



# CAN 300 PRO - Application Example DS402 Maxon

CAN Communication Module for S7-300 Application Example of CANopen<sup>®</sup> DS402 with Maxon Motors

# Manual

Edition 4 / 22.12.2011

All rights are reserved, including those of translation, reprinting, and reproduction of this manual, or parts thereof. No part of this manual may be reproduced, processed, copied, or transmitted in any way whatsoever (photocopy, microfilm, or other method) without the express written permission of Systeme Helmholz GmbH, not even for use as training material, or using electronic systems. All rights reserved in the case of a patent grant or registration of a utility model or design.

Copyright © 2011 by

#### Systeme Helmholz GmbH

Hannberger Weg 2, 91091 Grossenseebach, Germany

#### Note:

We have checked the content of this manual for conformity with the hardware and software described. Nevertheless, because deviations cannot be ruled out, we cannot accept any liability for complete conformity. The information in this manual is regularly updated. When using purchased products, please heed the latest version of the manual, which can be viewed in the Internet at www.helmholz.com, from where it can also be downloaded.

Our customers are important to us. We are always glad to receive suggestions for improvement and ideas.

S7-300, Step and SIMATIC are registered trademarks of SIEMENS AG

## Revision history of this document:

Edition	Date	Revision
1	06.04.2009	1 <sup>st</sup> version
2	24.06.2009	minor corrections
3	15.04.2010	Modification for CANParam v4.20
4	22.12.2011	Adaptation for the example with current mode and further small corrections

# Contents

1	Overview	6
1.1	Application and function description	6
1.2	PLC configuration	7
1.3	Maxon motor configuration	8
2	Configuring the CAN module	9
2.1	Setting the CANopen <sup>®</sup> Master	9
2.2	Setting the Maxon motor as a slave	10
2.3	Setting the PDOs	11
3	Programming in the PLC	13
3.1	Overview	13
3.2	Process image assignment	13
3.3	Example FC 1 (DS402 Maxon test)	14
3.4	Profile velocity (FB 40)	15
3.5	Profile position (FB 41)	16
3.6	Homing (FB 42)	17
3.7	Use with several drives	19
3.8	Content of the status word	20

### 1 Overview

### 1.1 Application and function description



This manual describes the application example (handling blocks) for controlling a Maxon motor with an EPOS24/5 controller using a CAN 300 PRO module according to the CANopen<sup>®</sup> profile DS402. The application example should also work with EPOS 24/1, EPOS 70/10, EPOS2 24/5, EPOS2 50/5 und MCD EPOS 60W.

This is for use in conjunction with the manual for the CAN 300 PRO module. The information in these manuals is assumed to be known, in particular, the description of the CANopen<sup>®</sup> protocol and the CANopen<sup>®</sup> master handling modules.

In addition to this, the CANopen<sup>®</sup> profile description "DSP-402 Device Profile for Drives and Motion" and the CANopen<sup>®</sup> description from Maxon "EPOS Firmware Specification," especially Section "Object Dictionary" are very helpful.

The handling blocks described here (FBs) and the example project for CANParam provide the following basic functions:

- Basic initialization of a drive
- Profile velocity mode
- Profile position mode
- Homing mode
- Current mode

The handling blocks are functionally based on the Maxon instruction "EPOS Application Note Device Programming."

### 1.2 PLC configuration

In the application example, an S7-300 CPU312, a 32-bit digital output module, and a CAN 300 PRO module are used.

🖳 HW Config - [CAN300PRO DS402 (Configuration) DS402_C3PR0_V10_Maxon]								
🛄 Station Edit Insert PLC View Op	🖓 Station Edit Insert PLC View Options Window Help							
D 🚅 🔓 🗣 👫   🚑    🐚 💼	D 📂 💱 🖉 🎭 🥌 📾 💼 🏙 🏛 📳 🖽 🛠 🕅							
		-			<u>^</u>			
= (0) UR		3			<u>F</u> ind:		mt m	
2 CPU 312					Profile	Standard		
3 4 DD32xDC24V/0.5A		-				PROFIBUS DP	1	
5 2 CAN 300 PRO						PROFIBUS-PA		
6 7						SIMATIC 300		
8					ŧ	- <u> </u>		
9		-				E-C-SUU E-C AS-Interface		
11						🗄 🧰 Industrial Ethernet		
						E Dint-to-Point		
L						🖻 🧰 CP 340		
					<u>~</u>	CP 340 RS232C		
					-	CP 340 20mA TTY		
(0) UR								
Slot Module Order nu	umber Fir	M I addre	. Q addr	Comment	1	CP 340 20mA TTY		
		_						
2 CPU 312 6ES7 31:	2-1AE13-0AB0 V2.6	2			E	- CPU-300		
4 D032xDC24V/0.5A 6ES7 32	2-1BL00-0AA0		03			Head FM-300		
5 CAN 300 PRO 6ES7 34	0-1AH00-0AE0	256271	256271			- M-300		
7					Ē	He M7-EXTENSION	_	
8					Ē			
<u>9</u> 10					E E	- CINA 740 400		
11					6ES7	340-1AH01-0AE0	۰ ۴	
					Comm RS23	unication processor with connection: 2C (ASCII, 3964R, printer); also availabl	, 🗐 –	
1					as SIF	LUS module with order number 6AG1	~	
Press F1 to get Help.								

The digital output module is for displaying status information.

#### 1.3 Maxon motor configuration

The handling example was created with an EPOS 24/5. The motor is connected as Node 1.

This handling example assumes that the EPOS system is ready for use (cabling, tuning, parameters of the motor used, etc.).

Please read carefully the Maxon Motor documentation on configuring and commissioning the EPOS and the motor.

With the "Object Dictionary" of the EPOS User Interfaces it is possible to monitor the CANopen<sup>®</sup> SDO Objects directly.

We recommend testing the basic motor functions with the EPOS software:

🔆 EPOS Studio 1.41	š EPOS Studio 1.41 [C:\WyProject.pjm*] - [Profile Yelocity Mode - EPOS [Node 1]] 📃 🗖 🔀																				
Eile View Extras Wi	Elle View Extras Window 2																				
: 🚰 😂 🖬 🔝 🏺	🔋 🔯 🕦 🤇																				
Mavigation	* ^	Prof	ile Veloc	ity Mode	• EPC	IS [Node 1]															<b>₹</b> ×
vvorkspace □	*		maxon		maxon	maxon		maxon		IIIdXon	maxon		maxon		maxon	maxon		maxon		maxon	
		S		S			⊆			⊆					2	-	⊆		<u>D</u>		5
		max(		max(		Profile Ve	elocit	у Мо	de			The <b>EF</b>	<i>205</i>	is enat	oled	<u> </u>			max(		max(
			uo	_		Operation I Active Op	rlode eration №	1ode F	ProfileVelocit	Mode		A	ctivate Pi	rofile Velo	sity Mode	]				uo	_
			max	_		Profile Target Ve Profile Typ Profile Ac	locity celeration	0 Tra	pezoidal 📘	rpm		Parame Max P Quicks	ters rofile Velc Stop Deco	ocity eleration	25000		rpm rpm/s			max	
		maxor		maxor		Profile De	celeration	n  500	, 10	rpm/s									maxor		maxor
			NOXE	_		The Epo er	s is abled		Set⊻eloo <u>H</u> alt	ity		Actual \ Velocil Velocil	/alues ty Actual <sup>1</sup> ty Deman	Value d Value	0		rpm rpm			NOXE	
Workspace			Ĕ																	Ĕ	
Image: Communication       Wizards       Tools	1	maxon		maxon		maxon	maxon		maxon	maxon		maxon		maxon			maxon		maxon		maxon
	»				c					_			c					c			-
Status																					<b>4</b> ×
Type Node		Coo	de	[	Nam	•			D	escription											

### 2 Configuring the CAN module

To use the example program, the provided CAN project "C3PRO DS402 Maxon.par" with the CANParam software (Version 4 and higher) must be transferred to the CAN 300 PRO module.

CANParam v4.03		
File Project Online Help Language		
	CAN300 PRO CANopen Co	mPort COM3 (CAN300/400 via USB)
Projects		
⊟ C3PRO DS402 Maxon	Node ID 85	Baudrate 1M
🖨 Master		
🖻 - Slave 1 (Maxon EPOS)	- Synchronous signal	
E T PDO's		
- T PDO 1	Sync activate	50 msec
T PDO 2	Device meritaring	
T PDO 3	Device monitoling	17 
T PDO 4	🔽 Master heartbeat	500 msec
E R PDO's	Status behaviour	
- R PDO 1	- Startup benaviour	
R PDU 2	Autostart of slaves	✓ With PLC run/stop - master start/stop
R PDU 3	- Wait for PLC start	
6 FDU 4	j waktor i ze stak	
	Waiting for slave-reset	10 sec
	- PLC I/O buffer	
	Memory type	Base addr Butter size
	IN IB 💌	50 50 Byte
	OUT QB 💌	50 50 Byte
	🔽 Blocking time after startup	
	- BTB polling	
	, man pointig	

### 2.1 Setting the CANopen Master

The application example works with a 1 Mbit CAN bus.

The SYNC signal is used for PDO communication with the Maxon EPOS. The time for the SYNC signal can be adapted to the required response time and the cycle time of the PLC.

The data of the PDOs are mapped in the PLC in the input or output image starting at IB 50 and QB 50.

CANParam v4 20				
File Project Online Help Language				
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0 D	CAN 300 PRO CA	Nopen ComPort	COM5 (CAN 300/400 via USB) 💌
Projects				
E C3PR0 DS402 Maxon				
⊟- Master				
🖮 Slave 1 (Maxon EPOS)	Node ID	1	🔽 Check	Device type 0x0192
E T PDO's				
T PDO 1	Slave name	Maxon EPOS	Mandatory	Reset after failure
T PDO 2		-		
- T PDO 3	Note	Maxon EPUS 24/5		
- T PDO 4	-Device Monito	ring		
- TPD0.5				
T PD0 5	0	OFF C Produ	cer heartbeat 🔅 Noc	deguard Lifetime faktor
T PD0 7		0	500	
		10	ins 1000	ms 13
	-Consumer hea	rtbeat		
B PD0 2		Heartheat monitored b	u the meeter	
B PD0 3		meanuear monitoreu r	ly the master i	
- B PDO 4	1.5			5
- R PD0.5				
- R PDO 6				
R PDO 7				
- R PDO 8				
SDO's				

### 2.2 Setting the Maxon motor as a slave

The Maxon EPOS is identified by the device type 0x0192. The device type is compared with the SDO 0x1000 when the master starts up.

The slave is monitored by the master every 500ms by means of node guarding.

### 2.3 Setting the PDOs

The handling blocks are based on the DS402 standard PDO mapping of the Maxon motor. The PDO 4 has been extend for the current mode.

TPDO1	(is transr	nitted by	the EPOS):
-------	------------	-----------	------------

	(		/.		
	Byte 0-1:	SDO 6041	/0	Status word	
ТΡ	DO2 (is transr	nitted by the	EPOS):		
	Byte 0+1:	SDO 6041	/0	Status word	
	Byte 2:	SDO 6061	/0	Mode of operation d	isplay
	🔽 T PDO 2 activate				
	COB ID	0x281 Offset	2	Byte (IB 52 - 54)	
	Transmission type	Event driven on char	nge (255) 💌		
	Data length 3	Byte			
		Diata tuna	Jv Transmit Pi	Subindex	
	N-7 E0				
	10 52		0.00041	0.00	
	IB 54		UX6061		
	IB	<b>•</b>	0x0000	0x00	
ТΡ	DO3 (is transr	nitted by the	EPOS):		
	Byte 0+1:	SDO 6041	/0	Status word	
	Byte 2-5:	SDO 6064	1/0	Position actual value	
	🔽 T PDO 3 activate				
	COB ID	0x381 Offset	10	Byte (IB 60 - 65)	
	Transmission type	SYNC cyclic (1-240)	•	1 💌	
	Data length 6	Byte			
			🔽 Transmit Pl	DO mapping to the slave	
		Data type	Index	Subindex	
	IW 60	Unsigned16 💌	0x6041	0x00	
	ID 62	Unsigned32 🔻	0x6064	0x00	
			-		

### **TPDO4** (is transmitted by the EPOS):

IB --

Byte 0+1:	SDO 6041/0	Status word
Byte 2-5:	SDO 606C/0	Velocity actual value
Byte 6+7:	SDO 2027/0	Current act. value averaged

0x0000

-

0x00

TPDO 3 & TPDO4 are transmitted to the SYNC signal.

RP	PDO1 (is received by the EPOS):							
	Byte 0+1:	SDO 604	0/0	Control word				
RP	<b>RPDO2</b> (is received by the EPOS):							
	Byte 0+1:	SDO 604	0/0	Control word				
	Byte 2:	SDO 606	0/0	Modes of operation				
	🔽 R PDO 2 activate							
	COB ID	0x301 Offset	2	Byte (QB 52 - 54)				
	Transmission type	Event driven on cha	inge (255) 💌					
	Data length 3	Byte						
			🔽 Transmit P	DO mapping to the slave				
		Data type	Index	Subindex				
	QW 52	Unsigned16 💌	0x6040	0x00				
	QB 54	Unsigned8 💌	0x6060	0x00				
	QB	•	0x0000	0x00				
RP	DO3 (is receiv	ed by the EP	OS):					
	Byte 0+1:	SDO 604	0/0	Control word				
	Byte 2-5:	SDO 607	A/0	Target position				
	🔽 R PDO 3 activate							
	COB ID	0x401 Offset	10					

-				-	-
- 🔽 B PDO 3 activate					
J• III DO Sacinaio					
COB ID	0x401	Offset	10	Byte	(QB 60 - 65)
Transmission turo	Eugent driver	n on ohon	ao (255)		
riansmission type	L ven dive	n on chan	ge (200)		
Data length - 6	Bute				
Data icingti i o	byte				
			🔽 Transmit PD(	) mapping	; to the slave
	Data type		Index	Subinde	×
QW 60	Unsigned16	5 💌	0x6040	0x00	
QD 62	Unsigned32	2 👻	0x607A	0x00	
QB		-	0x0000	0x00	
	,		,	,	

**RPDO4** (is received by the EPOS):

Byte 0+1:	SDO 6040/0	Control word
Byte 2-5:	SDO 60FF/0	Target velocity
Byte 6+7:	SDO 2030/0	Current mode setting value

### 3 Programming in the PLC

#### 3.1 Overview

The example contains the handling blocks of the CANopen<sup>®</sup> Master handling (FB20 – FB24) that are explained in detail in the "CAN 300 PRO" manual.

FB40 and FB43 are the blocks specially created for handling the Maxon motor and they call the blocks of the CANopen<sup>®</sup> Master handling.

The input process data are read from the CAN 300 PRO module at the start of the OB1 by calling FB20 "IO Read". At the end of OB1, the output data are transferred to the CAN 300 PRO with FB21 "IO Write".

#### 3.2 Process image assignment

Assignment of the EPOS values in the process image:

IW 50	TPDO1	Status word
IW 52	TPDO2	Status word
IB 54	TPDO2	Actual mode of operation
IW 60	TPDO3	Status word
ID 62	TPDO3	Actual position
IW 70	TPDO4	Status word
ID 72	TPDO4	Actual velocity
IW 76	TPDO4	Current act. value averaged
QW 50	RPDO1	Control word
QW 52	RPDO2	Control word
QB 54	RPDO2	Set mode of operation
QW 60	RPDO3	Control word
QD 62	RPDO3	Set position
QW 70	RPDO4	Control word
QD 72	RPDO4	Set velocity
QW 76	RPDO4	Current mode setting value

### 3.3 Example FC 1 (DS402 Maxon test)

The functions of the handling blocks are triggered in FC1 by the bits of marker bytes 108, 109 and 112.

The drive functions are activated with the following markers in FC1:

Network 1:

M 108.0	Init profile velocity mode (FB40)
M108.1	Set velocity
MD 120	Target velocity
Network 2:	
M 108.4	Init profile position mode (FB41)
M108.5	Activate positioning
MD 124	Target position
Network 3:	
M 109.0	Init homing mode (FB42)
M 109.1	Activate homing
MW 32	Homing method
Network 4:	
M 112.0	Init profile current mode (FB43)
M 112.1	Set current
MW 116	Target current

### 3.4 Profile velocity (FB 40)

The **INIT\_VELOCITYMODE (FB 40)** function block activates the profile velocity mode of the drive and transfers the necessary parameters.

The block requires information of the EPOS ("Status word," "Actual mode of operation") from the input image and sets the "Control word" and "Mode of operation" in the output image accordingly.

Activate	:=M108.0
Base	:=256
Node	:=1
Statusword	:=IW52
Mode_of_Operation	:=IB54
MaxProfileVelocity	:=L#5000
ProfileAcceleration	:=L#2000
ProfileDeceleration	:=L#2000
QuickStopDecel	:=L#4000
Busy	:=M110.0
Done	:=M110.1
Error	:=M111.7
RetVal	:=MW114
Controlword	:=QW52
Set Mode of Operation	:=0B54

Parameter	Т	уре	Function
Activate	IN	BOOL	Activation bit
Base	IN	INT	Basic address of the module
Node	IN	INT	Node ID
Status word	IN	WORD	Actual status word of the EPOS
Mode_of_Operation	IN	BYTE	Actual EPOS "Mode of Operation"
MaxProfileVelocity	IN	DWORD	→ SDO 607F/0
ProfileAcceleration	IN	DWORD	→ SDO 6083/0
ProfileDeceleration	IN	DWORD	→ SDO 6084/0
QuickStopDecel	IN	DWORD	→ SDO 6085/0
Busy	OUT	BOOL	Flag bit for current function
Done	OUT	BOOL	Flag bit for initialization complete
Error	OUT	BOOL	Flag bit for error occurred
RetVal	OUT	WORD	Error number
Control word	OUT	WORD	Output of the control word to the EPOS
Set_Mode_of_ Operation	OUT	BYTE	Output of the mode of operation to the

### 3.5 Profile position (FB 41)

The **INIT\_POSITIONMODE (FB 41)** function block activates the profile position mode of the drive and transfers the necessary parameters.

The block requires information of the EPOS ("Status word," "Actual mode of operation") from the input image and sets the "Control word" and "Mode of operation" in the output image accordingly.

CALL FB 41 , DB41	
Activate	:=M108.4
Base	:=256
Node	:=1
Statusword	:=IW52
Mode_of_Operation	:=IB54
ProfileVelocity	:=L#5000
ProfileAcceleration	:=L#2000
ProfileDeceleration	:=L#2000
QuickStopDecel	:=L#4000
Busy	:=M110.4
Done	:=M110.5
Error	:=M111.7
RetVal	:=MW114
Controlword	:=QW52
Set_Mode_of_Operatior	1:=QB54

Parameter	Туре		Function
Activate	IN	BOOL	Activation bit
Base	IN	INT	Basic address of the module
Node	IN	INT	Node ID
Status word	IN	WORD	Actual status word of the EPOS
Mode_of_Operation	IN	BYTE	Actual EPOS "Mode of Operation"
ProfileVelocity	IN	DWORD	→ SDO 6081/0
ProfileAcceleration	IN	DWORD	→ SDO 6083/0
ProfileDeceleration	IN	DWORD	→ SDO 6084/0
QuickStopDecel	IN	DWORD	→ SDO 6085/0
Busy	OUT	BOOL	Flag bit for current function
Done	OUT	BOOL	Flag bit for initialization complete
Error	OUT	BOOL	Flag bit for error occurred
RetVal	OUT	WORD	Error number
Control word	OUT	WORD	Output of the control word to the EPOS
Set_Mode_of_ Operation	OUT	BYTE	Output of the mode of operation to the EPOS

### 3.6 Homing (FB 42)

The **INIT\_HOMINGMODE (FB 42)** function block activates the homing mode of the drive and transfers the necessary parameters.

The block requires information of the EPOS ("Status word," "Actual mode of operation") from the input image and sets the "Control word" and "Mode of operation" in the output image accordingly.

ativate	·-M109 0
Activate	
Base	•=250
Node	:=1
Statusword	:=IW52
Mode_of_Operation	:=IB54
HomingMethod	:=MW32
HomeOffset	:=L#0
HomingAcceleration	:=L#2000
SpeedSwitchSearch	:=L#1000
SpeedZeroSearch	:=L#1000
CurrentThreshold	:=500
QuickStopDecel	:=L#4000
Busy	:=M111.0
Done	:=M111.1
Error	:=M111.7
RetVal	:=MW114
Controlword	:=QW52
Set Mode of Operation	1:=0B54

Parameter	1	Гуре	Function
Activate	IN	BOOL	Activation bit
Base	IN	INT	Basic address of the module
Node	IN	INT	Node ID
Status word	IN	WORD	Actual status word of the EPOS
Mode_of_Operation	IN	BYTE	Actual EPOS "Mode of Operation"
HomingMethod	IN	WORD	→ SDO 6098/0
HomeOffset	IN	DWORD	→ SDO 607C/0
HomingAcceleration	IN	DWORD	→ SDO 609A/0
SpeedSwitchSearch	IN	DWORD	→ SDO 6099/1
SpeedZeroSearch	IN	DWORD	→ SDO 6099/2
CurrentThreshold	IN	DWORD	→ SDO 2080/0
QuickStopDecel	IN	DWORD	→ SDO 6085/0
Busy	OUT	BOOL	Flag bit for current function
Done	OUT	BOOL	Flag bit for initialization complete
Error	OUT	BOOL	Flag bit for error occurred
RetVal	OUT	WORD	Error number
Control word	OUT	WORD	Output of the control word to the EPOS
Set_Mode_of_	OUT	BYTE	Output of the mode of operation to the
Operation			EPOS

### 3.7 Profile current (FB 43)

The **INIT\_CURRENTMODE (FB 43)** function block activates the homing mode of the drive and transfers the necessary parameters.

The block requires information of the EPOS ("Status word," "Actual mode of operation") from the input image and sets the "Control word" and "Mode of operation" in the output image accordingly.

Activate :=M112.0 Base :=256 Node :=1 Statusword :=IW52
Base :=256 Node :=1 Statusword :=IW52
Node :=1 Statusword :=IW52
Statusword :=IW52
Mada of Operation : TDE4
Mode_ol_operation ·=1854
ProfileCurrent :=0
CurrentLimit :=1000
MaxSpeed :=1000
ThermalTime :=40
Busy :=M113.0
Done :=M113.1
Error :=M111.7
RetVal :=MW114
Controlword :=QW70
<pre>Set_Mode_of_Operation:=QB54</pre>

Parameter	1	Гуре	Function
Activate	IN	BOOL	Activation bit
Base	IN	INT	Basic address of the module
Node	IN	INT	Node ID
Status word	IN	WORD	Actual status word of the EPOS
Mode_of_Operation	IN	BYTE	Actual EPOS "Mode of Operation"
ProfileCurrent	IN	INT	→ SDO 2030/0
CurrentLimit	IN	INT	→ SDO 6410/1
MaxSpeed	IN	INT	→ SDO 6410/4
ThermalTime	IN	INT	→ SDO 6410/5
Busy	OUT	BOOL	Flag bit for current function
Done	OUT	BOOL	Flag bit for initialization complete
Error	OUT	BOOL	Flag bit for error occurred
RetVal	OUT	WORD	Error number
Control word	OUT	WORD	Output of the control word to the EPOS
Set_Mode_of_	OUT	BYTE	Output of the mode of operation to the
Operation			EPOS

#### 3.8 Use with several drives

If multiple drives are used, they must all be defined in the CANopen<sup>®</sup> Master project. In the process image, make sure that the addresses do not overlap.

The function blocks are used for various drives. Only the parameter "node" has to be adapted.

Please note that simultaneous activation of the "INIT\_..." block must be avoided because transmission of the SDOs executed in the blocks cannot be performed simultaneously. These blocks must only be called successively for each drive.



### 3.9 Content of the status word

The status word of the EPOS is stored in IW50:

Bit	Description	PPM	PVM	HMM
15	Position referenced to home position			
14	Refresh cycle of power stage			
13	Operation mode specific	Following error	Not used	Homing error
12	Operation mode specific	Set-point ack	Speed	Homing attained
11	not used (Internal limit active)			
10	Operation mode specific	Target reached	Target reached	Target reached
9	Remote (NMT operational state)			
8	Offset current measured			
7	Warning			
6	Switch on disable			
5	Quick stop			
4	Voltage enabled (power stage on)			
3	Fault			
2	Operation enable			
1	Switched on			
0	Ready to switch on			

State	Statusword [binary]	Description
Start	x0xx xxx0 x000 0000	Bootup
Not Ready to Switch On	x0xx xxx1 x000 0000	The current offset will be measured
_		The drive function is disabled
Switch On Disabled	x0xx xxx1 x100 0000	The drive initialization is complete
		The drive parameters may be changed
		The drive function is disabled
Ready to Switch On	x0xx xxx1 x010 0001	The drive parameters may be changed
		The drive function is disabled
Switched On	x0xx xxx1 x010 0011	The drive function is disabled
Refresh	x1xx xxx1 x010 0011	Refresh power stage
Measure Init	x1xx xxx1 x011 0011	The power is applied to motor
		The motor resistance or the commutation delay is measured
Operation Enable	x0xx xxx1 x011 0111	No faults have been detected
		The drive function is enabled and power is applied to motor
Quick Stop Active	x0xx xxx1 x001 0111	The quick stop function is being executed
		The drive function is enabled and power is applied to motor
Fault Reaction Active	x0xx xxx1 x000 1111	A fault has occurred in the drive
(disabled)		The drive function is disabled
Fault Reaction Active	x0xx xxx1 x001 1111	A fault has occurred in the drive
(enabled)		The quick stop function is being executed
		The drive function is enabled and power is applied to motor
Fault	x0xx xxx1 x000 1000	A fault has occurred in the drive
		The drive parameters may be changed
		The drive function is disabled

You will find more detailed explanations on the status and control word in the "EPOS Firmware Specification" in Section 8.