
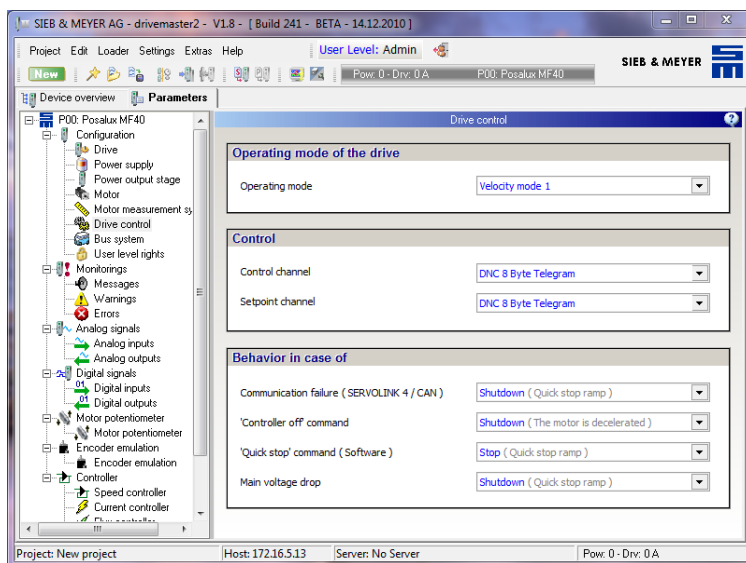


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# 1. Setting drivemaster2

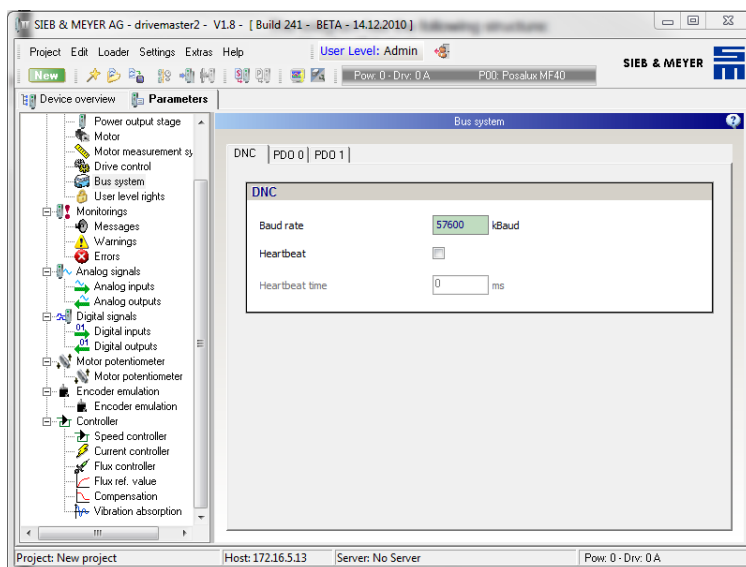
## 1.1. Device control


Set the Device Control to 8 DNC Byte Telegram



## 1.2. Baudrate and heartbeat

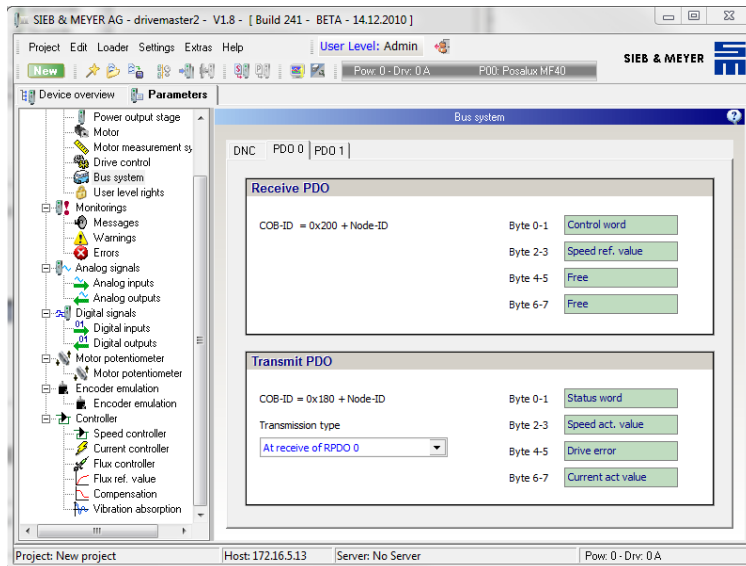
Set the Baudrate to 57600 and disable the heartbeat.




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## 1.3. PDO 0

Set the transmission type to “At receive of RPDO 0”

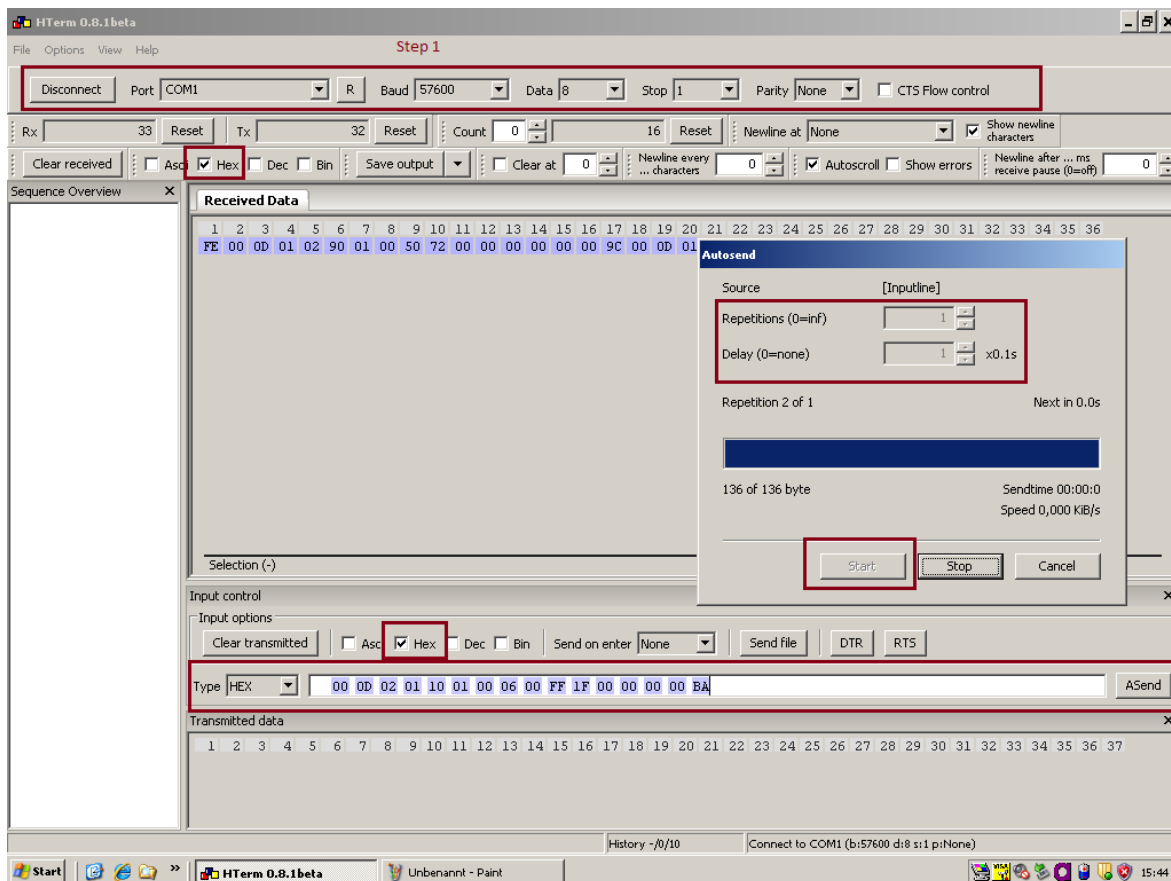



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## 2. Serial program

### 2.1. Serial program

- Select port
- Set baudrate to 57600
- Set data 8
- Set stop 1
- Set parity none
- Press connect
- Set all to values to Hex type
- Put in the Hex code (16/24 byte) and press Asend. Repetitions:1 /Delay: 1. Start



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## 3. Example of Hex codes

### 3.1. Cyclic data

#### DNC 8 Byte Prompt Telegram

Byte	Name	Value	Protocol
1	zero	0	DNC
2	Length	13	DNC
3	dest	Module address plus 2	DNC
4	Source	1 for PC	DNC
5	CMD	0x10 (const)	DNC
6	PDO Header	PDO Header 0	Cyclic channel
7	PDO Header	PDO Header 1	Cyclic channel
8	PDO Data	PDO Data 0	Cyclic channel
⋮	PDO Data	⋮	Cyclic channel
15	PDO Data	PDO Data 7	Cyclic channel
16	check <sup>(1)</sup>	Checksum	DNC

<sup>(1)</sup> Check = 0xFF - (sum of the bytes 2 to 15)

#### 3.1.1. Switch off (Shutdown)

- Header 0 Togglebit 0 (when you use the Heartbeat)
- Speed reference to 50%
- PDO Data 0 / 1 Command 6
- PDO Data 2 / 3 Speed (1FFF=50% of velocity scaling in the drivemaster2 parameter)

**Motor measurement system**


Type of measurement system    Sensorless

Connection    Vcc\_FB = 5.3V

Velocity scaling    40000.000    RPM =>    100.000    % Reference value

PDO Data 2 / 3:

0 = Speed 0 ..... 3FFF = Speed 100%  
FFFF = Speed 0 .... C000 = Speed -100%

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send:

zero	len	dest	source	cmd	header 0	header 1	PDO Data 0	PDO Data 1	PDO Date 2	PDO Data 3	PDO Data 4	●●●		
0x00	0x0d	0x02	0x01	0x10	0x01	0x00	0x06	0x00	0xff	0x1f	0x00			
										●●●	PDO Data 5	PDO Dat 6	PDO Data 7	psum
											0x00	0x00	0x00	0xba

reply: (ready to switch on)

- PDO Data 0 / 1 Status word
- PDO Data 2 / 3 Speed actual value
- PDO Data 4 / 5 Drive Error
- PDO Data 6 / 7 Current actual value

zero	len	dest	source	cmd	header 0	header 1	PDO Data 0	PDO Data 1	PDO Date 2	PDO Data 3	PDO Data 4	●●●		
0x00	0x0d	0x01	0x02	0x90	0x01	0x00	0x31	0x72	0x00	0x00	0x00			
										●●●	PDO Data 5	PDO Dat 6	PDO Data 7	psum
											0x00	0x00	0x00	0x?

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### 3.1.2.      Switch on

- PDO Data 0 / 1 Command 7
- Header 0 Togglebit 1 (when you use the Heartbeat)

send:

zero	len	dest	source	cmd	header 0	header 1	PDO Data 0	PDO Data 1	PDO Date 2	PDO Data 3	PDO Data 4	...		
0x00	0x0d	0x02	0x01	0x10	0x05	0x00	0x07	0x00	0xff	0x1f	0x00			
										...	PDO Data 5	PDO Dat 6	PDO Data 7	psum
											0x00	0x00	0x00	0xb5

reply: (switched on)

zero	len	dest	source	cmd	header 0	header 1	PDO Data 0	PDO Data 1	PDO Date 2	PDO Data 3	PDO Data 4	●●●		
0x00	0x0d	0x01	0x02	0x90	0x05	0x00	0x33	0x72	0x00	0x00	0x00			
										●●●	PDO Data 5	PDO Dat 6	PDO Data 7	psum
											0x00	0x21	0x43	0x?

### 3.1.3.      Enable operation


- PDO Data 0 / 1 Command 10
- PDO Data 2 / 3 Speed (1FFF=50% of velocity scaling in the drivemaster2 parameter)
- Header 0 Togglebit 0 (when you use the Heartbeat)

send:

zero	len	dest	source	cmd	header 0	header 1	PDO Data 0	PDO Data 1	PDO Date 2	PDO Data 3	PDO Data 4	●●●		
0x00	0x0d	0x02	0x01	0x10	0x01	0x00	0x0f	0x00	0xff	0x1f	0x00			
										●●●	PDO Data 5	PDO Dat 6	PDO Data 7	psum
											0x00	0x00	0x00	0xb1

reply: (operation enable)

zero	len	dest	source	cmd	header 0	header 1	PDO Data 0	PDO Data 1	PDO Date 2	PDO Data 3	PDO Data 4	●●●			
0x00	0x0d	0x01	0x02	0x90	0x01	0x00	0x37	0x72	0xff	0x1f	0x00				
										●●●	PDO Data 5	PDO Dat 6	PDO Data 7	psum	
											0x00	0x21	0x43	0x?	

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### 3.1.4.      Change speed (Enable operation)

- PDO Data 0 / 1 Command 10
- PDO Data 2 / 3 Speed (0FFF=25% of velocity scaling in the drivemaster2 parameter )
- Header 0 Togglebit 1 (when you use the Heartbeat)

send:

zero	len	dest	source	cmd	header 0	header 1	PDO Data 0	PDO Data 1	PDO Date 2	PDO Data 3	PDO Data 4	●●●		
0x00	0x0d	0x02	0x01	0x10	0x05	0x00	0x0f	0x00	0xff	0x0f	0x00			
										●●●	PDO Data 5	PDO Dat 6	PDO Data 7	psum
											0x00	0x00	0x00	0xbd

reply:

zero	len	dest	source	cmd	header 0	header 1	PDO Data 0	PDO Data 1	PDO Date 2	PDO Data 3	PDO Data 4	●●●		
0x00	0x0d	0x01	0x02	0x90	0x05	0x00	0x37	0x72	0xff	0x0f	0x00			
										●●●	PDO Data 5	PDO Dat 6	PDO Data 7	psum
											0x00	0x21	0x43	0x?

### 3.1.5.      Disable operation


- PDO Data 0 / 1 Command 7
- Header 0 Togglebit 0 (when you use the Heartbeat)

send:

zero	len	dest	source	cmd	header 0	header 1	PDO Data 0	PDO Data 1	PDO Date 2	PDO Data 3	PDO Data 4	●●●		
0x00	0x0d	0x02	0x01	0x10	0x01	0x00	0x07	0x00	0xff	0x0f	0x00			
										●●●	PDO Data 5	PDO Dat 6	PDO Data 7	psum
											0x00	0x00	0x00	0xc9

reply: (switched on)

zero	len	dest	source	cmd	header 0	header 1	PDO Data 0	PDO Data 1	PDO Date 2	PDO Data 3	PDO Data 4	●●●		
0x00	0x0d	0x01	0x02	0x90	0x05	0x00	0x33	0x72	0x00	0x00	0x00			
										●●●	PDO Data 5	PDO Dat 6	PDO Data 7	psum
											0x00	0x21	0x43	0x?

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### 3.1.6.      Switch off (Shutdown)

- PDO Data 0 / 1 Command 6

- Header 0 Togglebit 1 (when you use the Heartbeat)


send:

zero	len	dest	source	cmd	header 0	header 1	PDO Data 0	PDO Data 1	PDO Date 2	PDO Data 3	PDO Data 4	●●●		
0x00	0x0d	0x02	0x01	0x10	0x05	0x00	0x06	0x00	0xff	0x0f	0x00			
										●●●	PDO Data 5	PDO Dat 6	PDO Data 7	psum
											0x00	0x00	0x00	0xc6

reply:

zero	len	dest	source	cmd	header 0	header 1	PDO Data 0	PDO Data 1	PDO Data 2	PDO Data 3	PDO Data 4	...		
0x00	0x0d	0x01	0x02	0x90	0x05	0x00	0x31	0x72	0x00	0x00	0x00	...		
										...	PDO Data 5	PDO Data 6	PDO Data 7	psum
										...	0x00	0x21	0x43	0x?



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## 3.2. Acyclic service data

Read out POWER\_STAGE\_LOAD\_ACTUAL (object 39 / 27 hex):

- The Bytes 0,2,3,4 and 6 to 14 must be the same as the last send command.
- The length change to 15 hex. Attention: It is also possible use 24 Bytes length for the cyclic data.
- The header 0 the togglebit change
- Ctrl

### Service Control (Byte 17)

Service Control:

Bit	Description
0	ServiceValidToggle
1	ServiceFunction bit 0
2	ServiceFunction bit 1
3	ServiceLastValidByteIndex bit 0
4	ServiceLastValidByteIndex bit 1
5	-
6	-
7	-

3

ServiceFunction bit 1, 2:

- ▶ 0 = Read Object
- ▶ 1 = Set Array Index
- ▶ 2 = Write Object
- ▶ 3 = free → fault

ServiceLastValidByteIndex bit 3, 4:

Number of valid bytes:

- ▶ 0 = 1 byte
- ▶ 1 = 2 bytes
- ▶ 2 = 3 bytes
- ▶ 3 = 4 bytes


- Index 0 = object number (hex) low byte
- Index 1 = object number (hex) high byte

send:

Zero	len	dest	source	cmd	header 0	header 1	PDO Data 0	PDO Data 1	PDO Data 2	PDO Data 3	PDO Data 4	...		
0x00	0x15	0x02	0x01	0x10	0x01	0x00	0x06	0x00	0xff	0x0f	0x00			
		...	PDO Data 5	PDO Dat 6	PDO Data 7	0	ctrl	index 0	index 1	s-data 0	s-data 1	s-data 2	s-data 3	psum
		...	0x00	0x00	0x00	0x00	0x08	0x27	0x00	0x00	0x00	0x00	0x00	0x93

reply: (value in the s-data Byte 0 to 3)

Zero	len	dest	source	cmd	header 0	header 1	PDO Data 0	PDO Data 1	PDO Data 2	PDO Data 3	PDO Data 4	...		
0x00	0x15	0x01	0x02	0x90	0x01	0x00	0x31	0x72	0x00	0x00	0x00			
		...	PDO Data 5	PDO Dat 6	PDO Data 7	0	state	index 0	index 1	s-data 0	s-data 1	s-data 2	s-data 3	psum
		...	0x00	0x21	0x43	0x00	0x01	0x27	0x00	0x ?	0x ?	0x?	0x?	0x?


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**Write the Object Parameter\_Set to select the parameter set to 0,1...64 (object 352 / 160 hex):**

- The Bytes 0,2,3,4 and 6 to 14 must be the same as the last send command.
- The length change to 15 hex. Attention: It is also possible to the 24 Bytes length for the cyclic data.
- The header 0 the togglebit change
- Index 0 = object number (hex) low byte
- Index 1 = object number (hex) high byte
- S-data 0 = 1 for parameter set 1

send:

Zero	len	dest	source	cmd	header 0	header 1	PDO Data 0	PDO Data 1	PDO Date 2	PDO Data 3	PDO Data 4	●●●		
0x00	0x15	0x02	0x01	0x10	0x05	0x00	0x06	0x00	0xff	0x0f	0x00	●●●		
●●●		PDO Data 5	PDO Dat 6	PDO Data 7	0	ctrl	index 0	index 1	s-data 0	s-data 1	s-data 2	s-data 3	psum	
		0x00	0x00	0x00	0x00	0x0d	0x60	0x01	0x01	0x00	0x00	0x00	0x4f	

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reply:

Zero	len	dest	source	cmd	header 0	header 1	PDO Data 0	PDO Data 1	PDO Data 2	PDO Data 3	PDO Data 4	●●●	
0x00	0x15	0x01	0x02	0x90	0x01	0x00	0x31	0x72	0x00	0x00	0x00		
●●●		PDO Data 5	PDO Data 6	PDO Data 7	0	state	index 0	index 1	s-data 0	s-data 1	s-data 2	s-data 3	psum
		0x00	0x21	0x43	0x00	0x00	0x60	0x01	0x01	0x00	0x00	0x00	0x?

下面的例子来自 **DNC8 Telegram**:

sample follow DNC8 telegram:

operational/enable voltage/set toggle bit to 0/set speed to 50%:

00 0d 02 01 10 01 00 06 00 ff 1f 00 00 00 00 ba

activate controller:

00 0d 02 01 10 01 00 07 00 ff 1f 00 00 00 00 b9

operation enable:

00 0d 02 01 10 05 00 0f 00 ff 1f 00 00 00 00 ad

deactivate controller/toggle bit has been toggled:

00 0d 02 01 10 01 00 06 00 ff 1f 00 00 00 00 ba

设定转速同时读取数据:

read out of the bus voltage(index 33,DC, 230V\*1.414) :

00 15 02 01 10 01 00 06 00 ff 1f 00 00 00 00 08 21 00 00 00 00 89

index 168: 25% rpm

00 15 02 01 10 01 00 06 00 ff 0f 00 00 00 00 08 a8 00 00 00 00 12

index 398: 25% rpm

00 15 02 01 10 01 00 06 00 ff 0f 00 00 00 00 08 8e 01 00 00 00 2b

选择主轴:

writing of parameter set selection, byte18 to 1 (p01):

00 15 02 01 10 01 00 06 00 ff 1f 00 00 00 00 0d 60 01 01 00 00 43

writing of parameter set selection, byte18 to 0 (p00):

00 15 02 01 10 01 00 06 00 ff 1f 00 00 00 00 0d 60 01 00 00 00 44

sample from "无锡光阳 ":

Switch on: 00 0d 02 01 10 01 00 06 00 ff 1f 00 00 00 00 BA

使能 switch on : 00 0d 02 01 10 05 00 07 00 ff 1f 00 00 00 00 b5

起转, 带 50% 转转速值: 00 0d 02 01 10 01 00 0f 00 ff 1f 00 00 00 00 b1

转速 1W: 00 0d 02 01 10 01 00 0f 00 ff 0f 00 00 00 00 c1

转速 25%: 00 0d 02 01 10 05 00 0f 00 ff 0f 00 00 00 00 bd

停止: 00 0d 02 01 10 01 00 07 00 ff 0f 00 00 00 00 c9

switch off : 00 0d 02 01 10 05 00 06 00 ff 0f 00 00 00 00 c6

下面的指令例子来自 **DNC8 object**:

sample from DNC8 object:

speed setting and switch on:

The control channel is "Serial interface/RS485/USB" or "DNC 8 Byte Telegram"


(see "Parameter ? Drive control ? Control channel").

? The setpoint channel is "Serial interface/RS485/USB" or "DNC 8 Byte Telegram"

(see "Parameter ? Drive control ? Setpoint channel").

? The drive signals the state "Switch On Disabled, Software Funktion 'Quick Stop'"

(see "Diagnosis ? Drive actual values").

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1. Send Shutdown Command to Drive(index 68,value 6)  
00 0b 02 01 0e 44 00 00 00 00 02 06 00 97  
系统状态显示从"Switch On Disabled, Software Funktion 'Quick Stop'"变更为" Ready To switch On"

2. Set Reference Speed Value(1000rpm) (index 395,value 1000000)  
00 0b 02 01 0e 8b 01 00 00 00 00 04 40 42 0f 00 c2  
6000rpm:  
00 0b 02 01 0e 8b 01 00 00 00 00 04 80 8d 5b 00 eb  
6500rpm:  
00 0b 02 01 0e 8b 01 00 00 00 00 04 2e a0 63 00 22  
18000rpm:  
00 0b 02 01 0e 8b 01 00 00 00 00 04 80 a8 12 01 18

3. Activate Controller (value7)  
00 0b 02 01 0e 44 00 00 00 00 02 07 00 96  
系统状况从 "ready to switch on" 变更为" switched on"

4. Operation enable  
00 0b 02 01 0e 44 00 00 00 00 02 0f 00 8e  
系统状况从 "switch on" 变更为" operation enable",同时马达旋转。

5. disable operation(value 7)  
00 0b 02 01 0e 44 00 00 00 00 02 07 00 96

6. deactivate controller(value 6)  
00 0b 02 01 0e 44 00 00 00 00 02 06 00 97

#### 2.4.1 Control Word Object Number 68<sub>D</sub>

Bit	Name	Description
0	Switch on	Power unit is to be switched on
1	Disable voltage	The voltage at the power unit can be switched on
2	Quick stop	The quick stop is to be activated
3	Enable operation	Enable drive function
4	Dependent on the operating mode	See chapter "Operating Modes"
5	Dependent on the operating mode	See chapter "Operating Modes"
6	Dependent on the operating mode	See chapter "Operating Modes"
7	Fault reset	Drive fault is acknowledged
8	Hold	Stop function
9		Reserved
10		Reserved
11		Reserved
12		Reserved
13		Reserved
14		Reserved
15		Reserved

Bits 0, 1, 2, 3 and 7: The finite state automaton commands are mapped via these finite state automaton commands.  
Bits 4, 5, 6: At present, these bits are set to "0" for all bits.  
Bits 8, 9, 10, 12, 13: These control bits are reserved for future applications and must be set to "0".

## 2.4.2 Finite State Automaton Commands

The finite state automaton commands are mapped via the bits 0 to 3 and 7 of the control word as shown in the following table. Whether or not a finite state automaton command can be executed by the drive depends on the state of the drive.

Command	Bits of the Control Word					Transitions	Control Word
	Bit 7 Fault reset	Bit 3 Enable operation	Bit 2 Quick stop	Bit 1 Disable voltage	bit 0 Switch on		
Shutdown	0	x	1	1	0	2, 6, 8	6
Switch on	0	x	1	1	1	3	7
Disable voltage	0	x	x	0	x	7, 9, 10, 12	0
Quick stop	0	x	0	1	x	11	2
Disable operation	0	0	1	1	1	5	7
Enable operation	0	1	1	1	1	4	15
Fault reset	1	x	x	x	x	15	128

Positive edge / change from 0 to 1

x    The bits labeled with X have no relevance at the corresponding position in the table.

读取状态：例子来自 DNC object

Read Actual Speed Value(index 398)

00 09 02 01 0d 8e 01 00 00 00 00 57

回复： 0x00 0x09 0x01 0x02 0x8d 0x04 0x00 0x7f 0x50 0x0f 0x00 0x84

The actual speed is 0x000f507f = 1003647 ≈ 1004 rpm.

Read Actual Speed Value(index 168)


00 09 02 01 0d a8 00 00 00 00 00 3e

Read Status Word (index 67)

00 09 02 01 0d 43 00 00 00 00 00 a3

Read Parameter Set Identification (index 22)

00 09 02 01 0d 16 00 00 00 00 00 d0

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## 2.4.4    Device States

The states of the finite state automaton are indicated as follows via the status bits 0 to 3 and 5 to 6:

State	Bits of the status word					
	Bit 6 Switch on dis- abled	Bit 5 Quick stop	Bit 3 Fault	Bit 2 Enable operation	Bit 1 Switched on	bit 0 Ready to be switched on
Not ready to switch on	0	x	0	0	0	0
Switch on disabled	1	x	0	0	0	0
Ready to be switched on	0	1	0	0	0	1
Switched on	0	1	0	0	1	1
Enable operation	0	1	0	1	1	1
Quick stop	0	0	0	1	1	1
Fault reaction active	0	x	1	1	1	1
Fault	0	x	1	0	0	0