UNSIGNED32	
Access	RO	
Default Value	–	
Value Range	–	–

Description

This object contains the software specific revision number.

Related Objects

- → “EPOS P Version” on page 5-43

Name	Revision Number	
Index	0x1018	
Subindex	0x03	
Type	UNSIGNED32	
Access	RO	
Default Value	–	
Value Range	–	–

Description

This object contains a (unique) serial number.

Name	Serial Number	
Index	0x1018	
Subindex	0x04	
Type	UNSIGNED32	
Access	RO	
Default Value	–	
Value Range	–	–

5.14 Synchronous Counter

Description

This object indicates the configured highest value the counter supports. The synchronous counter is mapped into the SYNC message. The value of the counter will be incremented by one with any request of the service SYNC write. When the highest value is reached the counter starts counting from one.

Related Objects

- → "COB-ID SYNC" on page 5-18
- → "Communication Cycle Time" on page 5-19

Name	Synchronous Counter	
Index	0x1019	
Subindex	0x00	
Type	UNSIGNED32	
Access	RW	
Default Value	0x00	
Value Range	→ Table 5-14	–

Value	Description
0	The SYNC message will be transmitted as a CAN message of data length 0.
1	reserved
2...240	The SYNC message will be transmitted as a CAN message of data length 1. The data byte contains the counter.
241...255	reserved

Table 5-14 Synchronous Counter – Description

5.15 SDO Client Parameter**Description**

This object contains the parameters for the SDO servers for which the EPOS P is the SDO client.

Name	SDO Client Parameter
Index	0x1280...0x12FF
Number of entries	0x03

Description

This object specifies the COB-ID for the communication from the EPOS P as client to the associated SDO server.

Name	COB-ID Client to Server (internal, 1...127)	
Index	0x1280...0x12FF	
Subindex	0x01	
Type	UNSIGNED32	
Access	RW	
Default Value	0x600 + server node-Id	
Value Range	–	–

Description

This object specifies the COB-ID or the communication from the associated SDO server to the EPOS P.

Name	COB-ID Server to Client (internal, 1...127)	
Index	0x1280...0x12FF	
Subindex	0x02	
Type	UNSIGNED32	
Access	RW	
Default Value	0x580 + server node-Id	
Value Range	–	–

Description

This object specifies the node-Id of the associated sever.

Remarks

Not changeable

Name	Server Node ID (internal, 1...127)	
Index	0x1280...0x12FF	
Subindex	0x03	
Type	UNSIGNED32	
Access	RW	
Default Value	0x1280: 0x01 (Internal Port) 0x1281: 0x01 (CAN Port) 0x1282: 0x02 (CAN Port) 0x12FF: 0x7F (CAN Port)	
Value Range	–	–

5.16 Receive PDO Parameter

Description

This object contains the communication parameters for the PDOs the CANopen device is able to receive.

There are 32 receive PDOs (Index 0x1400 to 0x141F) for the external accessible CAN bus and 4 receive PDOs (Index 0x1500 – 0x1503) for internal use.

Related Objects

- ➔ “Receive PDO Mapping” on page 5-29

Name	Receive PDO Parameter
Index	0x1400...0x141F, 0x1500...0x1503
Number of entries	0x02

Description

Communication Object Identifier of receive process data object.

Remarks

Changes in mapping are only possible in **Nmt state Pre-Operational**

Name	COB-ID used by RxPDO 1 to 32, 1 internal to 4 internal	
Index	0x1400...0x141F, 0x1500...0x1503	
Subindex	0x01	
Type	UNSIGNED32	
Access	RW	
Default Value	0x1500:0x00000181 all others:0xC0000000	
Value Range	➔ Table 5-16	–

Bit 31	Bit 30	Bit 29...11	Bit 10...0
valid	RTR	0 (CAN base frame)	11-bit CAN-ID

Table 5-15 COB-ID RxPDO – Structure

Bit		Description
valid	0b	PDO exists / is valid
	1b	PDO does not exist / is not valid
RTR	0b	RTR allowed on this PDO
	1b	no RTR allowed on this PDO
11-bit CAN-ID		11-bit CAN-ID of the CAN base frame Value range:0x181...0x57F; 0x000 (if valid = 1)

Table 5-16 COB-ID RxPDO – Description

Description

The transmission type describes how PDO communication works.

Remarks

Changes in mapping are only possible in **Nmt state Pre-Operational**.

Name	Transmission Type RxPDO 1 to 32, 1 internal to 4 internal)	
Index	0x1400...0x141F, 0x1500...0x1503	
Subindex	0x02	
Type	UNSIGNED8	
Access	RW	
Default Value	255	
Value Range	1: synchronous 255: asynchronous	—

5.17 Receive PDO Mapping**Description**

This object contains the number of valid object entries within the mapping record.

Remarks

Changes in mapping are only possible in **Nmt state Pre-Operational**.

Name	Receive PDO Mapping	
Index	0x1600...0x161F, 0x1700...0x1703	
Number of entries	8	

Name	Number of Mapped Application Objects in RxPDO 1 to 32, 1 internal to 4 internal	
Index	0x1600...0x161F, 0x1700...0x1703	
Subindex	0x00	
Type	UNSIGNED8	
Access	RW	
Default Value	0x1700: 0x01 all others: 0x00	
Value Range	0: PDO is disabled 1...8: 1 to 8 objects are mapped	—

Description

The objects in the next table are supported to map.

Remarks

Changes in mapping are only possible in **Nmt state Pre-Operational**.

To change a mapped object it is necessary to disable PDO by writing 0 to the number of mapped PDO objects. The maximal length of a process data object (PDO) is 64 bit.

Name	1 st ...8 th mapped Object in RxPDO 1 to 32, 1 internal to 4 internal	
Index	0x1600...0x161F, 0x1700...0x1703	
Subindex	0x01...0x08	
Type	UNSIGNED32	
Access	RW	
Default Value	0x1700: 0x52800210 all others: 0x00000000	
Value Range	→ Table 5-17	–

Entries marked in *grey/italic* may also be mapped, but it might not really make sense to do so.

Bit 31...16 Index	Bit 15...8 Subindex	Bit 7...0 Length [bit]	Description
<i>0x5280...0x529F</i>	<i>0x01</i>	<i>0x10</i>	<i>Axis 0 to 31 Controlword</i>
<i>0x5280...0x529F</i>	<i>0x02</i>	<i>0x10</i>	<i>Axis 0 to 31 Statusword</i>
0xA000	0x01...0x10	0x08	Process Image Input Integer 8
0xA040	0x01...0x10	0x08	Process Image Input Unsigned 8
0xA0C0	0x01...0x10	0x10	Process Image Input Integer 16
0xA100	0x01...0x10	0x10	Process Image Input Unsigned 16
0xA1C0	0x01...0x10	0x20	Process Image Input Integer 32
0xA200	0x01...0x10	0x20	Process Image Input Unsigned 32
<i>0xA480</i>	<i>0x01...0x10</i>	<i>0x08</i>	<i>Process Image Output Integer 8</i>
<i>0xA4C0</i>	<i>0x01...0x10</i>	<i>0x08</i>	<i>Process Image Output Unsigned 8</i>
<i>0xA540</i>	<i>0x01...0x10</i>	<i>0x10</i>	<i>Process Image Output Integer 16</i>
<i>0xA580</i>	<i>0x01...0x10</i>	<i>0x10</i>	<i>Process Image Output Unsigned 16</i>
<i>0xA640</i>	<i>0x01...0x10</i>	<i>0x20</i>	<i>Process Image Output Integer 32</i>
<i>0xA680</i>	<i>0x01...0x10</i>	<i>0x20</i>	<i>Process Image Output Unsigned 32</i>

Table 5-17 Receive PDO Mapping Objects – Value Definition

5.18 Transmit PDO Parameter**Description**

This object contains the communication parameters for the PDOs the CANopen device is able to transmit. There are 32 transmit PDOs for the external accessible CAN bus (Index 0x1800 to 0x181F) and 4 transmit PDOs for internal use (Index 0x1900 to 0x1903).

Name	Transmit PDO Parameter
Index	0x1800...0x181F, 0x1900...0x1903
Number of entries	0x03

Description

Communication Object Identifier of transmit process data object 1.

Name	COB-ID used by TxPDO 1 to 32, 1 internal to 4 internal		
Index	0x1800...0x181F, 0x1900...0x1903		
Subindex	0x01		
Type	UNSIGNED8		
Access	RW		
Default Value	0xC0000000		
Value Range	→ Table 5-19	–	

Bit 31	Bit 30	Bit 29...11	Bit 10...0
valid	RTR	0 (CAN base frame)	11-bit CAN-ID

Table 5-18 COB-ID TxPDO – Structure

Bit		Description
valid	0b	PDO exists / is valid
	1b	PDO does not exist / is not valid
RTR	0b	RTR allowed on this PDO
	1b	no RTR allowed on this PDO
11-bit CAN-ID		11-bit CAN-ID of the CAN base frame Value range: 0x181...0x57F; 0x000 (if valid = 1)

Table 5-19 COB-ID TxPDO – Description

Description

The transmission type describes how PDO communication works.

Remarks

The transmission type 253 means that the PDO is only transmitted on remote transmission request (RTR). If transmission type 255 is selected the PDO is transmitted if the data's change its values. The inhibit time defines a minimum interval therefore.

Changes in mapping are only possible in **Nmt state Pre-Operational**.

Name	Transmission Type TxPDO 1 to 32, 1 internal to 4 internal	
Index	0x1800...0x181F, 0x1900...0x1903	
Subindex	0x02	
Type	UNSIGNED8	
Access	RW	
Default Value	255	
Value Range	→ Table 5-20	–

Value	Description
1	synchronous
253	asynchronous on RTR only
255	asynchronous on change

Table 5-20 Transmit PDO – Transmission Types

Description

This time is the minimum interval for event triggered PDO transmission. The value is defined as multiple of 100 µs.

Remarks

Event triggered PDOs can generate a huge CAN bus load and device load also, especially if the inhibit time of different PDOs are set to a small value.

Name	Inhibit Time TxPDO 1 to 32, 1 internal to 4 internal	
Index	0x1800...0x181F, 0x1900...0x1903	
Subindex	0x03	
Type	UNSIGNED16	
Access	RW	
Default Value	10	
Value Range	0	65535

Description

This time is the maximum interval for event triggered PDO transmission if the Transmission Type is set to 255. The value is defined as multiple of 1 ms. The value of 0 disables the Event Timer.

Name	Event Timer TxPDO 1 to 32, 1 internal to 4 internal	
Index	0x1800...0x181F, 0x1900...0x1903	
Subindex	0x05	
Type	UNSIGNED816	
Access	RW	
Default Value	0	
Value Range	0	65535

5.19 Transmit PDO Mapping**Description**

This object contains the number of valid object entries within the mapping record.

Remarks

Changes in mapping are only possible in **Nmt state Pre-Operational**.

Name	Transmit PDO Mapping	
Index	0x1A00...0x1A1F, 0x1B00...0x1B03	
Number of entries	–	

Name	Number of Mapped Application Objects in TxPDO 1 to 32, 1 internal to 4 internal	
Index	0x1A00...0x1A1F, 0x1B00...0x1B03	
Subindex	0x00	
Type	UNSIGNED8	
Access	RW	
Default Value	0	
Value Range	0: PDO is disabled 1...8: 1 to 8 objects are mapped	–

Description

The objects in next table are supported to map.

Remarks

Changes in mapping are only possible in **Nmt state Pre-Operational**.

To change a mapped object it is necessary to disable PDO by writing 0 to the number of mapped PDO objects. The maximal length of a process data object (PDO) is 64 bit.

Name	1 st to 8 th Mapped Object in TxPDO 1 to 32, 1 internal to 4 internal	
Index	0x1A00...0x1A1F, 0x1B00...0x1B03	
Subindex	0x01...0x08	
Type	UNSIGNED32	
Access	RW	
Default Value	0x00000000	
Value Range	→ Table 5-21	–

Entries marked in *grey/italic* may also be mapped, but it might not really make sense to do so.

Bit 31...16 Index	Bit 15...8 Subindex	Bit 7...0 Length [bit]	Description
0x5280...0x529F	0x01	0x10	Axis 0 to 31 Controlword
<i>0x5280...0x529F</i>	<i>0x02</i>	<i>0x10</i>	<i>Axis 0 to 31 Statusword</i>
<i>0xA000</i>	<i>0x01...0x10</i>	<i>0x08</i>	<i>Process Image Input Integer 8</i>
<i>0xA040</i>	<i>0x01...0x10</i>	<i>0x08</i>	<i>Process Image Input Unsigned 8</i>
<i>0xA0C0</i>	<i>0x01...0x10</i>	<i>0x10</i>	<i>Process Image Input Integer 16</i>
<i>0xA100</i>	<i>0x01...0x10</i>	<i>0x10</i>	<i>Process Image Input Unsigned 16</i>
<i>0xA1C0</i>	<i>0x01...0x10</i>	<i>0x20</i>	<i>Process Image Input Integer 32</i>
<i>0xA200</i>	<i>0x01...0x10</i>	<i>0x20</i>	<i>Process Image Input Unsigned 32</i>
0xA480	0x01...0x10	0x08	Process Image Output Integer 8
0xA4C0	0x01...0x10	0x08	Process Image Output Unsigned 8
0xA540	0x01...0x10	0x10	Process Image Output Integer 16
0xA580	0x01...0x10	0x10	Process Image Output Unsigned 16
0xA640	0x01...0x10	0x20	Process Image Output Integer 32
0xA680	0x01...0x10	0x20	Process Image Output Unsigned 32

Table 5-21 Transmit PDO Mapping Objects – Value Definition

5.20 Expected Configuration Date

Description

This object should contain the value of the Verify Configuration object (0x1020sub1) of the corresponding slave. This allows verifying the correct configuration of the connected slave at boot-up. A value of zero disables the check.

Remarks

Sub-indexes 1 to 127 are used for the devices with node-Id 1 to 127 connected to the (external accessible) CAN port number 2. Sub-index 128 (0x80) is used for the EPOS [Internal].

Name	Expected Configuration Date
Index	0x1F26
Number of entries	128

Name	Expected Configuration Date Node 1 to 128	
Index	0x1F26	
Subindex	0x01...0x80	
Type	UNSIGNED32	
Access	RW	
Default Value	0	
Value Range	–	–

5.21 Expected Configuration Time

Description

This object should contain the value of the Verify Configuration object (0x1020sub2) of the corresponding slave. This allows verifying the correct configuration of the connected slave at boot-up. A value of zero disables the check.

Remarks

Sub-indexes 1 to 127 are used for the devices with node-Id 1 to 127 connected to the (external accessible) CAN port number 2. Sub-index 128 (0x80) is used for the EPOS [Internal].

Name	Expected Configuration Time
Index	0x1F27
Number of entries	128

Name	Expected Configuration Time Node 1 to 128	
Index	0x1F27	
Subindex	0x01...0x80	
Type	UNSIGNED32	
Access	RW	
Default Value	0	
Value Range	–	–

5.22 Nmt Start-up

Description

This object configures the startup behavior of the device that is able to perform the Nmt.

Name	Nmt Start-up	
Index	0x1F80	
Subindex	0x00	
Type	UNSIGNED32	
Access	RW	
Default Value	0x00000007	
Value Range	–	–

Bit 31...8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
reserved 0x0000 00	reserved 0	Stop all nodes	Flying master	Reset all nodes	Start node	Self starting	Start all nodes	Nmt master

Table 5-22 Nmt Start-up – Structure

Bit		Description
Nmt master	0	not supported
	1	EPOS P is in Nmt master mode.
Start all nodes	0	Nmt service “start remote node” for each Node ID.
	1	Nmt service “start remote node” with Node ID = 0.
Self starting	0	EPOS P switches into Nmt state Operational in boot-up procedure.
	1	EPOS P does not automatically switch itself to Nmt state Operational.
Start node	0	EPOS P starts the slaves.
	1	EPOS P does not start the slaves, the application may start them.
Reset all slaves	0	Node reset on error of mandatory slave not implemented .
Flying master	0	Nmt flying master not implemented .
Stop all nodes	0	Node stop on error of mandatory slave not implemented .

Table 5-23 Nmt Startup – Bit Definition

5.23 Slave Assignment**Description**

This object is part of the network list. It assigns slaves to the Nmt Master.

Remarks

Sub-indexes 1 to 127 are used for the devices with node-Id 1 to 127 connected to the (external accessible) CAN port number 2. Sub-index 128 (0x80) is used for the EPOS [Internal].

Name	Slave Assignment
Index	0x1F81
Number of entries	128

Name	Slave Assignment Node 1 to 128	
Index	0x1F81	
Subindex	0x01...0x80	
Type	UNSIGNED32	
Access	RW	
Default Value	0	
Value Range	–	–

Bit 31...16	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
reserved 0x0000 00	reserved 0	Software update	Software version	Reset communication	Mandatory	Nmt boot slave	Restore	Nmt slave

Table 5-24 Slave Assignment – Structure

Bit		Description
Nmt slave	0	CANopen device in Nmt master mode or not available in network
	1	CANopen device in Nmt slave mode and available in network
Restore	0	CANopen device may be used without prior resetting
Nmt boot slave	0	Configuration and Nmt service 'Start remote node' not allowed
	1	Configuration and Nmt service 'Start remote node' allowed
Mandatory	0	CANopen device may be present prior to network start-up (optional)
	1	CANopen device shall be present prior to network start-up (mandatory)
Reset communication	0	no Reset Communication check implemented
Software version	0	no software verification implemented
Software update	0	no automatic software update implemented

Table 5-25 Slave Assignment – Bit Definition

5.24 Request Nmt

Description

The Request Nmt represents the current Nmt State of the connected CANopen Slaves when reading the objects (heartbeat must be active) and make possible to send nmt commands to the connected CANopen Slaves when writing the Object.

Name	Request Nmt
Index	0x1F82
Number of entries	128

Name	Request Nmt 1 to 128	
Index	0x1F82	
Subindex	0x01...0x80	
Type	UNSIGNED32	
Access	RW	
Default Value	–	
Value Range	–	–

OnReadAccess	Value	OnWriteAccess
Nmt state unknown	0x00	–
Nmt state stopped	0x04	Request Nmt Stop Command
Nmt state operational	0x05	Request Nmt Start Command
–	0x06	Request Nmt Reset Command
–	0x07	Request Nmt Reset Communication Command
Nmt state pre-operational	0x7F	Request Enter pre-operational Command

Table 5-26 Request Nmt – Commands and State Information

5.25 Device Type Identification

Description

This object is part of the network list. It allows entering values for expected device types (object 0x1000 sub-index 0x00 of the corresponding slave).

Remarks

Sub-indexes 1 to 127 are used for the devices with node-Id 1 to 127 connected to the (external accessible) CAN port number 2. Sub-index 128 (0x80) is used for the EPOS [Internal].

Name	Device Type Identification	
Index	0x1F84	
Number of entries	128	

Name	Device Type Identification Node 1 to 128	
Index	0x1F84	
Subindex	0x01...0x80	
Type	UNSIGNED32	
Access	RW	
Default Value	0	
Value Range	–	–

5.26 Vendor Identification

Description

This object is part of the network list. It allows entering values for expected Vendor identification (object 0x1018 sub-index 0x01 of the corresponding slave).

Remarks

Sub-indexes 1 to 127 are used for the devices with node-Id 1 to 127 connected to the (external accessible) CAN port number 2. Sub-index 128 (0x80) is used for the EPOS [Internal].

Name	Vendor Identification	
Index	0x1F85	
Number of entries	128	

Name	Vendor Identification Node 1 to 128	
Index	0x1F85	
Subindex	0x01...0x80	
Type	UNSIGNED32	
Access	RW	
Default Value	0	
Value Range	–	–

5.27 Product Code

Description

This object is part of the network list. It allows entering values for expected Product Code (object 0x1018 sub-index 0x02 of the corresponding slave).

Remarks

Sub-indexes 1 to 127 are used for the devices with node-Id 1 to 127 connected to the (external accessible) CAN port number 2. Sub-index 128 (0x80) is used for the EPOS [Internal].

Name	Product Code
Index	0x1F86
Number of entries	128

Name	Product Code Node 1 to 128	
Index	0x1F86	
Subindex	0x01...0x80	
Type	UNSIGNED32	
Access	RW	
Default Value	0	
Value Range	–	–

5.28 Revision Number

Description

This object is part of the network list. It allows entering values for expected Vendor identification (object 0x1018 sub-index 0x03 of the corresponding slave).

Remarks

Sub-indexes 1 to 127 are used for the devices with node-Id 1 to 127 connected to the (external accessible) CAN port number 2. Sub-index 128 (0x80) is used for the EPOS [Internal].

Name	Revision Number
Index	0x1F87
Number of entries	128

Name	Revision Number Node 1 to 128	
Index	0x1F87	
Subindex	0x01...0x80	
Type	UNSIGNED32	
Access	RW	
Default Value	0	
Value Range	–	–

5.29 Serial Number**Description**

This object is part of the network list. It allows entering values for expected Serial Number (object 0x1018 sub-index 0x04 of the corresponding slave).

Remarks

Sub-indices 1 to 127 are used for the devices with node-Id 1 to 127 connected to the (external accessible) CAN port number 2. Sub-index 128 (0x80) is used for the EPOS [Internal].

Name	Serial Number	
Index	0x1F88	
Number of entries	128	

Name	Serial Number Node 1 to 128	
Index	0x1F88	
Subindex	0x01...0x80	
Type	UNSIGNED32	
Access	RW	
Default Value	0	
Value Range	–	–

5.30 Boot Time**Description**

This object defines the time that will be elapse before the boot-up procedure accesses the slaves. The boot time is given in milliseconds (ms).

Name	Boot Time	
Index	0x1F89	
Subindex	0x00	
Type	UNSIGNED32	
Access	RW	
Default Value	500	
Value Range	200	30000

5.31 Node ID**Description**

EPOS P CAN Node Id.

Remarks

Changes to this object take only affect after restart. Therefore it is necessary to store all parameters after changing and set DIP-Switches to 0 before restart.

Name	Node ID	
Index	0x5000	
Subindex	0x00	
Type	UNSIGNED8	
Access	RW	
Default Value	–	
Value Range	–	–

5.32 CAN Bitrate**Description**

Used to set the bit rate of the CAN interface.

Remarks

Changes to this object take only effect after restart. Therefore, it is necessary to store all parameters after changing and then restart.

Name	CAN Bitrate	
Index	0x5001	
Subindex	0x00	
Type	UNSIGNED16	
Access	RW	
Default Value	0	
Value Range	→ Table 5-27	–

Value	Bit Rate
0	1 Mbit/s
1	800 kbit/s
2	500 kbit/s
3	250 kbit/s
4	125 kbit/s
5	<i>reserved</i>
6	50 kbit/s
7	20 kbit/s
8	<i>reserved</i>
9	<i>(auto detection)</i>

Table 5-27 CAN Bit Rate Codes

5.33 EPOS P Version**Description**

This object contains the software version of the EPOS P.

Name	Version Numbers	
Index	0x5003	
Number of entries	0x04	

Name	EPOS P Software Version	
Index	0x5003	
Subindex	0x01	
Type	UNSIGNED16	
Access	RO	
Default Value	–	
Value Range	–	–

Description

This object contains the hardware version.

Name	EPOS P Hardware Version	
Index	0x5003	
Subindex	0x02	
Type	UNSIGNED16	
Access	RO	
Default Value	–	
Value Range	–	–

Value	Description
0x7300	EPOS P 24/5
0x7700	MCD EPOS P 60 W

Table 5-28 EPOS P Hardware Versions

Description

If the value of this object is not zero an application specific firmware is installed on this EPOS P.

Name	EPOS P Application Number	
Index	0x5003	
Subindex	0x03	
Type	UNSIGNED16	
Access	RO	
Default Value	–	
Value Range	–	–

Description

The application version is used as version number of an application or as internal revision number.

Name	EPOS P Application Version	
Index	0x5003	
Subindex	0x04	
Type	UNSIGNED16	
Access	RO	
Default Value	–	
Value Range	–	–

5.34 Module Version**Description**

This object contains the software version of the internal module.

Name	Version Numbers	
Index	0x5004	
Number of entries	0x04	

Name	Module Software Version	
Index	0x5004	
Subindex	0x01	
Type	UNSIGNED16	
Access	RO	
Default Value	–	
Value Range	–	–

Description

This object contains the hardware version of the internal module.

Name	Module Hardware Version	
Index	0x5004	
Subindex	0x02	
Type	UNSIGNED16	
Access	RO	
Default Value	–	
Value Range	–	–

Description

If the value of this object is not zero an application specific firmware is installed on the internal module.

Name	Module Application Number	
Index	0x5004	
Subindex	0x03	
Type	UNSIGNED16	
Access	RO	
Default Value	–	
Value Range	–	–

Description

The application version is used as version number of an application or as internal revision number.

Name	Module Application Version	
Index	0x5004	
Subindex	0x04	
Type	UNSIGNED16	
Access	RO	
Default Value	–	
Value Range	–	–

5.35 Serial Communication Frame Timeout

Description

This parameter defines the timeout over a RS-232 communication frame. It is scaled in milliseconds [ms].

Name	Serial Communication Frame Timeout	
Index	0x5005	
Subindex	0x00	
Type	UNSIGNED16	
Access	RW	
Default Value	500	
Value Range	–	–

5.36 Axis Control and Status Word, Slave Number**Description**

This object defines the assignment between the logical Axis number and the physical Slave device number.

Name	Axis 0 to 31 Control and Statusword
Index	0x5280...0x529F
Number of entries	0x03

Name	Axis 0 to 31 Slave Number	
Index	0x5280...0x529F	
Subindex	0x01	
Type	UNSIGNED8	
Access	RW	
Default Value	–	
Value Range	➔Table 5-29	–

Value	Slave Device
0	internal slave (with node-Id 1 on internal port)
1	slave with node-Id 1 on CAN Port
2	slave with node-Id 2 on CAN Port
...	...
127	slave with node-Id 127 on CAN Port
255	not assigned

Table 5-29 Slave Number

Description

Internally used.

Remarks

The EPOS P internal processing of the motion control function blocks needs the status of the connected axis. Therefore, the statusword of the associated axis should be transferred to this object by PDOs.

Name	Axis 0 to 31 Statusword	
Index	0x5280...0x529F	
Subindex	0x02	
Type	UNSIGNED16	
Access	RW	
Default Value	–	
Value Range	–	–

Description

Not in use (hidden).

Name	Axis 0 to 31 Controlword	
Index	0x5280...0x529F	
Subindex	0x03	
Type	UNSIGNED16	
Access	RW	
Default Value	–	
Value Range	–	–

5.37 Program Control**Description**

This object controls the start of a stored application program.

Name	Program Control	
Index	0x5F51	
Subindex	0x00	
Type	UNSIGNED16	
Access	RW	
Default Value	0	
Value Range	→ Table 5-30	–

Value	Boot-up State	Description
0	Stopped	no application execution
1	Coldstart	retain variables will be initialized
2	Warmstart	retain variables contain same value as before power down
3	Hotstart	

Table 5-30 Program Control Code

5.38 Process Input Integer 8**Description**

Process input channel for 8-bit integer variables.

Name	Process Input Integer 8	
Index	0xA000	
Number of entries	16	

Name	Process Input INT8 - 1 to 16	
Index	0xA000	
Subindex	0x01...0x10	
Type	INTEGER8	
Access	RW	
Default Value	–	
Value Range	–	–

5.39 Process Input Unsigned 8**Description**

Process input channel for unsigned 8-bit integer variables.

Name	Process Input Unsigned 8	
Index	0xA040	
Number of entries	16	

Name	Process Input UINT8 - 1 to 16	
Index	0xA040	
Subindex	0x01...0x10	
Type	UNSIGNED8	
Access	RW	
Default Value	–	
Value Range	–	–

5.40 Process Input Integer 16

Description

Process input channel for 16-bit integer variables.

Name	Process Input Integer 16
Index	0xA0C0
Number of entries	16

Name	Process Input INT16 - 1 to 16
Index	0xA0C0
Subindex	0x01...0x10
Type	INTEGER16
Access	RW
Default Value	–
Value Range	–

5.41 Process Input Unsigned 16

Description

Process input channel for unsigned 16-bit integer variables.

Name	Process Input Unsigned 16
Index	0xA100
Number of entries	16

Name	Process Input UINT16 - 1 to 16
Index	0xA100
Subindex	0x01...0x10
Type	UNSIGNED16
Access	RW
Default Value	–
Value Range	–

5.42 Process Input Integer 32**Description**

Process input channel for 32-bit integer variables.

Name	Process Input Integer 32	
Index	0xA1C0	
Number of entries	16	

Name	Process Input INT32 - 1 to 16	
Index	0xA1C0	
Subindex	0x01...0x10	
Type	INTEGER32	
Access	RW	
Default Value	–	
Value Range	–	–

5.43 Process Input Unsigned 32**Description**

Process input channel for unsigned 32-bit integer variables.

Name	Process Input Unsigned 32	
Index	0xA200	
Number of entries	16	

Name	Process Input UINT32 - 1 to 16	
Index	0xA200	
Subindex	0x01...0x10	
Type	UNSIGNED16	
Access	RW	
Default Value	–	
Value Range	–	–

5.44 Process Output Integer 8

Description

Process output channel for 8-bit integer variables.

Name	Process Output Integer 8
Index	0xA400
Number of entries	16

Name	Process Output INT8 - 1 to 16
Index	0xA400
Subindex	0x01...0x10
Type	INTEGER8
Access	RW
Default Value	–
Value Range	–

5.45 Process Output Unsigned 8

Description

Process output channel for unsigned 8-bit integer variables.

Name	Process Output Unsigned 8
Index	0xA4C0
Number of entries	16

Name	Process Output UINT8 - 1 to 16
Index	0xA4C0
Subindex	0x01...0x10
Type	UNSIGNED8
Access	RW
Default Value	–
Value Range	–

5.46 Process Output Integer 16**Description**

Process output channel for 16-bit integer variables.

Name	Process Output Integer 16	
Index	0xA540	
Number of entries	16	

Name	Process Output INT16 - 1 to 16	
Index	0xA540	
Subindex	0x01...0x10	
Type	INTEGER16	
Access	RW	
Default Value	–	
Value Range	–	–

5.47 Process Output Unsigned 16**Description**

Process output channel for unsigned 16-bit integer variables.

Name	Process Output Unsigned 16	
Index	0xA580	
Number of entries	16	

Name	Process Output UINT16 - 1 to 16	
Index	0xA580	
Subindex	0x01...0x10	
Type	UNSIGNED16	
Access	RW	
Default Value	–	
Value Range	–	–

5.48 Process Output Integer 32

Description

Process output channel for 32-bit integer variables.

Name	Process Output Integer 32
Index	0xA640
Number of entries	16

Name	Process Output INT32 - 1 to 16
Index	0xA640
Subindex	0x01...0x10
Type	INTEGER32
Access	RW
Default Value	–
Value Range	–

5.49 Process Output Unsigned 32

Description

Process output channel for unsigned 32-bit integer variables.

Name	Process Output Unsigned 32
Index	0xA680
Number of entries	16

Name	Process Output UINT32 - 1 to 16
Index	0xA680
Subindex	0x01...0x10
Type	UNSIGNED32
Access	RW
Default Value	–
Value Range	–

5.50 Overview

5.50.1 Object Dictionary Overview

Index	Name	Type	Attribute	Defined in...
0x1000	Device Type	UNSIGNED32	RO	DS-301
0x1002	Manufacturer Status Register	UNSIGNED32	RO	DS-301
0x1001	Error Register	UNSIGNED8	RO	DS-301
0x1003	Error History	RECORD	RW	DS-301
0x1005	COB-ID SYNC	UNSIGNED32	RW	DS-301
0x1006	Communication Cycle Time	UNSIGNED32	RW	DS-301
0x1007	Synchronous Window Length	UNSIGNED32	RW	DS-301
0x1008	Device Name	VISIBLE_STRING	CONST	DS-301
0x1010	Store Parameters	UNSIGNED32	RW	DS-301
0x1011	Restore Default Parameters	UNSIGNED32	RW	DS-301
0x1016	Consumer Heartbeat Time	ARRAY	RW	DS-301
0x1017	Producer Heartbeat Time	UNSIGNED16	RW	DS-301
0x1018	Identity Object	ARRAY	RW	DS-301
0x1019	Synchronous Counter	UNSIGNED8	RW	DS-301
0x1280...0x12FF	SDO Client Parameter	RECORD	RW	(DS-301)
0x1400...0x141F	Receive PDO Parameter	RECORD	RW	DS-301
0x1500...0x1503	Receive PDO Parameter	RECORD	RW	DS-301
0x1600...0x161F	Receive PDO Mapping	RECORD	RW	DS-301
0x1700...0x1703	Receive PDO Mapping	RECORD	RW	DS-301
0x1800...0x181F	Receive PDO Parameter	RECORD	RW	DS-301
0x1900...0x1903	Receive PDO Parameter	RECORD	RW	DS-301
0x1A00...0x1A1F	Transmit PDO Mapping	RECORD	RW	DS-301
0x1B00...0x1B03	Transmit PDO Mapping	RECORD	RW	DS-301
0x1F26	Expected Configuration Date	ARRAY	RW	DSP-302
0x1F27	Expected Configuration Time	ARRAY	RW	DSP-302
0x1F80	Nmt Start-up	UNSIGNED32	RW	DSP-302
0x1F81	Slave Assignment	ARRAY	RW	DSP-302
0x1F82	Request Nmt	ARRAY	RW	DSP-302
0x1F84	Device Type Identification	ARRAY	RW	DSP-302
0x1F85	Vendor Identification	ARRAY	RW	DSP-302
0x1F86	Product Code	ARRAY	RW	DSP-302
0x1F87	Revision Number	ARRAY	RW	DSP-302

Index	Name	Type	Attribute	Defined in...
0x1F88	Serial Number	ARRAY	RW	DSP-302
0x1F89	Boot Time	UNSIGNED32	RW	DSP-302
0x5000	Node ID	UNSIGNED8	RW	—
0x5001	CAN Bittate	UNSIGNED16	RW	—
0x5003	EPOS P Version	ARRAY	RO	—
0x5004	Module Version	ARRAY	RO	—
0x5005	Serial Communication Frame Timeout	UNSIGNED16	RW	—
0x5280...0x529F	Axis Control and Status Word, Slave Number	RECORD	RW	—
0x5F51	Program Control	UNSIGNED16	RW	—
0xA000	Process Input Integer 8	ARRAY	RO	DS-405
0xA040	Process Input Unsigned 8	ARRAY	RO	DS-405
0xA0C0	Process Input Integer 16	ARRAY	RO	DS-405
0xA100	Process Input Unsigned 16	ARRAY	RO	DS-405
0xA1C0	Process Input Integer 32	ARRAY	RO	DS-405
0xA200	Process Input Unsigned 32	ARRAY	RO	DS-405
0xA400	Process Output Integer 8	ARRAY	RO	DS-405
0xA4C0	Process Output Unsigned 8	ARRAY	RO	DS-405
0xA540	Process Output Integer 16	ARRAY	RO	DS-405
0xA580	Process Output Unsigned 16	ARRAY	RO	DS-405
0xA640	Process Output Integer 32	ARRAY	RO	DS-405
0xA680	Process Output Unsigned 32	ARRAY	RO	DS-405

Table 5-31 Object Dictionary Overview

5.50.2 Object Data Types

Type	Description	Size [Bits]	Range
INTEGER8	Signed Integer	8	-128...+127
INTEGER16	Signed Integer	16	-32 768...+32 767
INTEGER32	Signed Integer	32	-2 147 483 648...+2 147 483 647
UNSIGNED8	Unsigned Integer	8	0...255
UNSIGNED16	Unsigned Integer	16	0...65 535
UNSIGNED32	Unsigned Integer	32	0...4 294 967 295
UNSIGNED64	Unsigned Integer	64	0...18 446 744 073 709 551 615
VISIBLE_STRING	Array of (8-bit) characters	n * 8	–
ARRAY	Array of other type	n * size	Range of type
RECORD	Structure of other types	–	–

Table 5-32 Object Data Types

5.50.3 Object Attributes

Attribute	Description
RW	read and write access
RO	read only access
CONST	read only access, value is constant

Table 5-33 Object Attributes

6 Firmware Version History

6.1 Version Overview

Date [d.m.y]	Version		Application		Description
	Software	Hardware	#	Version	
27.10.2009	0111h	7300h, 7700h	0000h	0000h	Bug fixing
13.06.2007	0110h	7300h, 7700h	0000h	0000h	Bug fixing, new features
07.11.2006	0103h	7300h, 7700h	0000h	0000h	Bug fixing
24.08.2006	0102h	7300h, 7700h	0000h	0000h	Bug fixing
21.07.2006	0101h	7300h, 7700h	0000h	0000h	Bug fixing, new product
26.04.2006	0100h	7300h	0000h	0000h	First Firmware Release

Table 6-34 Firmware Versions Overview

6.2 Software Version 0111h

0111h	Hardware	Firmware Filename
Binary Files	EPOS P 24/5	Epos_P_0111h_7300h_0000h_0000h.bin
	MCD EPOS P 60 W	Epos_P_0111h_7700h_0000h_0000h.bin

Table 6-35 Software Version 0111h (1)

0111h	Description	
Changes	Bugfix	Sporadic occurrence of unforced "CAN communication time out" solved

Table 6-36 Software Version 0111h (2)

6.3 Software Version 0110h

0110h	Hardware	Firmware Filename
Binary Files	EPOS P 24/5	Epos_P_0110h_7300h_0000h_0000h.bin
	MCD EPOS P 60 W	Epos_P_0110h_7700h_0000h_0000h.bin

Table 6-37 Software Version 0110h (1)

0110h	Description	
Changes	Bugfix	Unsupported data types REAL and POINTER removed
	Bugfix	Unsupported function blocks and functions removed (all REAL based, MC_WriteBoolParameter, CAN_ReadSlaveError)
	Bugfix	Unsupported task type 'shutdown' removed
	Bugfix	Firmware download erases automatically the obsolete application program
	Bugfix	Debugging of Ladder diagrams activated (function blocks, power flow)
	Bugfix	MC_MoveVelocity function block behavior on calling with 0 velocity corrected
	Bugfix	Operator MOD added in native code (speed only)
	Bugfix	Command → Restore Default Parameters no longer allowed during running
	Bugfix	cTypecasts corrected (DINT_TO_TIME, ...)
	Communication	Handling of internal CAN SDO communication and service interface improved
	NMT Master	'NMT reset' and 'NMT reset communication' sequence improved
	Axis assignment	Axis to slave assignment can be done by objects 0x5280 - 0x529F (meaning and data type of objects 0x1280 - 0x129F → SDO Client Parameter adapted also)
	PLCopen	Adaptations according PLCopen standard 1.1 (MC_ReadAxisState, axis state machine, ...)
	Error Information	Advanced error information system (new error on timer or interrupt task execution overrun)
New Features	Marker area	New Marker area %M (with general purpose and error information sub-area)
	Function Block	New Function Block 'Etrc'
	Communication	New communication objects: 0x1017 & 0x5017 → Producer Heartbeat Time / 0x1F82 → Request Nmt / 0x1002 → Manufacturer Status Register / 0x1011-02 → Restore Default Parameters / 0x12A0...0x12FF → SDO Client Parameter / 0x5000 → Node ID

Table 6-38 Software Version 0110h (2)

6.4 Software Version 0103h

0103h	Hardware	Firmware Filename
Binary Files	EPOS P 24/5	Epos_P_0103h_7300h_0000h_0000h.bin
	MCD EPOS P 60 W	Epos_P_0103h_7700h_0000h_0000h.bin

Table 6-39 Software Version 0103h (1)

0103h	Description	
Changes	EPOS	new Slave Firmware Version 2032

Table 6-40 Software Version 0103h (2)

6.5 Software Version 0102h

0102h	Hardware	Firmware Filename
Binary Files	EPOS P 24/5	Epos_P_0102h_7300h_0000h_0000h.bin
	MCD EPOS P 60 W	Epos_P_0102h_7700h_0000h_0000h.bin

Table 6-41 Software Version 0102h (1)

0102h	Description	
Changes	Bugfix	MCD EPOS P 60 W: Retain Variables space corrected to 512 bytes
	Bugfix	initialize CAN network at boot-up even though the application will not be started
	Bugfix	Error History will be cleared at CAN network initialization
	Bugfix	watchdog reset enabled
	Bugfix	reset node command enabled
	Error History	manufacturer specific pat of the →Error History extended (additional warning flag and node-id)
	Error History	configuration errors while Nmt boot-up will be reported to the →Error History also
	Electronic Data Sheet	minor corrections in eds-file

Table 6-42 Software Version 0102h (2)

6.6 Software Version 0101h

0101h	Hardware	Firmware Filename
Binary Files	EPOS P 24/5	Epos_P_0101h_7300h_0000h_0000h.bin
	MCD EPOS P 60 W	Epos_P_0101h_7700h_0000h_0000h.bin

Table 6-43 Software Version 0101h (1)

0101h	Description	
Changes	Program Control	default value of →Program Control changed to Stopped (0)
	Consumer Heartbeat	the port code for CAN port number 2 in →Consumer Heartbeat Time is changed
	Bugfix	launching of event triggers PDOs corrected
	Bugfix	writing of →Transmit PDO Parameter Inhibit Time corrected
	Bugfix	writing of →Synchronous Counter (Object 0x1019) corrected
	Bugfix	detection of reinitialized CAN Nodes improved
	Bugfix	calculation of used PLC memory corrected
	Bugfix	Nmt commands to all Nodes will be executed correct

Table 6-44 Software Version 0101h (2)

6.7 Software Version 0100h

0100h	Hardware	Firmware Filename
Binary Files	EPOS P 24/5	Epos_P_0100h_7300h_0000h_0000h.bin

Table 6-45 Software Version 0100h (1)

0100h	Description	
Changes	none	Initial release version
New Features	none	Initial release version

Table 6-46 Software Version 0100h (2)

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