

# EtherCAT LinMot Profile Interface

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Manual



Documentation of the EtherCAT Interface of the following  
Drives:

- **C1150-EC-XC-0S/1S**
- **C1250-EC-XC-0S/1S**
- **C1450-EC-VS-0S/1S**
- **E1450-EC-QN-0S/1S**
- **E1250-EC-UC**

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## 1 System overview

EtherCAT is the open real-time Ethernet network originally developed by Beckhoff. The LinMot act as Slave in this network and is implemented with the standard ASIC ET1100 from Beckhoff.

For further information on the EtherCAT fieldbus please visit:

<http://www.ethercat.org/>

### 1.1 References

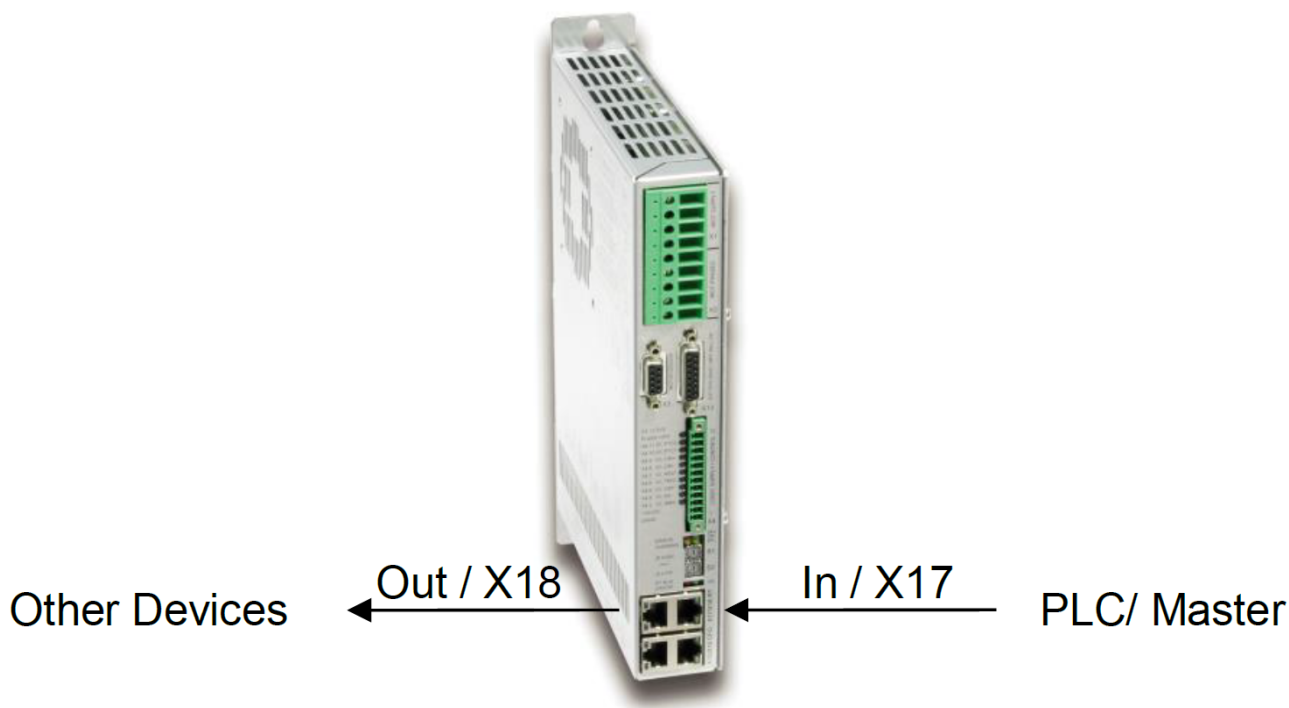
All user manuals are distributed with the LinMot-Talk software the newest versions can be downloaded from the LinMot homepage in the download section.

Ref	Title	Source
1	User Manual Motion Control SW	<a href="http://www.linmot.com">www.linmot.com</a>
2	LinMot Drive Configuration over Fieldbus Interfaces SG5	<a href="http://www.linmot.com">www.linmot.com</a>

### 1.2 Connecting In and Out



**Attention:** In the EtherCAT the cabling is directed due topology support, so In and Out is different! The real time Ethernet RJ45 connector X17 is the input and the real time RJ45 connector X18 is the output.



## 2 Setup in the PLC

In the following steps the integration of a LinMot EtherCAT Servo Drive in the PLC is described. In the example a Beckhoff master PLC is used. The easiest way is the online configuration when the device is connected to the EtherCAT network.

### 2.1 Copy Device Description File

The LinMot Servo Drive is described with \*.xml device description file distributed with the LinMot-Talk software. This file is only used when offline configuration is desired.

Example Source path of EtherCAT Device description file:

```
C:\Programme\LinMot\LinMot-Talk 6.2 Build  
20140915\Firmware\Interfaces\EtherCAT\XML\NTIL_LM_Servos_V1_7.xml
```

Example Destination path of EtherCAT Device description file:

**TwinCAT 2:**

```
C:\TwinCAT\Io\EtherCAT\ NTIL_LM_Servos_V1_7.xml
```

**TwinCAT 3:**

```
C:\TwinCAT\3.1\Config\Io\EtherCAT\ NTIL_LM_Servos_V1_7.xml
```

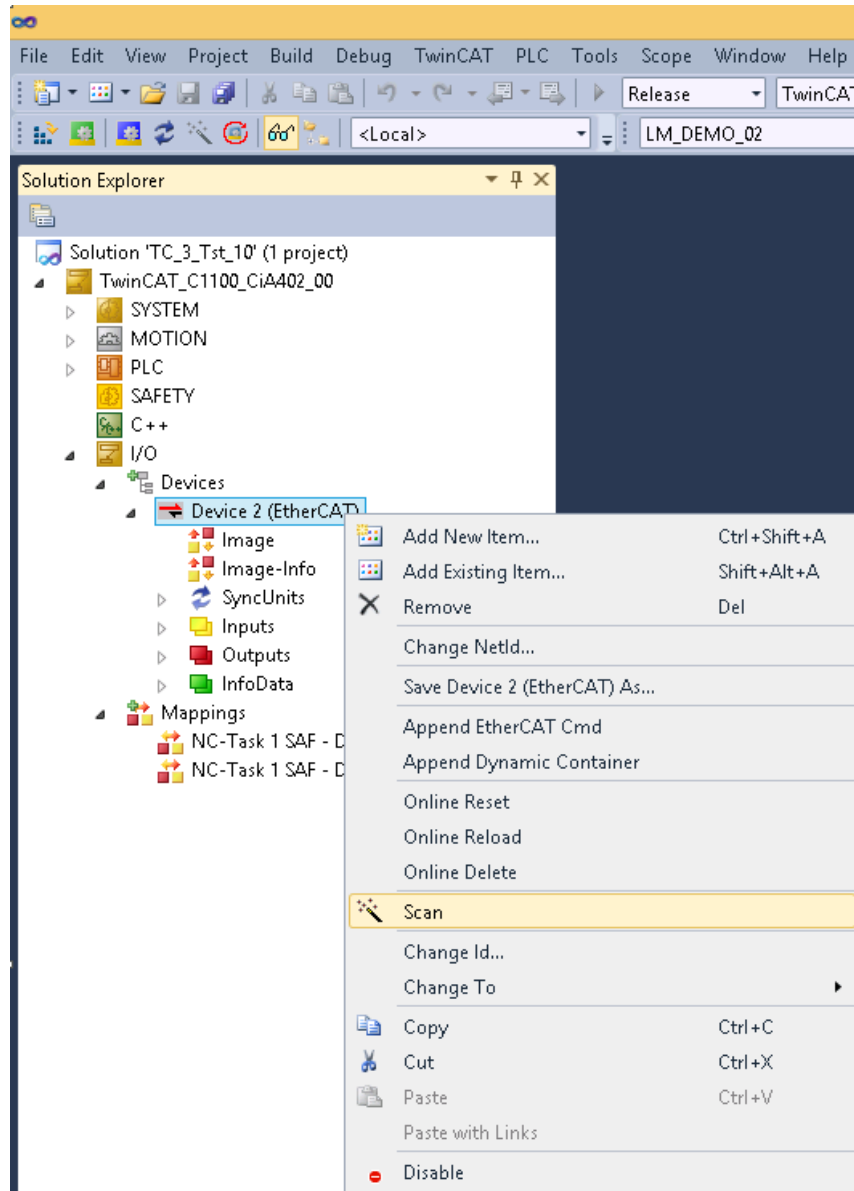
**Omron:**

```
C:\OMRON\Sysmac Studio\IODeviceProfiles\EsiFiles\UserEsiFiles\ NTIL_LM_Servos_V1_7.xml
```

If this is done the PLC should recognize the corresponding LinMot drives on the EtherCAT fieldbus automatically.

## 2.2 Scan the EtherCAT slave devices

Connect the EtherCAT LinMot CiA402 Servo Drive to the EtherCAT-Master and power on the signal supply. Then scan for the connected devices in the System Manager:



Scan for EtherCAT slave devices.



After this scan all recognized devices are imported to the project:

The screenshot shows the Microsoft Visual Studio interface for a TwinCAT project. The Solution Explorer on the left displays the project structure, with the 'Devices' folder expanded to show 'Device 2 (EtherCAT)' and its sub-items. The 'Box 1 (C1150-EC-XC-0S)' device is selected. The Properties window on the right shows the configuration for this device, including its name, object ID, and type. Below the properties window, a table lists the variables associated with the device.

Name	Online	Type	Size	>Addr...	In/Out	User ID	Linked to
StateVar	0x0000 (0)	UINT	2.0	26.0	Input	0	
StatusWord	0x0000 (0)	UINT	2.0	28.0	Input	0	
WarnWord	0x0000 (0)	UINT	2.0	30.0	Input	0	
DemandPosition	0x00000000 (0)	DINT	4.0	32.0	Input	0	
ActualPosition	0x00000000 (0)	DINT	4.0	36.0	Input	0	
DemandCurrent	0x00000000 (0)	DINT	4.0	40.0	Input	0	
WcState	1	BIT	0.1	1522.0	Input	0	
InputToggle	0	BIT	0.1	1524.0	Input	0	
State	0x0002 (2)	UINT	2.0	1548.0	Input	0	
AdsAddr	0x03E90103080A03...	AMSADDR	8.0	1550.0	Input	0	
AoeNetId	0A 03 C8 6E 03 02	AMSNETID	6.0	1558.0	Input	0	
Control Word	0x0000 (0)	UINT	2.0	26.0	Output	0	
Motion Command Header	0x0000 (0)	UINT	2.0	28.0	Output	0	
Motion Command Par 1	0x00000000 (0)	DINT	4.0	30.0	Output	0	
Motion Command Par 2	0x00000000 (0)	DINT	4.0	34.0	Output	0	
Motion Command Par 3	0x00000000 (0)	DINT	4.0	38.0	Output	0	
Motion Command Par 4	0x00000000 (0)	DINT	4.0	42.0	Output	0	
Motion Command Par 5	0x00000000 (0)	DINT	4.0	46.0	Output	0	

In this example the scan found the LinMot drive C1150-EC-XC-0S which is added to the project.

### 3 Process Data Object (PDO) Configuration

The cyclic process data is configured in the master and transmitted to the slave during startup. The default mapping is documented in the tables below. The inputs and outputs correspond to the PLC point of view. For a detailed description of the exchanged data and its meaning refer to [1].

For a detailed description of the PDO data refer to [1] or have a look at the TwinCAT demo program, which is included with the LinMot-Talk software.

#### 3.1 Input PDO Modules

General
EtherCAT
DC
Process Data
Startup
CoE - Online
Online

Sync Manager:

SM	Size	Type	Flags
0	128	MbxOut	
1	128	MbxIn	
2	24	Outputs	
3	18	Inputs	

PDO List:

Index	Size	Name	Flags	SM	SU
0x1A02	16.0	Cyclic Mode Inputs	F		0
0x1A20	0.0	User Defined Inputs			0
0x1B00	18.0	Default Inputs	F	3	0
0x1B01	18.0	NC Inputs	F		0
0x1B03	2.0	StateVar	F		0
0x1B04	2.0	Status Word	F		0
0x1B05	2.0	WarnWord	F		0
0x1B08	8.0	Config Module	F		0
0x1B10	4.0	Input DemVel	F		0
0x1B11	4.0	Input ActVel	F		0
0x1B12	4.0	Input ActVelFilt	F		0
0x1B13	4.0	Input DemandPosition	F		0
0x1B14	4.0	Input ActualPosition	F		0
0x1B15	4.0	Input DemandCurrent	F		0
0x1B16	4.0	Input DemCurrFilt	F		0
0x1B20	4.0	Input Command Table Var 1	F		0
0x1B21	4.0	Input Command Table Var 2	F		0
0x1602	8.0	Cyclic Position Mode	F		0

PDO Assignment (0x1C13):

- 0x1A02 (excluded by 0x1B00)
- 0x1A20
- 0x1B00
- 0x1B01 (excluded by 0x1B00)
- 0x1B03 (excluded by 0x1B00)
- 0x1B04 (excluded by 0x1B00)
- 0x1B05 (excluded by 0x1B00)
- 0x1B08
- 0x1B10
- 0x1B11
- 0x1B12
- 0x1B13 (excluded by 0x1B00)
- 0x1B14 (excluded by 0x1B00)
- 0x1B15 (excluded by 0x1B00)
- 0x1B16
- 0x1B20
- 0x1B21

PDO Content (0x1B00):

Index	Size	Offs	Name	Type	Default (hex)
0x1B00:01	2.0	0.0	StateVar	UINT	
0x1B00:02	2.0	2.0	StatusWord	UINT	
0x1B00:03	2.0	4.0	WarnWord	UINT	
0x1B00:04	4.0	6.0	DemandPosition	DINT	
0x1B00:05	4.0	10.0	ActualPosition	DINT	
0x1B00:06	4.0	14.0	DemandCurrent	DINT	
			18.0		

Overview of the predefined Input Process data objects

#### 3.1.1 Cyclic Mode Inputs 0x1A02

Index	Size [Byte]	Byte Offset	Name	Data Type
0x1A02	16	-	Variables	RECORD

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Index	Size [Byte]	Byte Offset	Name	Data Type
0x6041	2	0	Statusword	Uint16
0x6064	4	2	Position actual value	Int32
0x1B8A	4	6	DemandPosition	Int32
0x1B93	4	10	DemandCurrent	Int32
0x6061	1	14	Mode of Operation display	Byte
0x000	1	15	Byte Padding	Byte

This module could be used to map the inputs of an CiA402 NC axis.

### 3.1.2 User Defined Inputs 0x1A20

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>0x1A20</b>	<b>2..32</b>	<b>-</b>	<b>Variables</b>	<b>RECORD</b>
1..8			User defined Parameter/Variables accessed by UPID	

The PDO 0x1620 could be used, to read Variables/Parameters for which no predefined PDO exists. It is possible to map 1 to 8 entries defined by its UPID in this PDO. Allowed are only 16 or 32 bit entries. The defined Size of the data has to match with the size, defined by the UPID.

### 3.1.3 Default Inputs 0x1B00

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>0x1B00</b>	<b>18</b>	<b>-</b>	<b>Variables</b>	<b>RECORD</b>
0x1B62:00	2	0	StateVar	Uint16
0x1D51:00	2	2	StatusWord	Uint16
0x1D8E:00	2	4	WarnWord	Uint16
0x1B8A:00	4	6	DemandPosition	Int32
0x1B8D:00	4	10	ActualPosition	Int32
0x1B93:00	4	14	DemandCurrent	Int32

The Default input PDO mapping of 18 Bytes the index is the UPID value of the variable.

### 3.1.4 NC Inputs 0x1B01

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>0x1B01</b>	<b>18</b>	<b>-</b>	<b>Variables</b>	<b>RECORD</b>
0x1B62:00	2	0	StateVar	Uint16
0x1D51:00	2	2	StatusWord	Uint16
0x1D8E:00	2	4	WarnWord	Uint16
0x1B8A:00	4	6	DemandPosition	Int32
0x1B8D:00	4	10	ActualPosition	Int32
0x1B93:00	4	14	DemandCurrent	Int32

The NC Inputs could be used to map the variables for the feedback of a virtual axis.

### 3.1.5 StateVar 0x1B03

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>0x1B03</b>	<b>2</b>	<b>-</b>	<b>Variables</b>	
0x1B62:00	2	0	StateVar	Uint16

The StateVar is recommended for monitoring the main state machine of the drive in the PLC program.

### 3.1.6 StatusWord 0x1B04

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>0x1B04</b>	<b>2</b>	<b>-</b>	<b>Variables</b>	
0x1D51:00	2	2	StatusWord	Word16

### 3.1.7 WarnWord 0x1B05

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>0x1B05</b>	<b>2</b>	<b>-</b>	<b>Variables</b>	
0x1D8E:00	2	4	WarnWord	Word16

### 3.1.8 Config Module 0x1B08

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>0x1B08</b>	<b>8</b>	<b>-</b>	<b>Variables</b>	<b>RECORD</b>
0x1B09:00	2	0	Config Status Word	Uint16
0x1B0A:00	2	2	Config Index/..	Uint16
0x1B0B:00	4	4	Config Value	Word32

This module is the feedback data module of the module 1708 "Configuration Module Output".

### 3.1.9 Input Demvel 0x1B10

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>0x1B10</b>	<b>4</b>	<b>-</b>	<b>Variables</b>	
0x1B8B:00	4	0	DemandVelocity	Int32

### 3.1.10 Input ActVel 0x1B11

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>0x1B11</b>	<b>4</b>	<b>-</b>	<b>Variables</b>	
0x1B8E:00	4	0	ActualVelocity	Int32

### 3.1.11 Input ActVelFilt 0x1B12

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>0x1B12</b>	<b>4</b>	<b>-</b>	<b>Variables</b>	
0x1BAF:00	4	0	ActualVelocityFilt	Int32

### 3.1.12 Input DemandPosition 0x1B13

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>0x1B13</b>	<b>4</b>	<b>-</b>	<b>Variables</b>	
0x1B8A:00	4	0	DemandPosition	Int32

### 3.1.13 Input ActualPosition 0x1B14

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>0x1B14</b>	<b>4</b>	<b>-</b>	<b>Variables</b>	
0x1B8D:00	4	0	ActualPosition	Int32

### 3.1.14 Input DemandCurrent 0x1B15

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>0x1B15</b>	<b>4</b>	<b>-</b>	<b>Variables</b>	
0x1B14:00	4	0	DemandCurrent	Int32

### 3.1.15 Input DemCurrFilt 0x1B16

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>0x1B16</b>	<b>4</b>	<b>-</b>	<b>Variables</b>	
0x1B98:00	4	0	DemandCurrentFilt	Int32

### 3.1.16 CAM Counts 0x1B18

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>0x1B18</b>	<b>4</b>	<b>-</b>	<b>Variables</b>	<b>RECORD</b>
0x1C50:00	4	0	CAM Counts	Int32

This PDO is only available on the drives, which support the CAM functionality.

### 3.1.17 Input Command Table Var 1 0x1B20

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>0x1B20</b>	<b>4</b>	<b>-</b>	<b>Variables</b>	
0x1E72:00	4	0	Command Table Var 1	Int32

### 3.1.18 Input Command Table Var 2 0x1B21

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>0x1B21</b>	<b>4</b>	<b>-</b>	<b>Variables</b>	
0x1E73:00	4	0	Command Table Var 2	Int32

## 3.2 Output PDO Modules

General
EtherCAT
DC
Process Data
Startup
CoE - Online
Online

Sync Manager:

SM	Size	Type	Flags
0	128	MbxOut	
1	128	MbxIn	
2	24	Outputs	
3	18	Inputs	

PDO List:

Index	Size	Name	Flags	SM	SU
0x1B21	4.0	Input Command Table Var 2	F		0
0x1602	8.0	Cyclic Position Mode	F		0
0x1603	12.0	Cyclic Position Velocity Mode	F		0
0x1604	14.0	Cyclic Position Velocity Mode	F		0
0x1606	6.0	Cyclic Torque Mode	F		0
0x1620	0.0	User Defined Outputs			0
0x1700	24.0	Default Outputs	F	2	0
0x1701	26.0	NC Outputs	F		0
0x1703	2.0	Control Word	F		0
0x1704	6.0	Motion Command Intf #6	F		0
0x1708	8.0	Config Module	F		0
0x1710	4.0	Max Current Set A	F		0

PDO Assignment (0x1C12):

- 0x1602 (excluded by 0x1700)
- 0x1603 (excluded by 0x1700)
- 0x1604 (excluded by 0x1700)
- 0x1606 (excluded by 0x1700)
- 0x1620
- 0x1700
- 0x1701 (excluded by 0x1700)
- 0x1703 (excluded by 0x1700)
- 0x1704 (excluded by 0x1700)
- 0x1708
- 0x1710

PDO Content (0x1700):

Index	Size	Offs	Name	Type	Default (hex)
0x1D52:00	2.0	0.0	Control Word	UINT	
0x1DB0:...	2.0	2.0	Motion Command Header	UINT	
0x1E40:00	4.0	4.0	Motion Command Par 1	DINT	
0x1E41:00	4.0	8.0	Motion Command Par 2	DINT	
0x1E42:00	4.0	12.0	Motion Command Par 3	DINT	
0x1E43:00	4.0	16.0	Motion Command Par 4	DINT	
0x1E44:00	4.0	20.0	Motion Command Par 5	DINT	
		24.0			

Overview of the predefined Output Process data objects

### 3.2.1 Cyclic Position Mode 0x1602

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>0x1602</b>	<b>8</b>	<b>-</b>	<b>Variables</b>	<b>RECORD</b>
0x6040:00	2	0	Controlword	Word16
0x607A:00	4	2	Target position	Int32
0x6060:00	1	6	Mode of Operation	Byte
0x0000:00	1	7	Byte Padding	Byte

### 3.2.2 Cyclic Position Velocity Mode 0x1603

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>0x1603</b>	<b>12</b>	<b>-</b>	<b>Variables</b>	<b>RECORD</b>
0x6040:00	2	0	Controlword	Word16
0x607A:00	4	2	Target position	Int32
0x60FF:00	4	6	Target velocity	Int32
0x6060:00	1	10	Mode of Operation	Byte
0x0000:00	1	11	Byte Padding	Byte

### 3.2.3 Cyclic Position Velocity Torque Mode 0x1604

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>0x1603</b>	<b>12</b>	<b>-</b>	<b>Variables</b>	<b>RECORD</b>
0x6040:00	2	0	Controlword	Word16
0x607A:00	4	2	Target position	Int32
0x60FF:00	4	6	Target velocity	Int32
0x6071:00	2	10	Target torque	Int16
0x6060:00	1	12	Mode of Operation	Byte
0x0000:00	1	13	Byte Padding	Byte

This module can be used, if the operation mode has to be changed during run time. At the moment the cyclic position mode (0x08) and the cyclic torque mode (0xA) are supported. To change the operation mode simply change the value of "Mode of Operation" variable.

### 3.2.4 Cyclic Torque Mode 0x1606

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>0x1606</b>	<b>6</b>	<b>-</b>	<b>Variables</b>	<b>RECORD</b>
0x6040:00	2	0	Controlword	Word16
0x6071:00	2	2	Target torque	Int32
0x6060:00	1	4	Mode of Operation	Byte
0x0000:00	1	5	Byte Padding	Byte

### 3.2.5 User Defined Outputs 0x1620

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>0x1620</b>	<b>2..32</b>	<b>-</b>	<b>Variables</b>	<b>RECORD</b>
1..8			User defined Parameter/Variables accessed by UPID	

The PDO 0x1620 could be used to set Variables/Parameters for which no predefined PDO exists. It is possible to map 1 to 8 entries defined by its UPID in this PDO. Allowed are only 16 or 32 bit entries. The defined Size of the data has to match with the size defined with the UPID.

### 3.2.6 Default Outputs 0x1700

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>0x1700</b>	<b>24</b>	<b>-</b>	<b>Variables</b>	<b>RECORD</b>
0x1D52:00	2	0	ControlWord	Uint16
0x1DB0:00	2	2	MotionCommandHeader	Uint16
0x1E40:00	4	4	MotionCommand Par 1	Word32
0x1E41:00	4	8	MotionCommand Par 2	Word32
0x1E42:00	4	12	MotionCommand Par 3	Word32
0x1E43:00	4	16	MotionCommand Par 4	Word32
0x1E44:00	4	20	MotionCommand Par 5	Word32

Default output PDO mapping of 24 Bytes the index is the UPID value of the variable

The default PDO output data contains the control word and the generic motion command interface over which all types of motion commands can be accessed.

### 3.2.7 NC Outputs 0x1701

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>0x1701</b>	<b>26</b>	<b>-</b>	<b>Variables</b>	<b>RECORD</b>
0x1D52:00	2	0	ControlWord	Uint16
0x1E80:00	8	2	Setpoint Position	LREAL64
0x1E81:00	8	10	Setpoint Velocity	LREAL64
0x1E82:00	8	18	Setpoint Acceleration	LREAL64

This module could be mapped to the setpoint generator of an axis as motion interface.

### 3.2.8 Control Word 0x1703

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>0x1703</b>	<b>2</b>	<b>-</b>	<b>Variables</b>	<b>RECORD</b>
0x1703:01	2	0	ControlWord	Uint16

Output PDO with LinMot control word.

### 3.2.9 Motion Command Intf #6 0x1704

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>0x1704</b>	<b>6</b>	<b>-</b>	<b>Variables</b>	<b>RECORD</b>
0x1704:01	2	0	MotionCommandHeader	Uint16
0x1704:02	4	2	MotionCommand Par 1	Word32

Output PDO mapping of 6 Bytes with tiny motion command interface.



### 3.2.10 Config Module 0x1708

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>0x1708</b>	<b>8</b>	<b>-</b>	<b>Variables</b>	<b>RECORD</b>
0x1709:00	2	0	Config Control Word	Uint16
0x170A:00	2	2	Config Index/..	Uint16
0x170B:00	4	4	Config Value	Word32

With this module the LinMot drive can be completely configured. So it gives access over parameters curves command table entries and the error log. The detail functionality is described in the document [2] "Configuration over fieldbus SG5". As response module "Configuration Module Input" (0x1B08) has to be configured.

### 3.2.11 Max Current Set A 0x1710

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>0x1710</b>	<b>2</b>	<b>-</b>	<b>Variables</b>	
0x13A6:00	2	0	Max Current Set A	Uint16

### 3.2.12 CAM Start Enable 0x1718

Index	Size [Byte]	Byte Offset	Name	Data Type
<b>0x1718</b>	<b>2</b>	<b>-</b>	<b>Variables</b>	<b>RECORD</b>
0x1528:00	2	0	CAM Start Enable	Uint16

Bit 0 of the 16 bit data field is mapped to CAM Start Enable Flag (UPID 1528). Write 0 to all other bits.

## 3.3 Typical Startup Telegrams

		General	EtherCAT	DC	Process Data	Startup	CoE - Online	Online
Transition	Protocol	Index	Data	Comment				
<b>C</b> <PS>	CoE	0x1C12:00	0x00 (0)	clear sm pdos (0x1C12)				
<b>C</b> <PS>	CoE	0x1C13:00	0x00 (0)	clear sm pdos (0x1C13)				
<b>C</b> <PS>	CoE	0x1A20:00	0x00 (0)	clear pdo 0x1A20 entries				
<b>C</b> <PS>	CoE	0x1620:00	0x00 (0)	clear pdo 0x1620 entries				
<b>C</b> <PS>	CoE	0x1C12:01	0x1700 (5888)	download pdo 0x1C12:01 index				
<b>C</b> <PS>	CoE	0x1C12:00	0x01 (1)	download pdo 0x1C12 count				
<b>C</b> <PS>	CoE	0x1C13:01	0x1B00 (6912)	download pdo 0x1C13:01 index				
<b>C</b> <PS>	CoE	0x1C13:00	0x01 (1)	download pdo 0x1C13 count				
<b>A</b> <IP, PS>	AoE	1/3	0A 03 C8 6E 03 02	AoE Init Cmd (download NetId)				

This figure shows the startup telegram list of LinMot EtherCAT servo drive

## 4 Asynchronous Configuration Protocol AoE

For configuration purpose (Parameter, Curves, Command Table and Program Handling) the Beckhoff ADS-Protocol is used. Within EtherCAT this protocol is integrated as AoE (ADS over EtherCAT). For this reason the AoeNetId has to be used for ADS over EtherCAT.

The screenshot displays the TwinCAT configuration interface. On the left, the 'Solution Explorer' shows a project named 'TwinCAT\_C1100\_EC\_1ms'. Under the 'I/O' section, 'Device 2 (EtherCAT)' is expanded, and 'AoeNetId' is selected. The right pane shows the configuration for the 'AoeNetId' variable:

- Name:** AoeNetId
- Type:** AMSNETID
- Group:** InfoData
- Size:** 6.0
- Address:** 1558 (0x616)
- User ID:** 0
- Linked to...:** (empty)
- Comment:** Slave contains an ADS router with this NetId
- ADS Info:** Port: 11, IGrp: 0x3040020, IDffs: 0x80000616, Len: 6
- Full Name:** TIID^Device 2 (EtherCAT)^Box 1 (C1150-EC-XC-0S)^InfoData^AoeNetId

**AoeNetId with Beckhoff**

#### 4.1 ADS Services Overview

For the LinMot drives in the ADS index group, the service is coded. In the index offset normally the UPID for parameters or curve ID for curves is coded.

ADS Service	Index Group	Index Offset	Description
Read	0040h	UPID	Parameter UPID read RAM value
Write	0041h	UPID	Parameter UPID write RAM value
Read	0042h	UPID	Parameter UPID read ROM value
Write	0043h	UPID	Parameter UPID write ROM value
Read	0044h	UPID	Parameter Start read UPID list
Read	0045h	-	Parameter Get next UPID list item
Read	0046h	UPID	Parameter Start read modified UPID list
Read	0047h	-	Parameter Get next modified UPID list item
Write	0048h	Inst	Parameter Default SW instance
Write	0050h	-	Curves delete all in RAM
Write	0051h	ID	Curves delete single curve in RAM
Read	0052h	ID	Curves read info and data size
Read	0053h	ID	Curves read info block data
Read	0054h	ID	Curves read setpoint data
Write	0055h	ID	Curves start write curve in RAM
Write	0056h	ID	Curves write curve info block data in RAM
Write	0057h	ID	Curves write curve set point data in RAM
Write	0058h	ID	Curves start modify curve in RAM
Write	0059h	ID	Curves modify curve info block data in RAM
Write	005Ah	ID	Curves modify curve set point data in RAM
Read	005Eh	ID Off	Curves read presence list
Write	005Fh	-	Curves start write curves from RAM to FLASH
Write	0060h	-	Command Table delete all entries in RAM
Write	0061h	ID	Command Table delete single entry in RAM
Read	0062h	ID	Command Table read data size
Read	0063h	ID	Command Table read data
Write	0065h	ID	Command Table start write entry in RAM
Write	0066h	ID	Command Table write entry data in RAM
Read	006Eh	ID Off	Command Table read presence list
Write	006Fh	-	Command Table start write entries from RAM to FLASH
Write	0070h	-	Reset device
Write	0071h	Inst	Stop SW instances
Write	0072h	Inst	Start SW instances

ADS Service	Index Group	Index Offset	Description

For a general description and an overview of the concepts used in fieldbus configuration, please refer to the document "LinMot 1100 Drive Configuration over Fieldbus Interfaces".

## 4.2 ADS Parameter Services

The LinMot drive supports a unique parameter access for all parameter data types (bit, byte, uint16, ..). The parameter data is always be mapped into a 4 bytes data field. The parameter itself is specified by its UPID (unique parameter ID).

### 4.2.1 Parameter UPID read RAM value

Read the RAM value of the parameter specified by its UPID.

FUNCTION_BLOCK ADSREAD			
Direction	Name	Type	Description
Input	NETID	T_AmsNetId	AoE NetID
Input	PORT	T_AmsPort	ADS Port
Input	IDXGRP	UDINT	0040h (LinMot Service ID)
Input	IDXOFFS	UDINT	UPID
Input	LEN	UDINT	always 4 bytes
Input	DESTADDR	DWORD	ADR(read_buffer (4bytes))
Input	READ	BOOL	Rising edge starts reading
Input	TMOUT	TIME	Timeout value
Output	BUSY	BOOL	Indicates reading active/finished
Output	ERR	BOOL	Indicates reading error
Output	ERRID	UDINT	Error id

Example:

```
VARIABLES:
    FbAdsRead:    ADSREAD;      (* instance of ADSREAD function block *)
    NetID:        T_AmsNetId;   (* AoE net ID of slave device *)
    Port:         T_AmsPort;    (* ADS port of slave device *)
    TimeOut:      TIME;         (* time out value for AoE communication *)
    RdVal:        DWORD;        (* 4byte buffer for read response *)
    bErr:         BOOL;         (* flag for error return *)
    ErrId:        DUINT;        (* error ID *)

CODE:
(* starting parameter UPID read RAM value
(* should be called only once per reading
=====*)

FbAdsRead(READ:= FALSE);      (* reset READ input to assure rising edge for start reading *)
FbAdsRead(
    NETID  := NetID,          (* AoE NetId of slave device to read *)
    PORT   := Port,          (* ADS port of slave device to read *)
    IDXGRP := 0x0040,        (* Parameter UPID read RAM value service ID *)
    IDXOFFS := 0x13A2,       (* UPID value of parameter P Gain of position controller *)
    LEN    := 4,             (* read length 4 bytes for all LinMot parameter types *)
    DESTADDR:= ADR(RdVal),   (* pointer to read result data buffer *)
    READ   := TRUE,          (* generate rising edge on input for start reading *)
    TMOUT  := TimeOut,       (* timeout value for read command *)
    BUSY   := RdBusy,        (* busy output for detecting end of reading *)
    ERR    := bErr           (* error output for assure correct reading *)
    ERRID  := ErrId);        (* error id for debugging problem *)

(* polling for read response
(* should be called cyclic
=====*)
FbAdsRead(
    BUSY   := RdBusy,        (* busy output for detecting end of reading *)
    ERR    := bErr           (* error output for assure correct reading *)
    ERRID  := ErrId);        (* error id for debugging problem *)

IF(RdBusy = FALSE)
    IF(bErr = FALSE)
        PosCtrlPGain = DWORD_TO_UINT(RdVal)
    ELSE
        (* eval error condition *)
    END_IF
END_IF
```

#### 4.2.2 Parameter UPID write RAM value

Write the RAM value of the parameter specified by its UPID.

FUNCTION_BLOCK ADSWRITE			
Direction	Name	Type	Description
Input	NETID	T_AmsNetId	AoE NetID
Input	PORT	T_AmsPort	ADS Port
Input	IDXGRP	UDINT	0041h (LinMot Service ID)
Input	IDXOFFS	UDINT	UPID
Input	LEN	UDINT	always 4 bytes
Input	SRCADDR	DWORD	ADR(write_buffer (4bytes))
Input	WRITE	BOOL	Rising edge starts reading
Input	TMOUT	TIME	Timeout value
Output	BUSY	BOOL	Indicates reading active/finished
Output	ERR	BOOL	Indicates reading error
Output	ERRID	UDINT	Error id

#### 4.2.3 Parameter UPID read ROM value

Read the ROM value of the parameter specified by its UPID.

FUNCTION_BLOCK ADSREAD			
Direction	Name	Type	Description
Input	NETID	T_AmsNetId	AoE NetID
Input	PORT	T_AmsPort	ADS Port
Input	IDXGRP	UDINT	0042h (LinMot Service ID)
Input	IDXOFFS	UDINT	UPID
Input	LEN	UDINT	Always 4 bytes
Input	DESTADDR	DWORD	ADR(read_buffer (4bytes))
Input	READ	BOOL	Rising edge starts reading
Input	TMOUT	TIME	Timeout value
Output	BUSY	BOOL	Indicates reading active/finished
Output	ERR	BOOL	Indicates reading error
Output	ERRID	UDINT	Error id

#### 4.2.4 Parameter UPID write ROM value

Write the RAM value of the parameter specified by its UPID.

FUNCTION_BLOCK ADSWRITE			
Direction	Name	Type	Description
Input	NETID	T_AmsNetId	AoE NetID
Input	PORT	T_AmsPort	ADS Port
Input	IDXGRP	UDINT	0043h (LinMot Service ID)
Input	IDXOFFS	UDINT	UPID
Input	LEN	UDINT	Always 4 bytes
Input	SRCADDR	DWORD	ADR(write_buffer (4bytes))
Input	WRITE	BOOL	Rising edge starts reading
Input	TMOUT	TIME	Timeout value
Output	BUSY	BOOL	Indicates reading active/finished
Output	ERR	BOOL	Indicates reading error
Output	ERRID	UDINT	Error id

#### 4.2.5 Parameter start read UPID list

Specify the SW layer by its start UPID of which the UPID list will be read out. The list contains all parameters and variables of the SW layer.

FUNCTION_BLOCK ADSREAD			
Direction	Name	Type	Description
Input	NETID	T_AmsNetId	AoE NetID
Input	PORT	T_AmsPort	ADS Port
Input	IDXGRP	UDINT	0044h (LinMot Service ID)
Input	IDXOFFS	UDINT	Start UPID: 0000h: OS SW layer 1000h: MC SW layer 2000h: Intf SW layer 3000h: Appl SW layer
Input	LEN	UDINT	Always 8 bytes
Input	DESTADDR	DWORD	ADR(read_buffer (8bytes))
Input	READ	BOOL	Rising edge starts reading
Input	TMOUT	TIME	Timeout value
Output	BUSY	BOOL	Indicates reading active/finished
Output	ERR	BOOL	Indicates reading error
Output	ERRID	UDINT	Error ID: 00h: ok



#### 4.2.6 Parameter get next UPID list item

Read the UPID, address usage and ROM value of the parameter and the RAM value of the variables.

FUNCTION_BLOCK ADSREAD			
Direction	Name	Type	Description
Input	NETID	T_AmsNetId	AoE NetID
Input	PORT	T_AmsPort	ADS Port
Input	IDXGRP	UDINT	0045h (LinMot Service ID)
Input	IDXOFFS	-	Not evaluated
Input	LEN	UDINT	Always 8 bytes
Input	DESTADDR	DWORD	ADR(read_buffer (8bytes)) Bytes 0..1 UPID Bytes 2..3 Address usage Bytes 4..7 ROM Value
Input	READ	BOOL	Rising edge starts reading
Input	TMOUT	TIME	Timeout value
Output	BUSY	BOOL	Indicates reading active/finished
Output	ERR	BOOL	Indicates reading error
Output	ERRID	UDINT	Error ID: 00h: ok C6h: No new UPID found

#### 4.2.7 Parameter start read modified UPID list

Specify the SW layer by its start UPID of which the UPID list will be read out. The list contains only the parameter that differs in the ROM value of its default value.

FUNCTION_BLOCK ADSREAD			
Direction	Name	Type	Description
Input	NETID	T_AmsNetId	AoE NetID
Input	PORT	T_AmsPort	ADS Port
Input	IDXGRP	UDINT	0046h (LinMot Service ID)
Input	IDXOFFS	UDINT	Start UPID: 0000h: OS SW layer 1000h: MC SW layer 2000h: Intf SW layer 3000h: Appl SW layer
Input	LEN	UDINT	0
Input	DESTADDR	DWORD	ADR(read_buffer (8bytes)) Bytes 0..1 UPID Bytes 2..3 Address usage Bytes 4..7 ROM Value
Input	READ	BOOL	Rising edge starts reading
Input	TMOUT	TIME	Timeout value
Output	BUSY	BOOL	Indicates reading active/finished
Output	ERR	BOOL	Indicates reading error
Output	ERRID	UDINT	Error ID:

**FUNCTION\_BLOCK ADSREAD**

Direction	Name	Type	Description
			00h: ok

#### 4.2.8 Parameter get next modified UPID list item

Read the UPID, Address usage and ROM value of the parameter of the defined SW layer specified by its start UPID.

FUNCTION_BLOCK ADSREAD			
Direction	Name	Type	Description
Input	NETID	T_AmsNetId	AoE NetID
Input	PORT	T_AmsPort	ADS Port
Input	IDXGRP	UDINT	0047h (LinMot Service ID)
Input	IDXOFFS	-	Not evaluated
Input	LEN	UDINT	Always 8 bytes
Input	DESTADDR	DWORD	ADR(read_buffer (8bytes)) Bytes 0..1 UPID Bytes 2..3 Address usage Bytes 4..7 ROM Value
Input	READ	BOOL	Rising edge starts reading
Input	TMOU	TIME	Timeout value
Output	BUSY	BOOL	Indicates reading active/finished
Output	ERR	BOOL	Indicates reading error
Output	ERRID	UDINT	Error ID: 00h: ok C6h: No new UPID found

#### 4.2.9 Parameter Default SW instance

With this command all parameters of one SW instance can be set to the default value.

FUNCTION_BLOCK ADSWRITE			
Direction	Name	Type	Description
Input	NETID	T_AmsNetId	AoE NetID
Input	PORT	T_AmsPort	ADS Port
Input	IDXGRP	UDINT	0048h (LinMot Service ID)
Input	IDXOFFS	UDINT	SW instance selection 0: OS SW layer 1: MC SW layer 2: Interface SW layer 3: application SW layer
Input	LEN	UDINT	Always 0 bytes
Input	SRCADDR	DWORD	ADR(write_buffer (0bytes))
Input	WRITE	BOOL	Rising edge starts reading
Input	TMOU	TIME	Timeout value
Output	BUSY	BOOL	Indicates reading active/finished
Output	ERR	BOOL	Indicates reading error
Output	ERRID	UDINT	Error ID

## 4.3 ADS Curves Services

### 4.3.1 Curves delete all in RAM

Delete all curves in RAM.

FUNCTION_BLOCK ADSWRITE			
Direction	Name	Type	Description
Input	NETID	T_AmsNetId	AoE NetID
Input	PORT	T_AmsPort	ADS Port
Input	IDXGRP	UDINT	0050h (LinMot Service ID)
Input	IDXOFFS	UDINT	Not evaluated
Input	LEN	UDINT	Always 0 bytes
Input	SRCADDR	DWORD	ADR(write_buffer (0bytes))
Input	WRITE	BOOL	Rising edge starts reading
Input	TMOUT	TIME	Timeout value
Output	BUSY	BOOL	Indicates reading active/finished
Output	ERR	BOOL	Indicates reading error
Output	ERRID	UDINT	Error ID

### 4.3.2 Curves delete single curve in RAM

Delete a single curve in RAM.

FUNCTION_BLOCK ADSWRITE			
Direction	Name	Type	Description
Input	NETID	T_AmsNetId	AoE NetID
Input	PORT	T_AmsPort	ADS Port
Input	IDXGRP	UDINT	0051h (LinMot Service ID)
Input	IDXOFFS	UDINT	Curve ID to delete
Input	LEN	UDINT	Always 0 bytes
Input	SRCADDR	DWORD	ADR(write_buffer (0bytes))
Input	WRITE	BOOL	Rising edge starts reading
Input	TMOUT	TIME	Timeout value
Output	BUSY	BOOL	Indicates reading active/finished
Output	ERR	BOOL	Indicates reading error
Output	ERRID	UDINT	Error ID

### 4.3.3 Curves read info and data size

Read the info block and curve setpoint data size of the specified curve.

FUNCTION_BLOCK ADSREAD			
Direction	Name	Type	Description
Input	NETID	T_AmsNetId	AoE NetID
Input	PORT	T_AmsPort	ADS Port
Input	IDXGRP	UDINT	0052h (LinMot Service ID)
Input	IDXOFFS	UDINT	Curve ID
Input	LEN	UDINT	Always 4 bytes
Input	DESTADDR	DWORD	ADR(read_buffer (4bytes)) 0..1 : Info block size in bytes 0x0046 2..3 : setpoint data size in bytes (4 bytes per setpoint)
Input	READ	BOOL	Rising edge starts reading
Input	TMOUT	TIME	Timeout value
Output	BUSY	BOOL	Indicates reading active/finished
Output	ERR	BOOL	Indicates reading error
Output	ERRID	UDINT	Error id

### 4.3.4 Curves read info block data

Read the info block data of the specified curve. This command has to be repeated 18 times.

FUNCTION_BLOCK ADSREAD			
Direction	Name	Type	Description
Input	NETID	T_AmsNetId	AoE NetID
Input	PORT	T_AmsPort	ADS Port
Input	IDXGRP	UDINT	0053h (LinMot Service ID)
Input	IDXOFFS	UDINT	Curve ID
Input	LEN	UDINT	Always 4 bytes
Input	DESTADDR	DWORD	ADR(read_buffer (4bytes))
Input	READ	BOOL	Rising edge starts reading
Input	TMOUT	TIME	Timeout value
Output	BUSY	BOOL	Indicates reading active/finished
Output	ERR	BOOL	Indicates reading error
Output	ERRID	UDINT	Error id

### 4.3.5 Curves read setpoint data

Read the setpoint data of the specified curve. This command has to be repeated until all data is read out.

FUNCTION_BLOCK ADSREAD			
Direction	Name	Type	Description
Input	NETID	T_AmsNetId	AoE NetID
Input	PORT	T_AmsPort	ADS Port
Input	IDXGRP	UDINT	0054h (LinMot Service ID)
Input	IDXOFFS	UDINT	Curve ID
Input	LEN	UDINT	Always 4 bytes
Input	DESTADDR	DWORD	ADR(read_buffer (4bytes))
Input	READ	BOOL	Rising edge starts reading
Input	TMOUT	TIME	Timeout value
Output	BUSY	BOOL	Indicates reading active/finished
Output	ERR	BOOL	Indicates reading error
Output	ERRID	UDINT	Error id

### 4.3.6 Curves start modify curve in RAM

Read the info block and curve setpoint data size of the specified curve.

FUNCTION_BLOCK ADSWRITE			
Direction	Name	Type	Description
Input	NETID	T_AmsNetId	AoE NetID
Input	PORT	T_AmsPort	ADS Port
Input	IDXGRP	UDINT	0058h (LinMot Service ID)
Input	IDXOFFS	UDINT	Curve ID
Input	LEN	UDINT	Always 4 bytes
Input	DESTADDR	DWORD	ADR(write_buffer (4bytes)) 0..1 : Info block size in bytes 0x0046 2..3 : setpoint data size in bytes (4 bytes per setpoint)
Input	READ	BOOL	Rising edge starts reading
Input	TMOUT	TIME	Timeout value
Output	BUSY	BOOL	Indicates reading active/finished
Output	ERR	BOOL	Indicates reading error
Output	ERRID	UDINT	Error id

### 4.3.7 Curves modify curve info block data in RAM

Write the info block data of the specified curve. This command has to be repeated 18 times.

FUNCTION_BLOCK ADSWRITE			
Direction	Name	Type	Description
Input	NETID	T_AmsNetId	AoE NetID
Input	PORT	T_AmsPort	ADS Port
Input	IDXGRP	UDINT	0059h (LinMot Service ID)
Input	IDXOFFS	UDINT	Curve ID
Input	LEN	UDINT	Always 4 bytes
Input	DESTADDR	DWORD	ADR(write_buffer (4bytes))
Input	READ	BOOL	Rising edge starts reading
Input	TMOUT	TIME	Timeout value
Output	BUSY	BOOL	Indicates reading active/finished
Output	ERR	BOOL	Indicates reading error
Output	ERRID	UDINT	Error id

### 4.3.8 Curves modify curve setpoint data in RAM

Write the setpoint data of the specified curve. This command has to be repeated until all data is written.

FUNCTION_BLOCK ADSWRITE			
Direction	Name	Type	Description
Input	NETID	T_AmsNetId	AoE NetID
Input	PORT	T_AmsPort	ADS Port
Input	IDXGRP	UDINT	005Ah (LinMot Service ID)
Input	IDXOFFS	UDINT	Curve ID
Input	LEN	UDINT	Always 4 bytes
Input	DESTADDR	DWORD	ADR(write_buffer (4bytes))
Input	READ	BOOL	Rising edge starts reading
Input	TMOUT	TIME	Timeout value
Output	BUSY	BOOL	Indicates reading active/finished
Output	ERR	BOOL	Indicates reading error
Output	ERRID	UDINT	Error id

### 4.3.9 Curves start write curve to RAM

Initiates writing a curve to RAM. Then the “Curves write curve info block data to RAM” service has to be called several times. Only non existing curve IDs can be written. If the curve exists, it has to be deleted before (Command. “Curves delete single curve in RAM”). Repeated curve writing can lead to a full curve memory. In this case the complete curve memory has to be deleted with the command “Delete all curves”.

FUNCTION_BLOCK ADSWRITE			
Direction	Name	Type	Description
Input	NETID	T_AmsNetId	AoE NetID
Input	PORT	T_AmsPort	ADS Port
Input	IDXGRP	UDINT	0055h (LinMot Service ID)
Input	IDXOFFS	UDINT	Curve ID to write
Input	LEN	UDINT	Always 4 bytes
Input	SRCADDR	DWORD	ADR(write_buffer (0bytes)) Bytes 0..1 curve info block size Bytes 2..3 curve data block size
Input	WRITE	BOOL	Rising edge starts reading
Input	TMOUT	TIME	Timeout value
Output	BUSY	BOOL	Indicates reading active/finished
Output	ERR	BOOL	Indicates reading error
Output	ERRID	UDINT	Error ID

### 4.3.10 Curves write curve info block data to RAM

Write the curve header data to RAM. This command has to be repeated until the whole curve info block data is written. Then the “Curves write curve info block data to RAM” service has to be called several times.

FUNCTION_BLOCK ADSWRITE			
Direction	Name	Type	Description
Input	NETID	T_AmsNetId	AoE NetID
Input	PORT	T_AmsPort	ADS Port
Input	IDXGRP	UDINT	0056h (LinMot Service ID)
Input	IDXOFFS	UDINT	Curve ID to write
Input	LEN	UDINT	Always 4 bytes
Input	SRCADDR	DWORD	ADR(write_buffer (4bytes))
Input	WRITE	BOOL	Rising edge starts reading
Input	TMOUT	TIME	Timeout value
Output	BUSY	BOOL	Indicates reading active/finished
Output	ERR	BOOL	Indicates reading error
Output	ERRID	UDINT	Error ID



#### 4.3.11 Curves write curve setpoint data to RAM

Write the curve setpoint data to RAM. This has to be repeated until the whole setpoint data block is written.

FUNCTION_BLOCK ADSWRITE			
Direction	Name	Type	Description
Input	NETID	T_AmsNetId	AoE NetID
Input	PORT	T_AmsPort	ADS Port
Input	IDXGRP	UDINT	0057h (LinMot Service ID)
Input	IDXOFFS	UDINT	Curve ID to write
Input	LEN	UDINT	Always 4 bytes
Input	SRCADDR	DWORD	ADR(write_buffer (4bytes))
Input	WRITE	BOOL	Rising edge starts reading
Input	TMOUT	TIME	Timeout value
Output	BUSY	BOOL	Indicates reading active/finished
Output	ERR	BOOL	Indicates reading error
Output	ERRID	UDINT	Error ID

#### 4.3.12 Curves read presence list

Read out the presence list which curves are defined.

FUNCTION_BLOCK ADSREAD			
Direction	Name	Type	Description
Input	NETID	T_AmsNetId	AoE NetID
Input	PORT	T_AmsPort	ADS Port
Input	IDXGRP	UDINT	005Eh (LinMot Service ID)
Input	IDXOFFS	UDINT	IDOff : 0: curves 1..32 32: curves 33..64 64: curves 65..96 96: curves 96..100
Input	LEN	UDINT	Always 4 bytes
Input	SRCADDR	DWORD	ADR(write_buffer (4bytes))
Input	WRITE	BOOL	Rising edge starts reading
Input	TMOUT	TIME	Timeout value
Output	BUSY	BOOL	Indicates reading active/finished
Output	ERR	BOOL	Indicates reading error
Output	ERRID	UDINT	Error ID

### 4.3.13 Curves start write curves from RAM to FLASH

Save the whole curve section from RAM to FLASH memory.

FUNCTION_BLOCK ADSWRITE			
Direction	Name	Type	Description
Input	NETID	T_AmsNetId	AoE NetID
Input	PORT	T_AmsPort	ADS Port
Input	IDXGRP	UDINT	005Fh (LinMot Service ID)
Input	IDXOFFS	UDINT	-
Input	LEN	UDINT	Always 0 bytes
Input	SRCADDR	DWORD	ADR(write_buffer (0bytes))
Input	WRITE	BOOL	Rising edge starts reading
Input	TMOUT	TIME	Timeout value
Output	BUSY	BOOL	Indicates reading active/finished
Output	ERR	BOOL	Indicates reading error
Output	ERRID	UDINT	Error ID

## 4.4 ADS Command Table Services

### 4.4.1 Command Table delete all entries from RAM

Delete all command table entries in RAM.

FUNCTION_BLOCK ADSWRITE			
Direction	Name	Type	Description
Input	NETID	T_AmsNetId	AoE NetID
Input	PORT	T_AmsPort	ADS Port
Input	IDXGRP	UDINT	0060h (LinMot Service ID)
Input	IDXOFFS	UDINT	Not evaluated
Input	LEN	UDINT	Always 0 bytes
Input	SRCADDR	DWORD	ADR(write_buffer (0bytes))
Input	WRITE	BOOL	Rising edge starts reading
Input	TMOUT	TIME	Timeout value
Output	BUSY	BOOL	Indicates reading active/finished
Output	ERR	BOOL	Indicates reading error
Output	ERRID	UDINT	Error ID

#### 4.4.2 Command Table delete single entry from RAM

Delete a single command table entry in RAM.

FUNCTION_BLOCK ADSWRITE			
Direction	Name	Type	Description
Input	NETID	T_AmsNetId	AoE NetID
Input	PORT	T_AmsPort	ADS Port
Input	IDXGRP	UDINT	0061h (LinMot Service ID)
Input	IDXOFFS	UDINT	Command Table ID to delete
Input	LEN	UDINT	Always 0 bytes
Input	SRCADDR	DWORD	ADR(write_buffer (0bytes))
Input	WRITE	BOOL	Rising edge starts reading
Input	TMOUT	TIME	Timeout value
Output	BUSY	BOOL	Indicates reading active/finished
Output	ERR	BOOL	Indicates reading error
Output	ERRID	UDINT	Error ID

#### 4.4.3 Command Table read data size

Start command to read a Command Table entry. The entry size will be returned.

FUNCTION_BLOCK ADSREAD			
Direction	Name	Type	Description
Input	NETID	T_AmsNetId	AoE NetID
Input	PORT	T_AmsPort	ADS Port
Input	IDXGRP	UDINT	0062h (LinMot Service ID)
Input	IDXOFFS	UDINT	Command Table ID
Input	LEN	UDINT	Always 4 bytes
Input	DESTADDR	DWORD	ADR(read_buffer (4bytes)) 0..3 : Command Table size in bytes 0x0040
Input	READ	BOOL	Rising edge starts reading
Input	TMOUT	TIME	Timeout value
Output	BUSY	BOOL	Indicates reading active/finished
Output	ERR	BOOL	Indicates reading error
Output	ERRID	UDINT	Error ID

#### 4.4.4 Command Table read data

Read the Command Table data. This command has to be repeated until all 64 bytes are read.

FUNCTION_BLOCK ADSREAD			
Direction	Name	Type	Description
Input	NETID	T_AmsNetId	AoE NetID
Input	PORT	T_AmsPort	ADS Port
Input	IDXGRP	UDINT	0063h (LinMot Service ID)
Input	IDXOFFS	UDINT	Command Table ID
Input	LEN	UDINT	Always 4 bytes
Input	DESTADDR	DWORD	ADR(read_buffer (4bytes))
Input	READ	BOOL	Rising edge starts reading
Input	TMOUT	TIME	Timeout value
Output	BUSY	BOOL	Indicates reading active/finished
Output	ERR	BOOL	Indicates reading error
Output	ERRID	UDINT	Error id

#### 4.4.5 Command Table start write entry in RAM

Start command to write a Command Table entry in the RAM.

FUNCTION_BLOCK ADSWRITE			
Direction	Name	Type	Description
Input	NETID	T_AmsNetId	AoE NetID
Input	PORT	T_AmsPort	ADS Port
Input	IDXGRP	UDINT	0065h (LinMot Service ID)
Input	IDXOFFS	UDINT	Command Table ID
Input	LEN	UDINT	Always 4 bytes
Input	DESTADDR	DWORD	ADR(write_buffer (4bytes)) 0..3 : Command Table size in bytes 0x0040
Input	READ	BOOL	Rising edge starts reading
Input	TMOUT	TIME	Timeout value
Output	BUSY	BOOL	Indicates reading active/finished
Output	ERR	BOOL	Indicates reading error
Output	ERRID	UDINT	Error id

#### 4.4.6 Command Table write entry data in RAM

Write the Command Table data. This command has to be repeated until all 64 bytes are written.

FUNCTION_BLOCK ADSWRITE			
Direction	Name	Type	Description
Input	NETID	T_AmsNetId	AoE NetID
Input	PORT	T_AmsPort	ADS Port
Input	IDXGRP	UDINT	0066h (LinMot Service ID)
Input	IDXOFFS	UDINT	Command Table ID
Input	LEN	UDINT	Always 4 bytes
Input	DESTADDR	DWORD	ADR(write_buffer (4bytes))
Input	READ	BOOL	Rising edge starts reading
Input	TMOUT	TIME	Timeout value
Output	BUSY	BOOL	Indicates reading active/finished
Output	ERR	BOOL	Indicates reading error
Output	ERRID	UDINT	Error id

#### 4.4.7 Command Table read presence list

Gets the presence list of all Command Table entries.

FUNCTION_BLOCK ADSREAD			
Direction	Name	Type	Description
Input	NETID	T_AmsNetId	AoE NetID
Input	PORT	T_AmsPort	ADS Port
Input	IDXGRP	UDINT	006Eh (LinMot Service ID)
Input	IDXOFFS	UDINT	(Bit=0 means Entry exists) IDOff : 0: entries 1..31 32: entries 33..63 64: entries 65..95 96: entries 96..127 128: entries 128..159 160: entries 160..191 192: entries 192..223 224: entries 224..255
Input	LEN	UDINT	Always 4 bytes
Input	SRCADDR	DWORD	ADR(write_buffer (4bytes))
Input	WRITE	BOOL	Rising edge starts reading
Input	TMOUT	TIME	Timeout value
Output	BUSY	BOOL	Indicates reading active/finished
Output	ERR	BOOL	Indicates reading error
Output	ERRID	UDINT	Error ID

#### 4.4.8 Command Table start write entries from RAM to FLASH

Copy the whole Command Table section from RAM to FLASH memory.

FUNCTION_BLOCK ADSWRITE			
Direction	Name	Type	Description
Input	NETID	T_AmsNetId	AoE NetID
Input	PORT	T_AmsPort	ADS Port
Input	IDXGRP	UDINT	006Fh (LinMot Service ID)
Input	IDXOFFS	UDINT	Curve ID to write
Input	LEN	UDINT	Always 0 bytes
Input	SRCADDR	DWORD	ADR(write_buffer (0bytes))
Input	WRITE	BOOL	Rising edge starts reading
Input	TMOUT	TIME	Timeout value
Output	BUSY	BOOL	Indicates reading active/finished
Output	ERR	BOOL	Indicates reading error
Output	ERRID	UDINT	Error ID

### 4.5 ADS Program handling

#### 4.5.1 Reset device

FUNCTION_BLOCK ADSWRITE			
Direction	Name	Type	Description
Input	NETID	T_AmsNetId	AoE NetID
Input	PORT	T_AmsPort	ADS Port
Input	IDXGRP	UDINT	0070h (LinMot Service ID)
Input	IDXOFFS	UDINT	-
Input	LEN	UDINT	Always 0 bytes
Input	SRCADDR	DWORD	ADR(write_buffer (0bytes))
Input	WRITE	BOOL	Rising edge starts reading
Input	TMOUT	TIME	Timeout value >12s
Output	BUSY	BOOL	Indicates reading active/finished
Output	ERR	BOOL	Indicates reading error
Output	ERRID	UDINT	Error ID

Typical restart time are <13 seconds, take this fact in account, when setting the ADS timeout value.

#### 4.5.2 Stop SW instances

Stop the selected SW instances e.g. for saving the curves into the FLASH memory.

FUNCTION_BLOCK ADSWRITE			
Direction	Name	Type	Description
Input	NETID	T_AmsNetId	AoE NetID
Input	PORT	T_AmsPort	ADS Port
Input	IDXGRP	UDINT	0071h (LinMot Service ID)
Input	IDXOFFS	UDINT	SW instance selection Bit 0: MC-SW layer Bit 1: Interface SW layer Bit 2: application SW layer
Input	LEN	UDINT	Always 0 bytes
Input	SRCADDR	DWORD	ADR(write_buffer (0bytes))
Input	WRITE	BOOL	Rising edge starts reading
Input	TMOUT	TIME	Timeout value
Output	BUSY	BOOL	Indicates reading active/finished
Output	ERR	BOOL	Indicates reading error
Output	ERRID	UDINT	Error ID

#### 4.5.3 Start SW instances

Start the selected SW instances e.g. after flashing the curves.

FUNCTION_BLOCK ADSWRITE			
Direction	Name	Type	Description
Input	NETID	T_AmsNetId	AoE NetID
Input	PORT	T_AmsPort	ADS Port
Input	IDXGRP	UDINT	0072h (LinMot Service ID)
Input	IDXOFFS	UDINT	SW instance selection Bit 0: MC-SW layer Bit 1: Interface SW layer Bit 2: application SW layer
Input	LEN	UDINT	Always 0 bytes
Input	SRCADDR	DWORD	ADR(write_buffer (0bytes))
Input	WRITE	BOOL	Rising edge starts reading
Input	TMOUT	TIME	Timeout value
Output	BUSY	BOOL	Indicates reading active/finished
Output	ERR	BOOL	Indicates reading error
Output	ERRID	UDINT	Error ID

## 5 Asynchronous Configuration Protocol CoE

For configuration purpose (Parameter Handling) the standard Sercos over EtherCAT SoE-Protocol is used.

### 5.1 Communication Profile Area(1000h-1FFFh)

General
EtherCAT
DC
Process Data
Startup
CoE - Online
Online

Update List

Auto Update
  Single Update
  Show Offline Data

Advanced...

Add to Startup...

Online Data

Module OD (AoE Port):

0

Index	Name	Flags	Value	Unit
1000	Device type	RO	0x00020192 (131474)	
1008	Device name	RO	C1150ECXC0S	
1009	Hardware version	RO	1RB	
100A	Software version	RO	6.3 Build 20141112-IM	
+ 1018:0	Identity	RO	> 4 <	
+ 1602:0	Cyclic Position Mode	RO	> 4 <	
+ 1603:0	Cyclic Position Velocity Mode	RO	> 5 <	
+ 1606:0	Cyclic Torque Mode	RO	> 4 <	
+ 1620:0	User Defined Outputs	RW	> 0 <	
+ 1700:0	Default Outputs	RO	> 7 <	
+ 1701:0	NC Outputs	RO	> 4 <	
+ 1708:0	Config Module	RO	> 3 <	
+ 1A02:0	Cyclic Mode Inputs	RO	> 6 <	
+ 1A20:0	User Defined Inputs	RW	> 0 <	
+ 1B00:0	Default Inputs	RO	> 7 <	
+ 1B01:0	NC Inputs	RO	> 7 <	
+ 1B08:0	Config Module	RO	> 4 <	
+ 1B10:0	Input DemVel	RO	> 1 <	
+ 1B11:0	Input ActVel	RO	> 1 <	
+ 1B12:0	Input ActVelFilt	RO	> 1 <	
+ 1C12:0	Sync Manager 2 PDO Assignment	RW	> 1 <	
+ 1C13:0	Sync Manager 3 PDO Assignment	RW	> 1 <	
6007	Abort connection option code	RW	0	
603F	Error code	RO	0	
6040	Controlword	RW P	0x0000 (0)	
6041	Statusword	RO P		
6060	Mode of Operation	RO P	0x00 (0)	
6061	Mode of Operation display	RW P	0x00 (0)	
6064	Position actual value ( units )	RW P	-467	
607A	Target position	RW P	0	
60E0	TorqueLimitPositiv	RW P	0x0000 (0)	
60E1	TorqueLimitNegativ	RW P	0x0000 (0)	

LinMot EtherCAT Object Dictionary



## 5.2 Manufacturer specific Profile Area(2000h-5FFFh)

Parameters can be modified via their UPIDs (Unique Parameter ID) via CoE. To use a UPID command, an SDO read (FB\_EcCoeSdoReadEx) or write (FB\_EcCoeSdoWriteEx) has to be performed on the index “2000h + UPID”. The sub-index specifies the command which is performed.

Sdo Service	Index	Sub-Index	Description
Read	2000h+UPID	01h	Parameter UPID read RAM value
Write	2000h+UPID	01h	Parameter UPID write RAM value
Read	2000h+UPID	02h	Parameter UPID read ROM value
Write	2000h+UPID	02h	Parameter UPID write ROM value
Read	2000h+UPID	03h	Parameter UPID read minimal value
Read	2000h+UPID	04h	Parameter UPID read maximal value
Read	2000h+UPID	05h	Parameter UPID read default value
Write	2000h+UPID	06h	Parameter UPID write RAM and ROM value
Write	2000h	07h	Parameter Default OS SW instance
Write	2000h	08h	Parameter Default MC SW instance
Write	2000h	09h	Parameter Default Intf SW instance
Write	2000h	0Ah	Parameter Default Appl SW instance
Write	2000h	0Bh	Reset device
Write	2000h	18h	Parameter Default MC SW instance with immediate response
Write	2000h	24h	Parameter Start Read UPID List
Read	2000h	25h	Parameter Read next UPID List entry
Write	2000h	26h	Parameter Start Read modified UPID List
Read	2000h	27h	Parameter Read next modified UPID List entry
Write	2000h	35h	Stop MC and Appl SW instances
Write	2000h	36h	Start MC and Appl SW instances
Write	2000h	40h	Curves copy curves from RAM to FLASH
Write	2000h	41h	Curves delete all in RAM
Write	2000h+ID	50h	Curves start write curve in RAM
Write	2000h+ID	54h	Curves write curve info block data in RAM
Write	2000h+ID	53h	Curves write curve set point data in RAM
Read	2000h+ID	60h	Curves read info and data size
Read	2000h+ID	61h	Curves read info block data
Read	2000h+ID	62h	Curves read setpoint data
Read	2000h	70h	Read error counters
Read	2000h+ID	71h	Read error code of logged entry
Read	2000h+ID	72h	Read error time low of logged entry
Read	2000h+ID	73h	Read error time high of logged entry

Sdo Service	Index	Sub-Index	Description
Read	2000h+ID	74h	Read error text stringlet 0 of error code
Read	2000h+ID	75h	Read error text stringlet 1 of error code
Read	2000h+ID	76h	Read error text stringlet 2 of error code
Read	2000h+ID	77h	Read error text stringlet 3 of error code
Read	2000h+ID	78h	Read error text stringlet 4 of error code
Read	2000h+ID	79h	Read error text stringlet 5 of error code
Read	2000h+ID	7Ah	Read error text stringlet 6 of error code
Read	2000h+ID	7Bh	Read error text stringlet 7 of error code
Write	2000h	80h	Command Table copy entries from RAM to FLASH
Write	2000h	81h	Command Table delete all entries in RAM
Write	2000h+ID	82h	Command Table delete single entry in RAM
Write	2000h+ID	83h	Command Table start write entry in RAM
Write	2000h+ID	84h	Command Table write entry data in RAM
Read	2000h+ID	85h	Command Table read entry data size
Read	2000h+ID	86h	Command Table read entry data
Read	2000h	87h	Command Table read presence list entries 0..31
Read	2000h	88h	Command Table read presence list entries 32..63
Read	2000h	89h	Command Table read presence list entries 64..95
Read	2000h	8Ah	Command Table read presence list entries 96..127
Read	2000h	8Bh	Command Table read presence list entries 128..159
Read	2000h	8Ch	Command Table read presence list entries 160..191
Read	2000h	8Dh	Command Table read presence list entries 192..223
Read	2000h	8Eh	Command Table read presence list entries 224..255

### 5.2.1 Parameter UPID read RAM value

Read the RAM value of the parameter specified by its UPID, and stores the result in the 4 bytes of the read\_buffer.

FUNCTION_BLOCK: FB_EcCoeSdoReadEx			
Direction	Name	Type	Description
Input	sNetId	T_AmsNetId	AmsNetId of master
Input	nSlaveAddr	UINT	Address of slave
Input	nSubIndex	Byte	01h (LinMot Sdo Service ID)
Input	nIndex	WORD	2000h + UPID
Input	pDstBuf	DWORD	ADR(read_buffer (4bytes))
Input	cbBufLen	UDINT	Always 4 bytes
Input	bExecute	BOOL	Rising edge starts writing
Input	tTimeout	TIME	Timeout value
Input	bComplAccess	BOOL	FALSE

**FUNCTION\_BLOCK: FB\_EcCoeSdoReadEx**

Direction	Name	Type	Description
Output	bBusy	BOOL	Indicates reading active/finished
Output	bError	BOOL	Indicates reading error
Output	nErrId	UDINT	Error ID

**5.2.2 Parameter UPID write RAM value**

Write the content of the write\_buffer to the RAM value of the parameter specified by its UPID. The write\_buffer can have a unique size of 4 bytes.

**FUNCTION\_BLOCK: FB\_EcCoeSdoWriteEx**

Direction	Name	Type	Description
Input	sNetId	T_AmsNetId	AmsNetId of master
Input	nSlaveAddr	UINT	Address of slave
Input	nSubIndex	Byte	01h (LinMot Sdo Service ID)
Input	nIndex	WORD	2000h + UPID
Input	pSrcBuf	DWORD	ADR(write_buffer (4bytes))
Input	cbBufLen	UDINT	Always 4 bytes
Input	bExecute	BOOL	Rising edge starts writing
Input	tTimeout	TIME	Timeout value
Input	bComplAccess	BOOL	FALSE
Output	bBusy	BOOL	Indicates reading active/finished
Output	bError	BOOL	Indicates reading error
Output	nErrId	UDINT	Error ID

**5.2.3 Parameter UPID read ROM value**

Read the ROM value of the parameter specified by its UPID, and stores the result in the 4 bytes of the read\_buffer.

**FUNCTION\_BLOCK: FB\_EcCoeSdoReadEx**

Direction	Name	Type	Description
Input	sNetId	T_AmsNetId	AmsNetId of master
Input	nSlaveAddr	UINT	Address of slave
Input	nSubIndex	Byte	02h (LinMot Sdo Service ID)
Input	nIndex	WORD	2000h + UPID
Input	pDstBuf	DWORD	ADR(read_buffer (4bytes))
Input	cbBufLen	UDINT	Always 4 bytes
Input	bExecute	BOOL	Rising edge starts writing
Input	tTimeout	TIME	Timeout value
Input	bComplAccess	BOOL	FALSE
Output	bBusy	BOOL	Indicates reading active/finished
Output	bError	BOOL	Indicates reading error
Output	nErrId	UDINT	Error ID

#### 5.2.4 Parameter UPID write ROM value

Write the content of the write\_buffer to the ROM value of the parameter specified by its UPID. The write\_buffer can have a unique size of 4 bytes.

FUNCTION_BLOCK: FB_EcCoeSdoWriteEx			
Direction	Name	Type	Description
Input	sNetId	T_AmsNetId	AmsNetId of master
Input	nSlaveAddr	UINT	Address of slave
Input	nSubIndex	Byte	02h (LinMot Sdo Service ID)
Input	nIndex	WORD	2000h + UPID
Input	pSrcBuf	DWORD	ADR(write_buffer (4bytes))
Input	cbBufLen	UDINT	Always 4 bytes
Input	bExecute	BOOL	Rising edge starts writing
Input	tTimeout	TIME	Timeout value
Input	bComplAccess	BOOL	FALSE
Output	bBusy	BOOL	Indicates reading active/finished
Output	bError	BOOL	Indicates reading error
Output	nErrId	UDINT	Error ID

#### 5.2.5 Parameter UPID read minimal value

Read the minimal value of the parameter specified by its UPID, and stores the result in the 4 bytes of the read\_buffer.

FUNCTION_BLOCK: FB_EcCoeSdoReadEx			
Direction	Name	Type	Description
Input	sNetId	T_AmsNetId	AmsNetId of master
Input	nSlaveAddr	UINT	Address of slave
Input	nSubIndex	Byte	03h (LinMot Sdo Service ID)
Input	nIndex	WORD	2000h + UPID
Input	pDstBuf	DWORD	ADR(read_buffer (4bytes))
Input	cbBufLen	UDINT	Always 4 bytes
Input	bExecute	BOOL	Rising edge starts writing
Input	tTimeout	TIME	Timeout value
Input	bComplAccess	BOOL	FALSE
Output	bBusy	BOOL	Indicates reading active/finished
Output	bError	BOOL	Indicates reading error
Output	nErrId	UDINT	Error ID

#### 5.2.6 Parameter UPID read maximal value

Read the maximal value of the parameter specified by its UPID, and stores the result in the 4 bytes of the read\_buffer.

**FUNCTION\_BLOCK: FB\_EcCoeSdoReadEx**

Direction	Name	Type	Description
Input	sNetId	T_AmsNetId	AmsNetId of master
Input	nSlaveAddr	UINT	Address of slave
Input	nSubIndex	Byte	04h (LinMot Sdo Service ID)
Input	nIndex	WORD	2000h + UPID
Input	pDstBuf	DWORD	ADR(read_buffer (4bytes))
Input	cbBufLen	UDINT	Always 4 bytes
Input	bExecute	BOOL	Rising edge starts writing
Input	tTimeout	TIME	Timeout value
Input	bComplAccess	BOOL	FALSE
Output	bBusy	BOOL	Indicates reading active/finished
Output	bError	BOOL	Indicates reading error
Output	nErrId	UDINT	Error ID

**5.2.7 Parameter UPID read default value**

Read the default value of the parameter specified by its UPID, and stores the result in the 4 bytes of the read\_buffer.

**FUNCTION\_BLOCK: FB\_EcCoeSdoReadEx**

Direction	Name	Type	Description
Input	sNetId	T_AmsNetId	AmsNetId of master
Input	nSlaveAddr	UINT	Address of slave
Input	nSubIndex	Byte	05h (LinMot Sdo Service ID)
Input	nIndex	WORD	2000h + UPID
Input	pDstBuf	DWORD	ADR(read_buffer (4bytes))
Input	cbBufLen	UDINT	Always 4 bytes
Input	bExecute	BOOL	Rising edge starts writing
Input	tTimeout	TIME	Timeout value
Input	bComplAccess	BOOL	FALSE
Output	bBusy	BOOL	Indicates reading active/finished
Output	bError	BOOL	Indicates reading error
Output	nErrId	UDINT	Error ID

**5.2.8 Parameter UPID write RAM & ROM value**

Write the content of the write\_buffer to the RAM and ROM value of the parameter specified by its UPID. The write\_buffer can have a unique size of 4 bytes.

**FUNCTION\_BLOCK: FB\_EcCoeSdoWriteEx**

Direction	Name	Type	Description
Input	sNetId	T_AmsNetId	AmsNetId of master
Input	nSlaveAddr	UINT	Address of slave
Input	nSubIndex	Byte	06h (LinMot Sdo Service ID)

**FUNCTION\_BLOCK: FB\_EcCoeSdoWriteEx**

Direction	Name	Type	Description
Input	nIndex	WORD	2000h + UPID
Input	pSrcBuf	DWORD	ADR(write_buffer (4bytes))
Input	cbBufLen	UDINT	Always 4 bytes
Input	bExecute	BOOL	Rising edge starts writing
Input	tTimeout	TIME	Timeout value
Input	bComplAccess	BOOL	FALSE
Output	bBusy	BOOL	Indicates reading active/finished
Output	bError	BOOL	Indicates reading error
Output	nErrId	UDINT	Error ID

**5.2.9 Parameter default OS SW instance**

All parameters of the OS SW instance are set to their default value. The SDO response is given when the defaulting process is finished, this can last several seconds.

**FUNCTION\_BLOCK: FB\_EcCoeSdoWriteEx**

Direction	Name	Type	Description
Input	sNetId	T_AmsNetId	AmsNetId of master
Input	nSlaveAddr	UINT	Address of slave
Input	nSubIndex	Byte	07h (LinMot Sdo Service ID)
Input	nIndex	WORD	2000h
Input	pSrcBuf	DWORD	ADR(write_buffer (0 bytes))
Input	cbBufLen	UDINT	0 bytes (4 bytes also accepted)
Input	bExecute	BOOL	Rising edge starts writing
Input	tTimeout	TIME	Timeout value
Input	bComplAccess	BOOL	FALSE
Output	bBusy	BOOL	Indicates reading active/finished
Output	bError	BOOL	Indicates reading error
Output	nErrId	UDINT	Error ID

**5.2.10 Parameter default MC SW instance**

All parameters of the MC SW instance are set to their default value. The SDO response is given when the defaulting process is finished, this can last several seconds.

**FUNCTION\_BLOCK: FB\_EcCoeSdoWriteEx**

Direction	Name	Type	Description
Input	sNetId	T_AmsNetId	AmsNetId of master
Input	nSlaveAddr	UINT	Address of slave
Input	nSubIndex	Byte	08h (LinMot Sdo Service ID)
Input	nIndex	WORD	2000h
Input	pSrcBuf	DWORD	ADR(write_buffer (0 bytes))
Input	cbBufLen	UDINT	0 bytes (4 bytes also accepted)

**FUNCTION\_BLOCK: FB\_EcCoeSdoWriteEx**

Direction	Name	Type	Description
Input	bExecute	BOOL	Rising edge starts writing
Input	tTimeout	TIME	Timeout value
Input	bComplAccess	BOOL	FALSE
Output	bBusy	BOOL	Indicates reading active/finished
Output	bError	BOOL	Indicates reading error
Output	nErrId	UDINT	Error ID

**5.2.11 Parameter default Intf SW instance**

All parameters of the interface SW instance are set to their default value. The SDO response is given when the defaulting process is finished, this can last several seconds.

**FUNCTION\_BLOCK: FB\_EcCoeSdoWriteEx**

Direction	Name	Type	Description
Input	sNetId	T_AmsNetId	AmsNetId of master
Input	nSlaveAddr	UINT	Address of slave
Input	nSubIndex	Byte	09h (LinMot Sdo Service ID)
Input	nIndex	WORD	2000h
Input	pSrcBuf	DWORD	ADR(write_buffer (0 bytes))
Input	cbBufLen	UDINT	0 bytes (4 bytes also accepted)
Input	bExecute	BOOL	Rising edge starts writing
Input	tTimeout	TIME	Timeout value
Input	bComplAccess	BOOL	FALSE
Output	bBusy	BOOL	Indicates reading active/finished
Output	bError	BOOL	Indicates reading error
Output	nErrId	UDINT	Error ID

**5.2.12 Parameter default Appl SW instance**

All parameters of the application SW instance are set to their default value. The SDO response is given when the defaulting process is finished, this can last several seconds.

**FUNCTION\_BLOCK: FB\_EcCoeSdoWriteEx**

Direction	Name	Type	Description
Input	sNetId	T_AmsNetId	AmsNetId of master
Input	nSlaveAddr	UINT	Address of slave
Input	nSubIndex	Byte	0Ah (LinMot Sdo Service ID)
Input	nIndex	WORD	2000h
Input	pSrcBuf	DWORD	ADR(write_buffer (0 bytes))
Input	cbBufLen	UDINT	0 bytes (4 bytes also accepted)
Input	bExecute	BOOL	Rising edge starts writing
Input	tTimeout	TIME	Timeout value
Input	bComplAccess	BOOL	FALSE

**FUNCTION\_BLOCK: FB\_EcCoeSdoWriteEx**

Direction	Name	Type	Description
Output	bBusy	BOOL	Indicates reading active/finished
Output	bError	BOOL	Indicates reading error
Output	nErrId	UDINT	Error ID

**5.2.13 Reset device**

This service resets the device.

**FUNCTION\_BLOCK: FB\_EcCoeSdoWriteEx**

Direction	Name	Type	Description
Input	sNetId	T_AmsNetId	AmsNetId of master
Input	nSlaveAddr	UINT	Address of slave
Input	nSubIndex	Byte	0Bh (LinMot Sdo Service ID)
Input	nIndex	WORD	2000h
Input	pSrcBuf	DWORD	ADR(write_buffer (0 bytes))
Input	cbBufLen	UDINT	0 bytes (4 bytes also accepted)
Input	bExecute	BOOL	Rising edge starts writing
Input	tTimeout	TIME	Timeout value
Input	bComplAccess	BOOL	FALSE
Output	bBusy	BOOL	Indicates reading active/finished
Output	bError	BOOL	Indicates reading error
Output	nErrId	UDINT	Error ID

**5.2.14 Parameter default MC SW instance with immediate response**

All parameters of the MC SW instance are set to their default value, the SDO response is given immediate. Take into account that the defaulting process last up to 10 seconds don't take other actions before this time is elapsed.

**FUNCTION\_BLOCK: FB\_EcCoeSdoWriteEx**

Direction	Name	Type	Description
Input	sNetId	T_AmsNetId	AmsNetId of master
Input	nSlaveAddr	UINT	Address of slave
Input	nSubIndex	Byte	18h (LinMot Sdo Service ID)
Input	nIndex	WORD	2000h
Input	pSrcBuf	DWORD	ADR(write_buffer (0 bytes))
Input	cbBufLen	UDINT	0 bytes (4 bytes also accepted)
Input	bExecute	BOOL	Rising edge starts writing
Input	tTimeout	TIME	Timeout value
Input	bComplAccess	BOOL	FALSE
Output	bBusy	BOOL	Indicates reading active/finished
Output	bError	BOOL	Indicates reading error
Output	nErrId	UDINT	Error ID



### 5.2.15 Start read UPID List

Specify the SW layer by its start UPID of which the UPID list will be read out. The list contains all parameters and variables of the SW layer.

FUNCTION_BLOCK FB_EcCoESdoWriteEx			
Direction	Name	Type	Description
Input	sNetId	T_AmsNetId	AoE NetID
Input	nSlaveAddr	T_AmsPort	ADS Port
Input	nSubIndex	UDINT	0024h (LinMot Service ID)
Input	nIndex	UDINT	2000h
Input	pSrcBuf	DWORD	ADR(write_buffer (4bytes)) Start UPID: 0000h: OS SW layer 1000h: MC SW layer 2000h: Intf SW layer 3000h: Appl SW layer
Input	cbBufLen	UDINT	Always 4 bytes
Input	bExecute	BOOL	Rising edge starts writing
Input	tTimeout	TIME	Timeout value
Input	bCompleteAccess	BOOL	FALSE
Output	bBusy	BOOL	Indicates reading active/finished
Output	bError	BOOL	Indicates reading error
Output	nErrId	UDINT	Error ID

### 5.2.16 Read next UPID List entry

Read the response state, UPID, address usage and ROM value of the parameter and the RAM value of the variables. The reading of the list doesn't stop at the end of a SW instance, only at the end of all instances.

FUNCTION_BLOCK FB_EcCoESdoReadEx			
Direction	Name	Type	Description
Input	sNetId	T_AmsNetId	AMS NetID
Input	nSlaveAddr	T_AmsPort	ADS Port
Input	nSubIndex	UDINT	0025h (LinMot Service ID)
Input	nIndex	UDINT	2000h
Input	pDstBuf	Struct	ADR(read_buffer (10bytes))
Input	cbBufLen	UDINT	Always 10 bytes
Input	bExecute	BOOL	Rising edge starts writing
Input	tTimeout	TIME	Timeout value
Input	bCompleteAccess	BOOL	FALSE
Output	bBusy	BOOL	Indicates reading active/finished
Output	bError	BOOL	Indicates reading error
Output	nErrId	UDINT	Error ID

Response Data Structure

Offset	Name	Type	Description
0	Res State	UINT	0x0000: No error 0x00C5: Reading not initialized 0x00C6: No UPID found (finished)
2	UPID	UINT	UPID of Parameter Or Variable
4	Value	UDINT	Value of Parameter
8	Address usage	UINT	

### 5.2.17 Start read modified UPID List

Specify the SW layer by its start UPID of which the UPID list will be read out. The list contains all parameters and variables of the SW layer.

FUNCTION_BLOCK FB_EcCoESdoWriteEx			
Direction	Name	Type	Description
Input	sNetId	T_AmsNetId	AoE NetID
Input	nSlaveAddr	T_AmsPort	ADS Port
Input	nSubIndex	UDINT	0026h (LinMot Service ID)
Input	nIndex	UDINT	2000h
Input	pSrcBuf	DWORD	ADR(write_buffer (4bytes)) Start UPID: 0000h: OS SW layer 1000h: MC SW layer 2000h: Intf SW layer 3000h: Appl SW layer
Input	cbBufLen	UDINT	Always 4 bytes
Input	bExecute	BOOL	Rising edge starts writing
Input	tTimeout	TIME	Timeout value
Input	bCompleteAccess	BOOL	FALSE
Output	bBusy	BOOL	Indicates reading active/finished
Output	bError	BOOL	Indicates reading error
Output	nErrId	UDINT	Error ID

### 5.2.18 Read next modified UPID List entry

Read the response state, UPID, address usage and ROM value of the next modified parameter. The reading of the list doesn't stop at the end of a SW instance, only at the end of all instances.

FUNCTION_BLOCK FB_EcCoESdoReadEx			
Direction	Name	Type	Description
Input	sNetId	T_AmsNetId	AMS NetID
Input	nSlaveAddr	T_AmsPort	ADS Port
Input	nSubIndex	UDINT	0027h (LinMot Service ID)
Input	nIndex	UDINT	2000h
Input	pDstBuf	Struct	ADR(read_buffer (10bytes))
Input	cbBufLen	UDINT	Always 10 bytes
Input	bExecute	BOOL	Rising edge starts writing

**FUNCTION\_BLOCK FB\_EcCoESdoReadEx**

Direction	Name	Type	Description
Input	tTimeout	TIME	Timeout value
Input	bCompleteAccess	BOOL	FALSE
Output	bBusy	BOOL	Indicates reading active/finished
Output	bError	BOOL	Indicates reading error
Output	nErrId	UDINT	Error ID

**Response Data Structure**

Offset	Name	Type	Description
0	Res State	UINT	0x0000: No error 0x00C5: Reading not initialized 0x00C6: No UPID found (finished)
2	UPID	UINT	UPID of Parameter Or Variable
4	Value	UDINT	Value of Parameter
8	Address usage	UINT	

**5.2.19 Stop MC and Application SW instances**

This service stops the execution of the MC and application SW layers. This command should be used before configuring (writing to ROM values) of these instances.

**FUNCTION\_BLOCK: FB\_EcCoeSdoWriteEx**

Direction	Name	Type	Description
Input	sNetId	T_AmsNetId	AmsNetId of master
Input	nSlaveAddr	UINT	Address of slave
Input	nSubIndex	Byte	35h (LinMot Sdo Service ID)
Input	nIndex	WORD	2000h
Input	pSrcBuf	DWORD	ADR(write_buffer (0 bytes))
Input	cbBufLen	UDINT	0 bytes (4 bytes also accepted)
Input	bExecute	BOOL	Rising edge starts writing
Input	tTimeout	TIME	Timeout value
Input	bComplAccess	BOOL	FALSE
Output	bBusy	BOOL	Indicates reading active/finished
Output	bError	BOOL	Indicates reading error
Output	nErrId	UDINT	Error ID

**5.2.20 Start MC and Application SW instances**

This service starts the execution of the MC and application SW layers. This command should be used after configuring (writing to ROM values) of these instances are finished.

**FUNCTION\_BLOCK: FB\_EcCoeSdoWriteEx**

Direction	Name	Type	Description
Input	sNetId	T_AmsNetId	AmsNetId of master
Input	nSlaveAddr	UINT	Address of slave

FUNCTION_BLOCK: FB_EcCoeSdoWriteEx			
Direction	Name	Type	Description
Input	nSubIndex	Byte	36h (LinMot Sdo Service ID)
Input	nIndex	WORD	2000h
Input	pSrcBuf	DWORD	ADR(write_buffer (0 bytes))
Input	cbBufLen	UDINT	0 bytes (4 bytes also accepted)
Input	bExecute	BOOL	Rising edge starts writing
Input	tTimeout	TIME	Timeout value
Input	bComplAccess	BOOL	FALSE
Output	bBusy	BOOL	Indicates reading active/finished
Output	bError	BOOL	Indicates reading error
Output	nErrId	UDINT	Error ID

### 5.2.21 Curves copy curves from RAM to FLASH

This service copies the actual in the RAM defined curves to the FLASH memory, so they are available after power up. Use this command only with stopped MC SW!

FUNCTION_BLOCK: FB_EcCoeSdoWriteEx			
Direction	Name	Type	Description
Input	sNetId	T_AmsNetId	AmsNetId of master
Input	nSlaveAddr	UINT	Address of slave
Input	nSubIndex	Byte	40h (LinMot Sdo Service ID)
Input	nIndex	WORD	2000h
Input	pSrcBuf	DWORD	ADR(write_buffer (0 bytes))
Input	cbBufLen	UDINT	0 bytes (4 bytes also accepted)
Input	bExecute	BOOL	Rising edge starts writing
Input	tTimeout	TIME	Timeout value
Input	bComplAccess	BOOL	FALSE
Output	bBusy	BOOL	Indicates reading active/finished
Output	bError	BOOL	Indicates reading error
Output	nErrId	UDINT	Error ID

### 5.2.22 Curves delete all curves in RAM

This service deletes all curves in the RAM.

FUNCTION_BLOCK: FB_EcCoeSdoWriteEx			
Direction	Name	Type	Description
Input	sNetId	T_AmsNetId	AmsNetId of master
Input	nSlaveAddr	UINT	Address of slave
Input	nSubIndex	Byte	41h (LinMot Sdo Service ID)
Input	nIndex	WORD	2000h
Input	pSrcBuf	DWORD	ADR(write_buffer (0 bytes))
Input	cbBufLen	UDINT	0 bytes (4 bytes also accepted)

**FUNCTION\_BLOCK: FB\_EcCoeSdoWriteEx**

Direction	Name	Type	Description
Input	bExecute	BOOL	Rising edge starts writing
Input	tTimeout	TIME	Timeout value
Input	bComplAccess	BOOL	FALSE
Output	bBusy	BOOL	Indicates reading active/finished
Output	bError	BOOL	Indicates reading error
Output	nErrId	UDINT	Error ID

**5.2.23 Curves start write curve in RAM**

This service initiate the writing of a new curve in the RAM.

**FUNCTION\_BLOCK: FB\_EcCoeSdoWriteEx**

Direction	Name	Type	Description
Input	sNetId	T_AmsNetId	AmsNetId of master
Input	nSlaveAddr	UINT	Address of slave
Input	nSubIndex	Byte	50h (LinMot Sdo Service ID)
Input	nIndex	WORD	2000h + ID
Input	pSrcBuf	DWORD	ADR(write_buffer)
Input	cbBufLen	UDINT	4 bytes: - UINT: Info Data Size - UINT: Set Point Data Size
Input	bExecute	BOOL	Rising edge starts writing
Input	tTimeout	TIME	Timeout value
Input	bComplAccess	BOOL	FALSE
Output	bBusy	BOOL	Indicates reading active/finished
Output	bError	BOOL	Indicates reading error
Output	nErrId	UDINT	Error ID

**5.2.24 Curves write curve info block data in RAM**

This service writes the curve info data block in the RAM, it has to be repeated until the whole info data block is written.

**FUNCTION\_BLOCK: FB\_EcCoeSdoWriteEx**

Direction	Name	Type	Description
Input	sNetId	T_AmsNetId	AmsNetId of master
Input	nSlaveAddr	UINT	Address of slave
Input	nSubIndex	Byte	53h (LinMot Sdo Service ID)
Input	nIndex	WORD	2000h + ID
Input	pSrcBuf	DWORD	ADR(write_buffer)
Input	cbBufLen	UDINT	4 bytes data of curve info block
Input	bExecute	BOOL	Rising edge starts writing
Input	tTimeout	TIME	Timeout value
Input	bComplAccess	BOOL	FALSE

**FUNCTION\_BLOCK: FB\_EcCoeSdoWriteEx**

Direction	Name	Type	Description
Output	bBusy	BOOL	Indicates reading active/finished
Output	bError	BOOL	Indicates reading error
Output	nErrId	UDINT	Error ID

**5.2.25 Curves write curve set point data in RAM**

This service writes the curve setpoint data block in the RAM, it has to be repeated until all setpoints are written.

**FUNCTION\_BLOCK: FB\_EcCoeSdoWriteEx**

Direction	Name	Type	Description
Input	sNetId	T_AmsNetId	AmsNetId of master
Input	nSlaveAddr	UINT	Address of slave
Input	nSubIndex	Byte	53h (LinMot Sdo Service ID)
Input	nIndex	WORD	2000h + ID
Input	pSrcBuf	DWORD	ADR(write_buffer)
Input	cbBufLen	UDINT	4 bytes of setpoint data
Input	bExecute	BOOL	Rising edge starts writing
Input	tTimeout	TIME	Timeout value
Input	bComplAccess	BOOL	FALSE
Output	bBusy	BOOL	Indicates reading active/finished
Output	bError	BOOL	Indicates reading error
Output	nErrId	UDINT	Error ID

**5.2.26 Curves read info and setpoint data block size in RAM**

Read the status and size of the data blocks of the curve defined by its ID the data is stored in the read\_buffer.

**FUNCTION\_BLOCK: FB\_EcCoeSdoReadEx**

Direction	Name	Type	Description
Input	sNetId	T_AmsNetId	AmsNetId of master
Input	nSlaveAddr	UINT	Address of slave
Input	nSubIndex	Byte	60h (LinMot Sdo Service ID)
Input	nIndex	WORD	2000h + ID
Input	pDstBuf	DWORD	ADR(read_buffer (6bytes)) - UINT: Status - UINT: Info block size - UINT: Set point data block size
Input	cbBufLen	UDINT	6 bytes
Input	bExecute	BOOL	Rising edge starts writing
Input	tTimeout	TIME	Timeout value
Input	bComplAccess	BOOL	FALSE
Output	bBusy	BOOL	Indicates reading active/finished
Output	bError	BOOL	Indicates reading error
Output	nErrId	UDINT	Error ID

### 5.2.27 Curves read info block data in RAM

Read the info data block of the curve defined by its ID the 4 byte result is stored together with the read status in the 6 bytes of the read\_buffer. This command has to be repeated until the whole info data block is read (status = 0).

FUNCTION_BLOCK: FB_EcCoeSdoReadEx			
Direction	Name	Type	Description
Input	sNetId	T_AmsNetId	AmsNetId of master
Input	nSlaveAddr	UINT	Address of slave
Input	nSubIndex	Byte	61h (LinMot Sdo Service ID)
Input	nIndex	WORD	2000h + ID
Input	pDstBuf	DWORD	ADR(read_buffer (6bytes)) - UINT: Status - DWORD: data
Input	cbBufLen	UDINT	6 bytes
Input	bExecute	BOOL	Rising edge starts writing
Input	tTimeout	TIME	Timeout value
Input	bComplAccess	BOOL	FALSE
Output	bBusy	BOOL	Indicates reading active/finished
Output	bError	BOOL	Indicates reading error
Output	nErrId	UDINT	Error ID

### 5.2.28 Curves read set point data in RAM

Read the set point data block of the curve defined by its ID the 4 byte result is stored together with the read status in the 6 bytes of the read\_buffer. This command has to be repeated until the whole set point data block is read (status = 0).

FUNCTION_BLOCK: FB_EcCoeSdoReadEx			
Direction	Name	Type	Description
Input	sNetId	T_AmsNetId	AmsNetId of master
Input	nSlaveAddr	UINT	Address of slave
Input	nSubIndex	Byte	62h (LinMot Sdo Service ID)
Input	nIndex	WORD	2000h + ID
Input	pDstBuf	DWORD	ADR(read_buffer (6bytes)) - UINT: Status - DWORD: data
Input	cbBufLen	UDINT	6 bytes
Input	bExecute	BOOL	Rising edge starts writing
Input	tTimeout	TIME	Timeout value
Input	bComplAccess	BOOL	FALSE
Output	bBusy	BOOL	Indicates reading active/finished
Output	bError	BOOL	Indicates reading error
Output	nErrId	UDINT	Error ID

### 5.2.29 Read error counters

Read the number of logged errors and total occurred errors and stores them in the read buffer.

<b>FUNCTION_BLOCK: FB_EcCoeSdoReadEx</b>			
<b>Direction</b>	<b>Name</b>	<b>Type</b>	<b>Description</b>
Input	sNetId	T_AmsNetId	AmsNetId of master
Input	nSlaveAddr	UINT	Address of slave
Input	nSubIndex	Byte	70h (LinMot Sdo Service ID)
Input	nIndex	WORD	2000h
Input	pDstBuf	DWORD	ADR(read_buffer (4bytes)) - UINT: Number of logged errors - UINT: Number of total errors
Input	cbBufLen	UDINT	4 bytes
Input	bExecute	BOOL	Rising edge starts writing
Input	tTimeout	TIME	Timeout value
Input	bComplAccess	BOOL	FALSE
Output	bBusy	BOOL	Indicates reading active/finished
Output	bError	BOOL	Indicates reading error
Output	nErrId	UDINT	Error ID



### 5.2.30 Read logged error item Code and instance

Read the error code of the specified (ID) logged error item.

FUNCTION_BLOCK: FB_EcCoeSdoReadEx			
Direction	Name	Type	Description
Input	sNetId	T_AmsNetId	AmsNetId of master
Input	nSlaveAddr	UINT	Address of slave
Input	nSubIndex	Byte	71h (LinMot Sdo Service ID)
Input	nIndex	WORD	2000h + ID
Input	pDstBuf	DWORD	ADR(read_buffer (4bytes)) - UINT: Error code - UINT: Error instance
Input	cbBufLen	UDINT	4 bytes
Input	bExecute	BOOL	Rising edge starts writing
Input	tTimeout	TIME	Timeout value
Input	bComplAccess	BOOL	FALSE
Output	bBusy	BOOL	Indicates reading active/finished
Output	bError	BOOL	Indicates reading error
Output	nErrId	UDINT	Error ID

### 5.2.31 Read logged error item time low

Read the error time millisecond part of the specified (ID) logged error item.

FUNCTION_BLOCK: FB_EcCoeSdoReadEx			
Direction	Name	Type	Description
Input	sNetId	T_AmsNetId	AmsNetId of master
Input	nSlaveAddr	UINT	Address of slave
Input	nSubIndex	Byte	72h (LinMot Sdo Service ID)
Input	nIndex	WORD	2000h + ID
Input	pDstBuf	DWORD	ADR(read_buffer (4bytes)) - DINT: Error time [ms]
Input	cbBufLen	UDINT	4 bytes
Input	bExecute	BOOL	Rising edge starts writing
Input	tTimeout	TIME	Timeout value
Input	bComplAccess	BOOL	FALSE
Output	bBusy	BOOL	Indicates reading active/finished
Output	bError	BOOL	Indicates reading error
Output	nErrId	UDINT	Error ID

### 5.2.32 Read logged error item time high

Read the error time hours part of the specified (ID) logged error item.

**FUNCTION\_BLOCK: FB\_EcCoeSdoReadEx**

Direction	Name	Type	Description
Input	sNetId	T_AmsNetId	AmsNetId of master
Input	nSlaveAddr	UINT	Address of slave
Input	nSubIndex	Byte	73h (LinMot Sdo Service ID)
Input	nIndex	WORD	2000h + ID
Input	pDstBuf	DWORD	ADR(read_buffer (4bytes)) - DINT: Error time [h]
Input	cbBufLen	UDINT	4 bytes
Input	bExecute	BOOL	Rising edge starts writing
Input	tTimeout	TIME	Timeout value
Input	bComplAccess	BOOL	FALSE
Output	bBusy	BOOL	Indicates reading active/finished
Output	bError	BOOL	Indicates reading error
Output	nErrId	UDINT	Error ID

**5.2.33 Read error short text**

Read the short text of an error defined by its error code, for each stringlet (4 characters) a service number 74h.. 7Bh is defined.

**FUNCTION\_BLOCK: FB\_EcCoeSdoReadEx**

Direction	Name	Type	Description
Input	sNetId	T_AmsNetId	AmsNetId of master
Input	nSlaveAddr	UINT	Address of slave
Input	nSubIndex	Byte	74h (LinMot Sdo Service ID) + stringlet Count 0..7)
Input	nIndex	WORD	2000h + ID
Input	pDstBuf	DWORD	ADR(read_buffer (4bytes)) - 4 characters of error short text
Input	cbBufLen	UDINT	4 bytes
Input	bExecute	BOOL	Rising edge starts writing
Input	tTimeout	TIME	Timeout value
Input	bComplAccess	BOOL	FALSE
Output	bBusy	BOOL	Indicates reading active/finished
Output	bError	BOOL	Indicates reading error
Output	nErrId	UDINT	Error ID

**5.2.34 Command Table copy entries from RAM to FLASH**

This service copies the actual in the RAM defined Command Table entries to the FLASH memory so they are available after power up. Use this command only with stopped MC SW!

**FUNCTION\_BLOCK: FB\_EcCoeSdoWriteEx**

Direction	Name	Type	Description
Input	sNetId	T_AmsNetId	AmsNetId of master
Input	nSlaveAddr	UINT	Address of slave

FUNCTION_BLOCK: FB_EcCoeSdoWriteEx			
Direction	Name	Type	Description
Input	nSubIndex	Byte	80h (LinMot Sdo Service ID)
Input	nIndex	WORD	2000h
Input	pSrcBuf	DWORD	ADR(write_buffer (0 bytes))
Input	cbBufLen	UDINT	0 bytes (4 bytes also accepted)
Input	bExecute	BOOL	Rising edge starts writing
Input	tTimeout	TIME	Timeout value
Input	bComplAccess	BOOL	FALSE
Output	bBusy	BOOL	Indicates reading active/finished
Output	bError	BOOL	Indicates reading error
Output	nErrId	UDINT	Error ID

### 5.2.35 Command Table delete all entries in RAM

This service deletes all Command table entries in the RAM.

FUNCTION_BLOCK: FB_EcCoeSdoWriteEx			
Direction	Name	Type	Description
Input	sNetId	T_AmsNetId	AmsNetId of master
Input	nSlaveAddr	UINT	Address of slave
Input	nSubIndex	Byte	81h (LinMot Sdo Service ID)
Input	nIndex	WORD	2000h
Input	pSrcBuf	DWORD	ADR(write_buffer (0 bytes))
Input	cbBufLen	UDINT	0 bytes (4 bytes also accepted)
Input	bExecute	BOOL	Rising edge starts writing
Input	tTimeout	TIME	Timeout value
Input	bComplAccess	BOOL	FALSE
Output	bBusy	BOOL	Indicates reading active/finished
Output	bError	BOOL	Indicates reading error
Output	nErrId	UDINT	Error ID

### 5.2.36 Command Table delete entry in RAM

This service delete a single Command Table entry defined by its ID in the RAM.

FUNCTION_BLOCK: FB_EcCoeSdoWriteEx			
Direction	Name	Type	Description
Input	sNetId	T_AmsNetId	AmsNetId of master
Input	nSlaveAddr	UINT	Address of slave
Input	nSubIndex	Byte	82h (LinMot Sdo Service ID)
Input	nIndex	WORD	2000h + ID
Input	pSrcBuf	DWORD	ADR(write_buffer (0 bytes))
Input	cbBufLen	UDINT	0 bytes (4 bytes also accepted)
Input	bExecute	BOOL	Rising edge starts writing

**FUNCTION\_BLOCK: FB\_EcCoeSdoWriteEx**

Direction	Name	Type	Description
Input	tTimeout	TIME	Timeout value
Input	bComplAccess	BOOL	FALSE
Output	bBusy	BOOL	Indicates reading active/finished
Output	bError	BOOL	Indicates reading error
Output	nErrId	UDINT	Error ID

### 5.2.37 Command Table start write entry in RAM

This service initiate the writing of a new Command Table entry in the RAM.

FUNCTION_BLOCK: FB_EcCoeSdoWriteEx			
Direction	Name	Type	Description
Input	sNetId	T_AmsNetId	AmsNetId of master
Input	nSlaveAddr	UINT	Address of slave
Input	nSubIndex	Byte	83h (LinMot Sdo Service ID)
Input	nIndex	WORD	2000h + ID
Input	pSrcBuf	DWORD	ADR(write_buffer)
Input	cbBufLen	UDINT	4 bytes: - UDINT: Entry Data Size
Input	bExecute	BOOL	Rising edge starts writing
Input	tTimeout	TIME	Timeout value
Input	bComplAccess	BOOL	FALSE
Output	bBusy	BOOL	Indicates reading active/finished
Output	bError	BOOL	Indicates reading error
Output	nErrId	UDINT	Error ID

### 5.2.38 Command Table write entry data in RAM

This service writes the Command Table data block in the RAM.

FUNCTION_BLOCK: FB_EcCoeSdoWriteEx			
Direction	Name	Type	Description
Input	sNetId	T_AmsNetId	AmsNetId of master
Input	nSlaveAddr	UINT	Address of slave
Input	nSubIndex	Byte	84h (LinMot Sdo Service ID)
Input	nIndex	WORD	2000h + ID
Input	pSrcBuf	DWORD	ADR(write_buffer)
Input	cbBufLen	UDINT	4 bytes of entry data
Input	bExecute	BOOL	Rising edge starts writing
Input	tTimeout	TIME	Timeout value
Input	bComplAccess	BOOL	FALSE
Output	bBusy	BOOL	Indicates reading active/finished
Output	bError	BOOL	Indicates reading error
Output	nErrId	UDINT	Error ID

### 5.2.39 Command Table entry data size in RAM

Read the the entry size of the Command Table entry specified by its ID, and stores the result in the 6 bytes of the read\_buffer.

**FUNCTION\_BLOCK: FB\_EcCoeSdoReadEx**

Direction	Name	Type	Description
Input	sNetId	T_AmsNetId	AmsNetId of master
Input	nSlaveAddr	UINT	Address of slave
Input	nSubIndex	Byte	85h (LinMot Sdo Service ID)
Input	nIndex	WORD	2000h + ID
Input	pDstBuf	DWORD	ADR(read_buffer (6bytes)) - UINT: Status - UDINT: entry size
Input	cbBufLen	UDINT	6 bytes
Input	bExecute	BOOL	Rising edge starts writing
Input	tTimeout	TIME	Timeout value
Input	bComplAccess	BOOL	FALSE
Output	bBusy	BOOL	Indicates reading active/finished
Output	bError	BOOL	Indicates reading error
Output	nErrId	UDINT	Error ID

**5.2.40 Command Table read entry data in RAM**

Read the Command Table entry data specified by its ID, and stores the result in the 6 bytes of the read\_buffer.

**FUNCTION\_BLOCK: FB\_EcCoeSdoReadEx**

Direction	Name	Type	Description
Input	sNetId	T_AmsNetId	AmsNetId of master
Input	nSlaveAddr	UINT	Address of slave
Input	nSubIndex	Byte	86h (LinMot Sdo Service ID)
Input	nIndex	WORD	2000h + ID
Input	pDstBuf	DWORD	ADR(read_buffer (6bytes)) - UINT: Status - DWORD: data
Input	cbBufLen	UDINT	6 bytes
Input	bExecute	BOOL	Rising edge starts writing
Input	tTimeout	TIME	Timeout value
Input	bComplAccess	BOOL	FALSE
Output	bBusy	BOOL	Indicates reading active/finished
Output	bError	BOOL	Indicates reading error
Output	nErrId	UDINT	Error ID

**5.2.41 Command Table read presence list**

Read the Command Table entry list defined by its subindex-ID, and stores the result in the 4 bytes of the read\_buffer. A zero of the corresponding bit means command table entry is present, a one means the corresponding entry doesn't exist.

**FUNCTION\_BLOCK: FB\_EcCoeSdoReadEx**

Direction	Name	Type	Description
Input	sNetId	T_AmsNetId	AmsNetId of master
Input	nSlaveAddr	UINT	Address of slave
Input	nSubIndex	Byte	87h + ID (LinMot Sdo Service ID) ID = 0: entries 0..31 ID = 1: entries 32..63 ID = 2: entries 64..95 ID = 3: entries 96..127 ID = 4: entries 128..159 ID = 5: entries 160..191 ID = 6: entries 192..223 ID = 7: entries 224..225
Input	nIndex	WORD	2000h
Input	pDstBuf	DWORD	ADR(read_buffer (4bytes)) - DWORD: presence list, 0 means entry exists
Input	cbBufLen	UDINT	4 bytes
Input	bExecute	BOOL	Rising edge starts writing
Input	tTimeout	TIME	Timeout value
Input	bComplAccess	BOOL	FALSE
Output	bBusy	BOOL	Indicates reading active/finished
Output	bError	BOOL	Indicates reading error
Output	nErrId	UDINT	Error ID

## 6 EtherCAT Parameters

### 6.1 Parameters



**Attention:** The EtherCAT Interface has an additional parameter tree branch (Parameters → EtherCAT), which can be configured with the distributed LinMot-Talk software.

With these parameters, the EtherCAT interface can be enabled or disabled. The LinMot-Talk software can be downloaded from <http://www.linmot.com> under the section download, software & manuals.

#### 6.1.1 EtherCAT/Dis-/Enable

With the Dis-/Enable parameter the LinMot Servo Drive can be run without the Ethernet EtherCAT Interface going online. So in a first step the system can be configured and run without any bus connection.

#### ETHERCAT/Dis-/Enable

Disable	Servo Drive runs without ETHERCAT.
Enable	Servo Drive runs with ETHERCAT connection.



**Important:** If the ETHERCAT Interface is disabled, the integrated ETHERCAT-ASIC rests in reset state! No messages will be sent to other devices connected to the ETHERCAT-Network via the servo drive.

### 6.1.2 EtherCAT/Station Alias/Alias Address Source

With this parameter the station alias address source is defined.



**Attention:** If a station alias address is defined in the ET1100 Eeprom (could be programmed from the master over the Network), this alias address is taken.

#### ETHERCAT/Station Alias/Alias Address Source

None	No station alias address is generated
ID Switches	The ID switches defines the station alias address
RT MAC	The lowest 2 bytes of the device MAC address are used as station alias address
Parameter	The Station alias address parameter value defines the Alias Address
Masked RT MAC and Parameter	The station alias address is defined by the masked parameter ored with the RT MAC masked with the inverse mask

### 6.1.3 EtherCAT/Station Alias/Alias Address Parameter

Parameter value of the station alias address.

### 6.1.4 EtherCAT/Station Alias/Alias Address Parameter Mask

Mask value for the parameter value of the station alias address.

### 6.1.5 EtherCAT/NC Configuration/Position Scale

This parameter is used to Scale the “NC Outputs” (Index 0x1701) PDO Value of “Setpoint Position” (Index 0x1E80) to the Drive Resolution which is [0.1um]. The LREAL Sepoint Position value is multiplied with this factor.

### 6.1.6 EtherCAT/NC Configuration/Velocity Scale

This parameter is used to Scale the “NC Outputs” (Index 0x1701) PDO Value of “Setpoint Velocity” (Index 0x1E81) to the Drive Resolution which is [1um/s]. The LREAL Sepoint Velocity value is multiplied with this factor.

### 6.1.7 EtherCAT/NC Configuration/Acceleration Scale

This parameter is used to Scale the “NC Outputs” (Index 0x1701) PDO Value of “Setpoint Acceleration” (Index 0x1E82) to the Drive Resolution which is [10um/s<sup>2</sup>]. The LREAL Sepoint Acceleration value is multiplied with this factor.

### 6.1.8 EtherCAT/NC Configuration/Velocity Scale Numerator /Denominator

This two parameters are taken to Scale the PDO Value of “Target velocity” (Index 0x60FF) to the Drive Resolution which is [1um/s]. The Scaling factor is Velocity Scale Numerator divided by Velocity Scale Denominator.

For the Beckoff this factor is typically 12.5 → Velocity Scale Numerator = 125 and Velocity Scale Denominator = 10.

For Omron PLC's this factor is typically 0.1 → Velocity Scale Numerator = 1 and Velocity Scale Denominator = 10.

### 6.1.9 EtherCAT/Connection Timeout/Timeout Behavior

With this parameter the drive behavior on an Connection timeout could be set. This parameter is also represented in the profile parameter with index 0x6007.




**ETHERCAT/Conection Timeout/Timeout Behavior**

Ignore	Nothing happens if an IO timeout occurs.
Error with Disable Voltage	Drive goes to Error State and the Voltage is disabled immediately when the IO timeout occurs.
Error with Quick Stop	Drive goes to Error State before the Voltage is disabled a Quick Stop is performed, when the IO timeout occurs.
Error with Go To Pos	Drive goes to Error State before the Voltage is disabled a Go To Position is performed, when the IO timeout occurs.

## 7 Connecting to the EtherCAT Network

### 7.1 Pin Assignment of the Connectors X17-X18

The ETHERCAT connector is a standard RJ45 female connector with a pin assignment as defined by EIA/TIA T568B:

X17 – X18	ETHERCAT Connector		
	Pin	Wire color code	Assignment 100BASE-TX
	1	WHT/ORG	Rx+
	2	ORG	Rx-
	3	WHT/GRN	Tx+
	4	BLU	-
	5	WHT/BLU	-
	6	GRN	Tx-
	7	WHT/BRN	-
	8	BRN	-
	case	-	-
RJ-45	Use standard patch cables (twisted pair, S/UTP, AWG26) for wiring. This type of cable is usually referred to as a "Cat5e-Cable".		

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