

CANopen SG5 to SG9

Manual



**CANopen Interface for
SG5, SG6, SG7 and SG9**

This document applies to the following drives:

- **E12x0-xx-xx-xxx (SG5)**
- **E14x0-xx-xx-xxx (SG5)**
- **E14x0V2-xx-xx-xxx (SG6)**
- **C11x0-xx-xx-xxx (SG7)**
- **A11x0-xx-xx-xxx (SG7)**
- **F1xx0-xx-xx-xxx (SG9)**
- **I1xx0-xx-xx-xxx (SG9)**

(with CANopen Interface SW installed)

© 2025 NTI AG

This work is protected by copyright.

Under the copyright laws, this publication may not be reproduced or transmitted in any form, electronic or mechanical, including photocopying, recording, microfilm, storing in an information retrieval system, not even for didactical use, or translating, in whole or in part, without the prior written consent of NTI AG.

LinMot® is a registered trademark of NTI AG.

Note

The information in this documentation reflects the stage of development at the time of press and is therefore without obligation. NTI AG reserves itself the right to make changes at any time and without notice to reflect further technical advance or product improvement.

NTI AG
LinMot
Bodenaeckerstrasse 2
CH-8957 Spreitenbach

Tel.: +41 56 419 91 91
Fax.: +41 56 419 91 92
Email: office@LinMot.com
Homepage: www.LinMot.com

Table of Contents

1 System overview	5
2 Connecting the CAN bus	5
2.1 Pin assignment of the CMD Connector (X7, X8)	5
2.2 Pin assignment of the EtherCAT/CANopen Connector (X17, X18)	6
2.3 Pin assignment of the Control Connector (X42, X43)	7
2.4 Pin assignment of the Mot / Periph I/O Connector (X44)	7
2.5 Pin assignment of the CAN Connector (X79)	7
2.6 CAN Termination	8
2.6.1 Activating the termination resistor (E12xx)	8
2.6.2 Activating the termination resistor (E14xx)	8
2.6.3 Activating the termination resistor (C11xx)	9
2.6.4 Activating the termination resistor (A11xx)	9
3 CANopen Parameters	10
3.1 Dis-/Enable	10
3.2 Baud Rate	10
3.2.1 Baud Rate Source Select	10
3.2.2 Baud Rate Parameter Definition	11
3.3 Node-ID	11
3.3.1 Node-ID Source Select	11
3.4 PDO Configuration	12
3.4.1 TxPDO 1..4 Enable	12
3.4.1.1 Transmission Type	12
3.4.1.2 No. of SYNC msgs between transmissions	12
3.4.1.3 Inhibit Time [us]	12
3.4.1.4 Event Time [ms]	12
3.4.2 RxPDO 1..4 Enable	13
3.4.2.1 Transmission Type	13
3.5 PDO Mapping	13
3.5.1 TxPDO 1	13
3.5.2 TxPDO 2	14
3.5.3 TxPDO 3	14
3.5.4 TxPDO 4	15
3.5.5 RxPDO 1	15
3.5.6 RxPDO 2	15
3.5.7 RxPDO 3	16
3.5.8 RxPDO 4	16
3.6 NMT Error Control	16
3.6.1 Node Guarding Protocol	17
3.6.2 Heartbeat Protocol	17
3.7 Legacy Sync Watchdog	17
3.7.1 Watchdog Enable	17
3.7.2 LSW monitored Cycle Time	18
4 CANopen Variables	19
5 Mapping of the PDOs	20
5.1 Default Mapping	20
5.1.1 Default Mapping of the Receive PDOs	20
5.1.2 Default Mapping of the Transmit PDOs	20

5.1.3 Default Identifier	20
5.2 Using the Motion Command Interface in asynchronous transmission modes	21
6 Object Dictionary	22
6.1 Communication Profile Area (1000h - 1FFFh)	22
6.2 Manufacturer specific Profile Area (2000h – 5FFFh)	27
6.2.1 UPID Commands	27
6.2.2 System Commands	30
6.2.3 Curve Service Commands	32
6.2.4 Error Log Commands	38
6.2.5 Command Table Commands	40
7 Examples	45
7.1 Homing and motion commands	45
8 Reset Parameters to default values	47
9 Configuration of the drive with an EDS File	48
9.1 Configuring a PDO variable by UPID with the EDS file	48
9.1.1 Setting the UPIDs of the parameter to map to a PDO	48
9.1.2 Getting UPID PDO data into PLC variables	48
9.1.3 Example	48
10 RT LEDs	50
11 Interface Error Codes	51

1 System overview

The LinMot CANopen drives comply with the following specifications:

- CiA 102 DS V2.0 CAN physical layer for industrial applications
- CiA 301 DS V4.0.2 – CANopen application layer and communication profile
- CiA 303-3 DR V1.3: CANopen additional specification – Part 3: Indicator specification
- CiA 306 DS V1.3: Electronic data sheet specification for CANopen

Further information on specifications can be found under: <http://www.can-cia.org/>

The following resources are available:

- 4 TxPDO
- 4 RxPDO
- 1 TxSDO
- 1 RxSDO

The supported protocols include:

- NMT Error Control (Node Guarding Protocol or Heartbeat Protocol)
- PDO (Transmission types 1-240, 250, 253 and 254)
- SDO Upload and Download
- NMT (Start, Stop, Enter PreOp, Reset Node, Reset Communication)
- Boot-Up Message

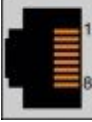
An EDS (Electronic Data Sheet) file is provided for convenient configuration of all CANopen functions of the drive via a PLC.

2 Connecting the CAN bus

The CANopen bus can be connected either via X7/8, X17/18, X42/X43, X44 or X79 depending on the drive type.

2.1 Pin assignment of the CMD Connector (X7, X8)

2 x RJ45 with 1:1 connected signals. Standard twisted pairs: 1/2, 3/6, 4/5, 7/8.

X7 - X8 CMD Connector		
	Pin	Assignment
	1	RS485 A
	2	RS485 B
	3	RS485 Y
	4/5	Ground (on C1100 series: Pin 4 = NC, Pin 5 = GND (1k Ohm to GND))
	6	RS485 Z
	7	CAN H
	8	CAN L
	case	-
RJ-45	Use Ethernet cables according the EIA / TIA 568A standard.	

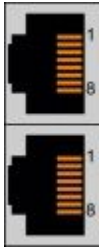
2.2 Pin assignment of the EtherCAT/CANopen Connector (X17, X18)

2 x RJ45 with 1:1 connected signals. Standard twisted pairs: 1/2, 3/6, 4/5, 7/8.

X17 - X18 EtherCAT / CANopen Connector		
	Pin	Assignment
	1	Do not connect
	2	Do not connect
	3	Do not connect
	4/5	Ground
	6	Do not connect
	7	CAN H
	8	CAN L
	case	-
RJ-45	Use Ethernet cables according the EIA / TIA 568A standard.	

2.3 Pin assignment of the Control Connector (X42, X43)

2 x RJ45 with 1:1 connected signals. Standard twisted pairs: 1/2, 3/6, 4/5, 7/8.

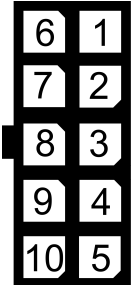
X42 - X43	Control Connector	
	Pin	Assignment
	1	C Dig IN 1
	2	C Dig IN 2
	3	C Dig IN 3
	4	Ground
	5	Ground
	6	C Dig OUT 1
	7	CAN H
	8	CAN L
	case	-
RJ-45	Use Ethernet cables according the EIA / TIA 568A standard.	

2.4 Pin assignment of the Mot / Periph I/O Connector (X44)

Molex Micro-Fit 3.0™ (Molex Art.Nr.: 43045-1000).

Use shielded cables with twisted pairs for CAN signals.

Connect the shield as close as possible to the drive to PE.

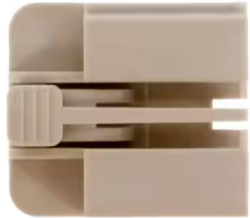
X44	Mot / Periph I/O Connector	
	Pin	Assignment
	1	DGND
	2	MP DIG IN 1
	3	MP DIG IN 2
	4	CAN GND
	5	CAN H
	6	24VDC OUT
	7	MP DIG OUT 1
	8	MP DIG IN 3
	9	AnIn
	10	CAN L
Use shielded cables with twisted pairs for CAN signals. Connect the shield as close as possible to the drive to PE.		

2.5 Pin assignment of the CAN Connector (X79)

Molex EdgeLock Wire-to-Board Edge Card Connector (Molex Art.Nr.: 2008900104).

Use shielded cables with twisted pairs for CAN signals.

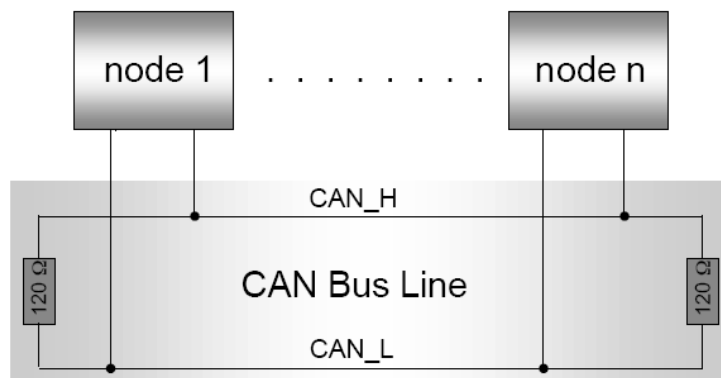
Connect the shield as close as possible to the drive to PE.

X79	CAN Connector	
	Pin	Assignment
	1	CAN L
	2	CAN H
	3	CAN L
	4	CAN H

	Use shielded cables with twisted pairs for CAN signals. Connect the shield as close as possible to the drive to PE.	

2.6 CAN Termination

The CAN-bus must be terminated by two 120 Ohm resistors at both ends of the bus line, according to the following figure:



For easy installation, E12xx, E14xx, C11xx and A11xx drives have built-in termination resistors, which can be activated, if the LinMot drive is at the end of the bus line, and if there is no termination in the connector.

F1150, F1050 and I1050 have no built-in termination resistors.

2.6.1 Activating the termination resistor (E12xx)

S5		
	Switch 4:	CAN termination on ME (120Ω between pin 7 and 8 on X10/X11) on/off
	Switch 3:	CAN termination on CMD (120Ω between pin 7 and 8 on X7/X8) on/off
	Switch 2:	Termination resistor for RS485 on CMD (120Ω between pin 1 and 2 on X7/X8) on/off
	Switch 1:	AnIn2 pull-down (4k7Ω Pulldown on X4.4). Set to ON, if X4.4 is used as digital output
	(Factory setting: all switches "off")	

To activate the built-in termination resistors, switch 3 of S5 has to be set to ON.

2.6.2 Activating the termination resistor (E14xx)

S5		
	Switch 6:	Override Configuration Ethernet to DHCP
	Switch 5:	Bootstrap: Must be off for normal operation
	Switch 4:	CAN termination on ME (120Ω between pin 7 and 8 on X10/X11) on/off
	Switch 3:	CAN termination on CMD (120Ω between pin 7 and 8 on X7/X8) on/off
	Switch 2:	Termination resistor for RS485 on CMD (120Ω between pin 1 and 2 on X7/X8) on/off
	Switch 1:	AnIn2 pull-down (4k7Ω Pulldown on X4.4). Set to ON, if X4.4 is used as digital output

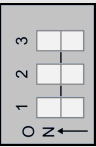
To activate the built-in termination resistors, switch 3 of S5 has to be set to ON.

2.6.3 Activating the termination resistor (C11xx)

S4	
	Switch 4: Bootstrap
	Switch 3: Termination resistor for CAN on/off
	Switch 2: Termination resistor for RS485 on CMD (120Ω between pin 1 and 2 on X7/X8) on/off
	Switch 1: RS232 / RS485 select
	(Factory setting: all switches "off")

To activate the built-in termination resistors, switch 3 of S4 has to be set to ON.

2.6.4 Activating the termination resistor (A11xx)

S5	
	Switch 3: Bootstrap
	Switch 2: Set all drive parameters to default
	Switch 1: CAN termination (120Ω between CANL and CANH) on/off
	(Factory setting: all switches "off")

To activate the built-in termination resistors, switch 1 of S5 has to be set to ON.

3 CANopen Parameters

The CANopen drives have an additional parameter tree branch, which can be configured with the distributed LinMot-Talk software. With these parameters, the CANopen behaviour can be defined. The LinMot-Talk1100 software can be downloaded from <http://www.linmot.com>.

Depending on the specific drive type used, not all parameters may be present.

It is also possible to configure the drive via a PLC by writing to the appropriate CANopen dictionary entries. This has to be done when the drive is in the pre-operational state.



Important: If the PLC reconfigures the drive, the changes are not reflected in the parameter section of the LinMot-Talk software. The values sent via the PLC will take precedence over the configuration seen in the LinMot-Talk software!

3.1 Dis-/Enable

With the Dis-/Enable parameter the LinMot drive can be run without the CANopen interface going online. So in a first step the system can be configured and run without any bus connection.

CANopen Interface\ Dis-/Enable		Default Value
Disable	The drive does not take part in the CANopen communication.	-
Enable	The drive takes part in the CANopen communication.	X

3.2 Baud Rate

In this section the parameters for the baud rate selection are located.

3.2.1 Baud Rate Source Select

Defines the source of the baud rate definition.

CANopen Interface\ Baud Rate \Baud Rate Source Select		Default Value
By Hex Switch S1	CAN bus baud rate dependent on S1: 0 = SG5-6: By BTR SG7: By Autodetection 1 = 125 kBit/s 2 = 250 kBit/s 3 = 500 kBit/s 4 = 1 Mbit/s 5 = SG5-6: By BTR SG7: By Autodetection 6 = SG5-6: By BTR SG7: By Autodetection 7 = SG5-6: By BTR SG7: By Autodetection	X
By Parameter	The CAN bus baud rate is selected by the "Baudrate Parameter": 125 kBit/s [1] 250 kBit/s [2] 500 kBit/s [3]	-

CANopen Interface\ Baud Rate \Baud Rate Source Select		Default Value
	1 Mbit/s [4]	
By BTR	CAN bus baud rate is defined according to the Bit Timing Register.	-
By Autodetection (SG7 only)	CAN bus baud rate is detected automatically (125, 250, 500 and 1000 k/Bits supported).	-

3.2.2 Baud Rate Parameter Definition

The baud rate parameter defines the CAN bus baud rate for the CANopen connection.

CANopen Interface\ Baud Rate\ Baud Rate Parameter Definition		Default Value
125 kBit/s	CAN bus baud rate = 125 kBit/s	-
250 kBit/s	CAN bus baud rate = 250 kBit/s	-
500 kBit/s	CAN bus baud rate = 500 kBit/s	X
1 Mbit/s	CAN bus baud rate = 1 Mbit/s	-

Advanced Bit Timing Setting

For special applications where no standard setting for the baud rate works, this parameter defines the bit timing for the CAN bus. The setting of the baud rate by Bit Timing Register is only necessary on special bus configurations: For example, if there are devices on the bus that have slow optocouplers. The default BTR value is equal to the 'By Parameter' setting of 500kBit/s.

3.3 Node-ID

In this section the Node-ID can be configured.

3.3.1 Node-ID Source Select

This parameter defines from which source the Node-ID is taken.

CANopen Interface\ Node-ID\ Node-ID Source Select		Default Value
By Hex Switch S2	The Node-ID is determined by the hex switch S2.	X
By Hex Switches S1 and S2	The Node-ID is determined by the two hex switches S1 and S2.	-
By Parameter	The Node-ID is determined via an additional parameter.	-

CANopen Interface\ Node-ID\ Node-ID Parameter Value		Default Value
Node-ID Parameter Value	Used Node-ID, when "By Parameter" is selected as source.	63

Note: If 'Baud Rate Source Select' is set to 'By Hex Switch S1' and Node-ID Source Select is set to 'By Hex switch S2' and all switches are off, the Node-ID is set to the Node-ID Parameter Value (Default = 63). If 'Baud Rate Source Select' is set to 'By Hex Switch S1' and the Value of S1 is greater or equal 8, the Node-ID is incremented by 16.

3.4 PDO Configuration

3.4.1 TxPDO 1..4 Enable

Selector for enabling/disabling the transmit PDO 1..4.

CANopen Interface\ PDO Configuration\ TxPDO 1..4\ TxPDO 1..4 Enable		Default Value
Disable	The PDO is deactivated	-
Enable	The PDO is activated	X

3.4.1.1 Transmission Type

CANopen Interface\ PDO Configuration\ TxPDO 1..4\ Transmission Type		Default Value
Asynchronous with inhibit time	Transmission type is set to 'Asynchronous with inhibit time'.	-
Asynchronous RTR only	Transmission type is set to 'Asynchronous RTR only'.	-
Cyclic synchronous	Transmission type is set to 'Cyclic synchronous'.	X
Poll-Request / Poll-Response	Transmission type is set to 'Poll-Request / Poll-Response'.	-

This defines the transmission type according to DS 301. Type 253 (Asynchronous RTR only) and 254 (Asynchronous with inhibit time) are supported as well.

The transmission type 250 is LinMot specific (it is reserved according to DS 301).

If the transmission type 250 is selected, the transmit PDO is sent immediately after reception of the corresponding receive PDO (TxPDO 1 corresponds to RxPDO 1 and so on). It can be used to realize a simple Poll-Request / Poll-Response type bus structure.

3.4.1.2 No. of SYNC msgs between transmissions

Defines how many SYNC messages have to be received before the TxPDO is sent again (this configures transmission types 1-240).

3.4.1.3 Inhibit Time [us]

Defines the minimal time between two send events in multiples of 100us.

3.4.1.4 Event Time [ms]

Defines the maximal time between two send events in ms.

3.4.2 RxPDO 1..4 Enable

Selector for enabling/disabling the receive PDO 1..4.

CANopen Interface\ PDO Configuration\ RxPDO 1..4\RxPDO 1..4 Enable		Default Value
Disable	The PDO is deactivated	-
Enable	The PDO is activated	X

3.4.2.1 Transmission Type

CANopen Interface\ PDO Configuration\ RxPDO 1..4\ Transmission Type		Default Value
Asynchronous with inhibit time	Transmission type is set to 'Asynchronous with inhibit time'.	-
Cyclic synchronous	Transmission type is set to 'Cyclic synchronous'.	X
Poll-Request / Poll-Response	Transmission type is set to 'Poll-Request / Poll-Response'.	-

This defines the transmission type according to DS 301. Type 254 (Asynchronous with inhibit Time) is supported as well.

The transmission type 250 is LinMot specific (its reserved according to DS 301). If the transmission type 250 is selected, the transmit PDO is sent immediately after reception of the corresponding receive PDO (TxPDO 1 corresponds to RxPDO 1 and so on). It can be used to realize a simple Poll- Request / Poll-Response type bus structure.

3.5 PDO Mapping

3.5.1 TxPDO 1

These parameters define the mapping of the transmit PDO 1.
Eight bytes can be mapped in total.

CANopen Interface\ PDO Mapping\ TxPDO 1		Default Value
Status Word [16Bit]	If this Boolean parameter is set, the status word is transmitted with TxPDO 1.	X
State Var [16Bit]	If this Boolean parameter is set, the state var (high byte = state / low byte = sub state) is transmitted with TxPDO 1.	X
Actual Position [32Bit]	If this Boolean parameter is set, the 32-bit actual position is transmitted with TxPDO 1.	X
By UPID [8-32Bit]	This parameter can be used for free mapping of any parameter or variable to TxPDO 1 (mapping through Unique Parameter ID = UPID, 0 = no mapping). The corresponding data size in TxPDO 1 is derived from the mapped UPID. For Boolean values one byte is used in the PDO with the lowest bit being the value of the Boolean.	0x0000

3.5.2 TxPDO 2

These parameters define the mapping of the transmit PDO 2.
Eight bytes can be mapped in total.

CANopen Interface\ PDO Mapping\ TxPDO 2		Default Value
Demand Position [32Bit]	If this Boolean parameter is set, the 32-bit demand position is transmitted with TxPDO 2.	X
Demand Current [32Bit]	If this Boolean parameter is set, the 32-bit demand current value (= motor current) is transmitted with TxPDO 2.	X
By UPID [8-32Bit]	This parameter can be used for free mapping of any parameter or variable to TxPDO 2 (mapping through Unique Parameter ID = UPID, 0 = no mapping). The corresponding data size in TxPDO 2 is derived from the mapped UPID. For Boolean values one byte is used in the PDO with the lowest bit being the value of the Boolean.	0x0000

3.5.3 TxPDO 3

These parameters define the mapping of the transmit PDO 3.
Eight bytes can be mapped in total.

CANopen Interface\ PDO Mapping\ TxPDO 3		Default Value
Warn Word [16Bit]	If this Boolean parameter is set, the warn word (= bit coded warnings) is transmitted with TxPDO 1.	X
Logged Error Code [16Bit]	If this Boolean parameter is set, the logged error code is transmitted with TxPDO 1.	X
Motion Cmd Status [16Bit]	Feedback of the motion command header (toggle, etc..)	-
By UPID [8-32Bit]	This parameter can be used for free mapping of any parameter or variable to TxPDO 3 (mapping through Unique Parameter ID = UPID, 0 = no mapping). The corresponding data size in TxPDO 3 is derived from the mapped UPID. For Boolean values one byte is used in the PDO with the lowest bit being the value of the Boolean.	0x0000

3.5.4 TxPDO 4

These parameters define the mapping of the transmit PDO 4.
Eight bytes can be mapped in total.

CANopen Interface\ PDO Mapping\ TxPDO 4		Default Value
By UPID [8-32Bit]	This parameter can be used for free mapping of any parameter or variable to TxPDO 4 (mapping through Unique Parameter ID = UPID, 0 = no mapping). The corresponding data size in TxPDO 4 is derived from the mapped UPID. For Boolean values one byte is used in the PDO with the lowest bit being the value of the Boolean.	0x0000

3.5.5 RxPDO 1

These parameters define the mapping of the receive PDO 1.
Eight bytes can be mapped in total.

CANopen Interface\ PDO Mapping\ RxPDO 1		Default Value
Control Word [16Bit]	If this Boolean parameter is set, the control word has to be transmitted with RxPDO 1.	X
Motion Cmd Header [16Bit]	Motion command interface header.	X
Motion Cmd Par Byte 0..3 [32Bit]	The first 4 bytes of the command parameters of the motion command interface.	X
By UPID [8-32Bit]	This parameter can be used for free mapping of any parameter or variable to RxPDO 1 (mapping through Unique Parameter ID = UPID, 0 = no mapping). The corresponding data size in RxPDO 1 is derived from the mapped UPID. For Boolean values one byte is used in the PDO with the lowest bit being the value of the Boolean.	0x0000

3.5.6 RxPDO 2

These parameters define the mapping of the receive PDO 2.
Eight bytes can be mapped in total.

CANopen Interface\ PDO Mapping\ RxPDO 2		Default Value
Motion Cmd Slave Header [16Bit]	To ensure data consistency with asynchronous communication modes, the slave headers have to be used when spreading motion commands across several PDOs.	-
Motion Cmd Par Byte 4..7 [32Bit]	The second 4 bytes of the command parameters of the motion command interface.	X
Motion Cmd Par Byte 8..9 [16Bit]	The first half of the third 4 bytes of the command parameters of the motion command interface.	-
Motion Cmd Par Byte 8..11 [32Bit]	The third 4 bytes of the command parameters of the motion command interface.	X
By UPID [8-32Bit]	This parameter can be used for free mapping of any parameter or variable to RxPDO 2 (mapping through Unique Parameter ID = UPID, 0 = no mapping). The corresponding data size in RxPDO 2 is derived from the mapped UPID.	0x0000

CANopen Interface\ PDO Mapping\ RxPDO 2		Default Value
	For Boolean values one byte is used in the PDO with the lowest bit being the value of the Boolean.	

3.5.7 RxPDO 3

These parameters define the mapping of the receive PDO 3.
Eight bytes can be mapped in total.

CANopen Interface\ PDO Mapping\ RxPDO 3		Default Value
Motion Cmd Slave Header [16Bit]	To ensure data consistency with asynchronous communication modes, the slave headers have to be used when spreading motion commands across several PDOs.	-
Motion Cmd Par Byte 10..13 [32Bit]	The fourth 4 bytes of the command parameters of the Motion Command Interface.	-
Motion Cmd Par Byte 14..15 [16Bit]	The second half of the fourth 4 bytes of the command parameters of the Motion Command Interface.	-
Motion Cmd Par Byte 12..15 [32Bit]	The fifth 4 bytes of the command parameters of the Motion Command Interface.	X
Motion Cmd Par Byte 16..19 [32Bit]	The sixth 4 bytes of the command parameters of the Motion Command Interface.	X
By UPID [8-32Bit]	This parameter can be used for free mapping of any parameter or variable to RxPDO 3 (mapping through Unique Parameter ID = UPID, 0 = no mapping). The corresponding data size in RxPDO 3 is derived from the mapped UPID. For Boolean values one byte is used in the PDO with the lowest bit being the value of the Boolean.	0x0000

3.5.8 RxPDO 4

These parameters define the mapping of the receive PDO 4.
Eight bytes can be mapped in total.

CANopen Interface\ PDO Mapping\ RxPDO 4		Default Value
Motion Cmd Slave Header [16Bit]	To ensure data consistency with asynchronous communication modes, the slave headers have to be used when spreading motion commands across several PDOs.	-
Motion Cmd Par Byte 16..19 [32Bit]	The sixth 4 bytes of the command parameters of the motion command interface.	-
By UPID [8-32Bit]	This parameter can be used for free mapping of any parameter or variable to RxPDO 4 (mapping through Unique Parameter ID = UPID, 0 = no mapping). The corresponding data size in RxPDO 4 is derived from the mapped UPID. For Boolean values one byte is used in the PDO with the lowest bit being the value of the Boolean.	0x0000

3.6 NMT Error Control

The heartbeat mechanism takes precedence over the node guarding protocol. If object 1017h of the object dictionary (Producer Heartbeat Time) is different from zero, the heartbeat protocol is used.

If this entry is zero and the guard time multiplied with the life time factor is not zero, the node guarding protocol is used instead.

If all of these values are zero, no error control mechanism will be active.

The drive is also capable of consuming a heartbeat. If object 1016h sub 1 of the object dictionary (Consumer Heartbeat Time 1) is different from zero, a heartbeat is consumed with the node-ID and time (given in ms) taken from this entry.

3.6.1 Node Guarding Protocol

Directory for configuring the node guarding protocol.

CANopen Interface\ NMT Error Control\ Node Guarding Protocol		Default Value
Guard Time	The guard time in ms, when the node guarding mechanism is active.	0ms
Life Time Factor	Multiplier used with the Guard Time.	0



Important: The total time that has to pass for a node to trigger a failure is called the node life time. The node life time is the guard time multiplied by the life time factor. Node Guarding starts with the reception of the first guarding message.

3.6.2 Heartbeat Protocol

These parameters configure the heartbeat protocol.

CANopen Interface\ NMT Error Control\ Heartbeat Protocol		Default Value
Producer Time	Cycle time for producing a heartbeat in ms.	0ms
Consumer Time	Time for the consumed heartbeat in ms.	0ms
Consumed Node-ID (Master)	Node-ID of the master, who's heartbeat is monitored.	0

3.7 Legacy Sync Watchdog

These parameters configure the legacy watchdog of the sync telegram. This can be used together with heartbeat or node guarding.

This feature is not part of the DS 301 specifications and is LinMot specific.

The time between the arrival of two sync telegrams is measured. If the measured time exceeds $1.5 \cdot \text{LSW}$ monitored cycle time an error is generated.

The Legacy Sync Watchdog is only active while the NMT-State of the drive is operational. Monitoring via the LSW starts automatically on the transition from Pre-Operational to Operational state.

3.7.1 Watchdog Enable

Enabling/Disabling the legacy sync watchdog feature.

CANopen Interface\ NMT Error Control\ Legacy Sync Watchdog\ LSW Enable		Default Value
Disable	The sync watchdog is deactivated.	X
Enable	The sync watchdog is activated.	-

3.7.2 LSW monitored Cycle Time

The real expected sync cycle time can be configured here.

4 CANopen Variables

CANopen

These variables show information about the status of the CANopen communication:

CANopen	
NMT State	Shows the NMT state of the drives. (INITIALISING, STOPPED, PREOPERATIONAL, OPERATIONAL)
Node-ID	Active node-ID of the drive.
Baud Rate	Active baud rate of the drive.
Active Error Control Protocol	Shows if a guarding protocol is active. (None, Heartbeat Protocol, Node Guarding Protocol)
SyncCycle	Time in [us] between the reception of two SYNC messages.
CAN Bit Timing	Value of the CAN Bit Timing Register.

CANopen: Object Dictionary

All supported object dictionary entries can be read [here](#).

5 Mapping of the PDOs

5.1 Default Mapping

The PDOs are mapped by default according to the following scheme:

5.1.1 Default Mapping of the Receive PDOs

RxPDO 1	Length
Control Word	[16Bit]
Motion Cmd Header	[16Bit]
Motion Cmd Par Byte 00..03	[32Bit]
RxPDO 2	Length
Motion Cmd Par Byte 04..07	[32Bit]
Motion Cmd Par Byte 08..11	[32Bit]
RxPDO 3	Length
Motion Cmd Par Byte 12..15	[32Bit]
Motion Cmd Par Byte 16..19	[32Bit]
RxPDO 4	Length
A maximum of 4 parameters with a total maximum length of 64 Bit can be mapped by UPID	[64Bit]

5.1.2 Default Mapping of the Transmit PDOs

TxPDO 1	Length
Status Word	[16Bit]
State Var	[16Bit]
Actual Position	[32Bit]
TxPDO 2	Length
Demand Position	[32Bit]
Demand Current	[32Bit]
TxPDO 3	Length
Warn Word	[16Bit]
Logged Error Code	[16Bit]
A maximum of 4 parameters with a total maximum length of 32 Bit can be mapped by UPID	[32Bit]
TxPDO 4	Length
A maximum of 4 parameters with a total maximum length of 64 Bit can be mapped by UPID	[64Bit]

If the application requires it, the mapping can be completely changed by the PDO Mapping parameter settings. Many applications do not require to use all resources.

5.1.3 Default Identifier

The default identifiers (11 bit identifier) are allocated by the following scheme:

10	9	8	7	6	5	4	3	2	1	0
Function Code				Node ID						

This results in the following table:

Object	Function Code (binary)	COB ID (hex)	COB ID (dec)	Object for Comm. Parameter / Mapping
NMT	0000b	00h	0	-
SYNC	0001b	80h	128	1005h / 1006h / 1007h
Emergency	0001b	81h – FFh	129-255	1014h
TxPDO 1	0011b	181h – 1FFh	385-511	1800h / 1A00h
TxPDO 2	0101b	281h – 2FFh	513-639	1801h / 1A01h
TxPDO 3	0111b	381h – 3FFh	641-767	1802h / 1A02h
TxPDO 4	1001b	481h – 4FFh	769-895	1803h / 1A03h
RxPDO 1	0100b	201h – 27Fh	897-1023	1400h / 1600h
RxPDO 2	0110b	301h – 37Fh	1025-1151	1401h / 1601h
RxPDO 3	1000b	401h – 47Fh	1153-1279	1402h / 1602h
RxPDO 4	1010b	501h – 57Fh	1281-1407	1403h / 1603h
TxSDO	1011b	581h – 5FFh	1409-1535	-
RxSDO	1100b	601h – 67Fh	1537-1663	-
NMT Error Control (NodeGuarding, Heartbeat)	1110b	701h – 77Fh	1793-1919	100Ch / 100Dh (NG) 1016h / 1017h (Heartbeat)

5.2 Using the Motion Command Interface in asynchronous transmission modes

Because the CMD interface of the LinMot drives consists of more than 8 bytes, it is necessary to link two or more RxPDOs together to ensure data consistency.

This is done by the “Motion CMD Slave Header”. In order to execute a command, the toggle bits of all headers have to be changed to the same new value. On the slave header only the last 4 bits are evaluated, so it is possible to simply copy the “CMD Header” from RxPDO 1 to the “Motion CMD Slave Header” of RxPDOs 2-4.

6 Object Dictionary

In this chapter all entries in the object dictionary, which are supported by the drives, are listed.

6.1 Communication Profile Area (1000h - 1FFFh)

Index	Sub-Index	Name	Access Type	Data Type
1000h	-	Device Type	ro	Unsigned32
Always zero (= no standardized device profile).				
1001h	-	Error register	ro	Unsigned8
Only bit 0 is supported, which indicates a generic error.				
1005h	-	COB-ID SYNC	rw	Unsigned32
Defines the COB-ID of the Synchronization Object (SYNC).				
1006h	-	Communication cycle period	rw	Unsigned32
This object defines the communication cycle period in μ s. This period defines the SYNC interval. It is 0 if not used. The object is only relevant for SYNC producers and is not used in CANopen slaves.				
1007h	-	Synchronous window length	rw	Unsigned32
Contains the length of the time window for synchronous PDOs in μ s. It is 0 if not used. This parameter is for compatibility only, it is not used in the LinMot drive.				
1008h	-	Manufacturer Device Name	const	String
Contains the Device Name (including HW Revision) as an ASCII string.				
1009h	-	Manufacturer HW Version	const	String
Contains the Device Serial Number as an ASCII string.				
100Ah	-	Manufacturer SW Version	const	String
Contains the version of the installed firmware as an ASCII string.				
100Ch	-	Guard Time	rw	Unsigned16
Contains the Guard Time used in the node guarding protocol.				
100Dh	-	Life Time Factor	rw	Unsigned8
Contains the Life Time Factor used in the node guarding protocol.				
1014h	-	COB-ID Emergency Object	rw	Unsigned32
Defines the COB-ID of the emergency object (EMCY).				
1016h	-	Consumer heartbeat time	-	-
	0h	Number of Entries	ro	Unsigned8
	1h	Consumer heartbeat time 1	rw	Unsigned32
The consumer heartbeat time defines the expected heartbeat cycle time and thus has to be higher than the corresponding producer heartbeat time configured on the device producing this heartbeat. Monitoring starts after the reception of the first heartbeat. If the consumer heartbeat time is 0 the corresponding entry is not used. The time has to be a multiple of 1ms.				
1017h	-	Producer heartbeat time	rw	Unsigned16
The producer heartbeat time defines the cycle time of the heartbeat. If not used it is to be set to 0. The time has to be a multiple of 1ms.				
1018h	-	Identity Object	-	-
	0h	Number of Entries	ro	Unsigned8
	1h	Vendor ID	ro	Unsigned32

Index	Sub-Index	Name	Access Type	Data Type										
The vendor ID contains a unique value allocated to each manufacturer of CANopen devices. The vendor ID of LinMot is 0000 0156h.														
	2h	Product Code	ro	Unsigned32										
Contains the drive type.														
	3h	Revision Number	ro	Unsigned32										
Contains the drive version.														
	4h	Serial Number	ro	Unsigned32										
Contains the last four ASCII characters of the serial number.														
1400h	-	Receive PDO Communication Parameter 0 (RxPDO 1)	-	-										
	0h	Number of Entries	ro	Unsigned8										
	1h	COB-ID	ro	Unsigned32										
<table border="1"> <tr> <th>31</th><th>30</th><th>29</th><th>28-11</th><th>10-0</th></tr> <tr> <td>0: PDO is valid 1: PDO is invalid</td><td>0: RTR allowed 1: no RTR allowed</td><td>0: (11-bit ID) 1: (29-bit ID)</td><td>All 0 if 11-bit identifier</td><td>11-bit identifier</td></tr> </table> The PDO valid/not valid bit allows to select which PDOs are used in the operational state. Only this bit can be changed by writing to this parameter. The identifiers themselves cannot be changed. The default ID is 200h + Node-ID.					31	30	29	28-11	10-0	0: PDO is valid 1: PDO is invalid	0: RTR allowed 1: no RTR allowed	0: (11-bit ID) 1: (29-bit ID)	All 0 if 11-bit identifier	11-bit identifier
31	30	29	28-11	10-0										
0: PDO is valid 1: PDO is invalid	0: RTR allowed 1: no RTR allowed	0: (11-bit ID) 1: (29-bit ID)	All 0 if 11-bit identifier	11-bit identifier										
	2h	Transmission type	rw	Unsigned8										
Only transmission types 1 (cyclic synchronous), 254 (asynchronous) and 250 (poll-request / poll-response) are supported. Type 250 is LinMot specific and not part of the CANopen standard. The Default is 1 (cyclic synchronous).														
1401h	-	Receive PDO Communication Parameter 1 (RxPDO 2)	-	-										
	0h	Number of Entries	ro	Unsigned8										
	1h	COB-ID	ro	Unsigned32										
The default ID is 300h + Node-ID. See 1400h sub 1h for additional details.														
	2h	Transmission type	rw	Unsigned8										
The default is 1 (cyclic synchronous). See 1400h sub 2h for additional details.														
1402h	-	Receive PDO Communication Parameter 2 (RxPDO 3)	-	-										
	0h	Number of Entries	ro	Unsigned8										
	1h	COB-ID	ro	Unsigned32										
The default ID is 400h + Node-ID. See 1400h sub 1h for additional details.														
	2h	Transmission type	rw	Unsigned8										
The default is 1 (cyclic synchronous). See 1400h sub 2h for additional details.														
1403h	-	Receive PDO Communication Parameter 3 (RxPDO 4)	-	-										
	0h	Number of Entries	ro	Unsigned8										
	1h	COB-ID	ro	Unsigned32										
The default ID is 500h + Node-ID. See 1400h sub 1h for additional details.														

Index	Sub-Index	Name	Access Type	Data Type
	2h	Transmission type	rw	Unsigned8
The default is 1 (cyclic synchronous). See 1400h sub 2h for additional details.				
1600h	-	Receive PDO Mapping Parameter 0 (RxPDO 1)	-	-
	0h	Number of mapped application objects in PDO	rw	Unsigned8
Number of valid mapping entries. Can be between 0 and 8.				
	1h-8h	PDO Mapping Entry 1-8	rw	Unsigned32
Contains the mapping for RxPDO 1. A mapping entry is built as follows:				
16-31		8-15	0-7	
index		sub-index	Object length	
1601h	-	Receive PDO Mapping Parameter 1 (RxPDO 2)	-	-
	0h	Number of mapped application objects in PDO	rw	Unsigned8
Number of valid mapping entries. Can be between 0 and 8.				
	1h-8h	PDO Mapping Entry 1-8	rw	Unsigned32
Contains the mapping for RxPDO 2 See 1600h sub 1-8h for additional details.				
1602h	-	Receive PDO Mapping Parameter 2 (RxPDO 3)	-	-
	0h	Number of mapped application objects in PDO	rw	Unsigned8
Number of valid mapping entries. Can be between 0 and 8.				
	1h-8h	PDO Mapping Entry 1-8	rw	Unsigned32
Contains the mapping for RxPDO 3 See 1600h sub 1-8h for additional details.				
1603h	-	Receive PDO Mapping Parameter 3 (RxPDO 4)	-	-
	0h	Number of mapped application objects in PDO	rw	Unsigned8
Number of valid mapping entries. Can be between 0 and 8.				
	1h-8h	PDO Mapping Entry 1-8	rw	Unsigned32
Contains the mapping for RxPDO 4 See 1600h sub 1-8h for additional details.				
1800h	-	Transmit PDO Communication Parameter 0 (TxPDO 1)	-	-
	0h	Number of Entries	ro	Unsigned8
	1h	COB-ID	ro	Unsigned32
31	30	29	28-11	10-0
0: PDO is valid 1: PDO is invalid	0: RTR allowed 1: no RTR allowed	0: (11-bit ID) 1: (29-bit ID)	All 0's if 11-bit identifier	11-bit identifier

Index	Sub-Index	Name	Access Type	Data Type
The PDO valid/not valid bit allows to select which PDOs are used in the operational state. Only this bit can be changed by writing to this parameter. The identifiers themselves cannot be changed. The default ID is 180h + Node-ID.				
	2h	Transmission type	rw	Unsigned8
Only transmission types 1 (cyclic synchronous), 254 (asynchronous) and 250 (poll-request / poll-response) are supported. Type 250 is LinMot specific and not part of the CANopen standard. The Default is 1 (cyclic synchronous).				
	3h	Inhibit time	rw	Unsigned16
This time is a minimum interval for PDO transmission in asynchronous modes. The value is defined as multiple of 100µs.				
	4h	Reserved	rw	Unsigned8
	5h	Event timer	rw	Unsigned16
In asynchronous modes additionally an event time can be used for TPDOs. If an event timer exists for a TPDO (value not equal to 0) the elapsed timer is considered to be an event. The event timer elapses as a multiple of 1 ms . This event will cause the transmission of this TPDO in addition to otherwise defined events.				
1801h	-	Transmit PDO Communication Parameter 1 (TxPDO 2)	-	-
	0h	Number of Entries	ro	Unsigned8
	1h	COB-ID	Ro	Unsigned32
The default ID is 280h + Node-ID. See 1800h sub 1h for additional details.				
	2h	Transmission type	rw	Unsigned8
The default is 1 (cyclic synchronous). See 1800h sub 2h for additional details.				
	3h	Inhibit time	rw	Unsigned16
See 1800h sub 3h for additional details.				
	4h	Reserved	rw	Unsigned8
	5h	Event timer	rw	Unsigned16
See 1800h sub 5h for additional details.				
1802h	-	Transmit PDO Communication Parameter 2 (TxPDO 3)	-	-
	0h	Number of Entries	ro	Unsigned8
	1h	COB-ID	ro	Unsigned32
The default ID is 380h + Node-ID. See 1800h sub 1h for additional details.				
	2h	Transmission type	rw	Unsigned8
The default is 1 (cyclic synchronous). See 1800h sub 2h for additional details.				
	3h	Inhibit time	rw	Unsigned16
See 1800h sub 3h for additional details.				
	4h	Reserved	rw	Unsigned8
	5h	Event timer	rw	Unsigned16
See 1800h sub 5h for additional details.				

Index	Sub-Index	Name	Access Type	Data Type
1803h	-	Transmit PDO Communication Parameter 3 (TxPDO 4)	-	-
	0h	Number of Entries	ro	Unsigned8
	1h	COB-ID	ro	Unsigned32
The default ID is 480h + Node-ID. See 1800h sub 1h for additional details.				
	2h	Transmission type	rw	Unsigned8
The default is 1 (cyclic synchronous). See 1800h sub 2h for additional details.				
	3h	Inhibit time	rw	Unsigned16
See 1800h sub 3h for additional details.				
	4h	Reserved	rw	Unsigned8
-				
	5h	Event timer	rw	Unsigned16
See 1800h sub 5h for additional details.				
1A00h	-	Transmit PDO Mapping Parameter 0 (TxPDO 1)	-	-
	0h	Number of mapped application objects in PDO	rw	Unsigned8
Number of valid mapping entries. Can be between 0 and 8.				
	1h-8h	PDO Mapping Entry 1-8	rw	Unsigned32
Contains the mapping for TxPDO 1 See 1600h sub 1-8h for additional details.				
1A01h	-	Transmit PDO Mapping Parameter 1 (TxPDO 2)	-	-
	0h	Number of mapped application objects in PDO	rw	Unsigned8
Number of valid mapping entries. Can be between 0 and 8.				
	1h-8h	PDO Mapping Entry 1-8	rw	Unsigned32
Contains the mapping for TxPDO 2 See 1600h sub 1-8h for additional details.				
1A02h	-	Transmit PDO Mapping Parameter 2 (TxPDO 3)	-	-
	0h	Number of mapped application objects in PDO	rw	Unsigned8
Number of valid mapping entries. Can be between 0 and 8.				
	1h-8h	PDO Mapping Entry 1-8	rw	Unsigned32
Contains the mapping for TxPDO 3 See 1600h sub 1-8h for additional details.				
1A03h	-	Transmit PDO Mapping Parameter 3 (TxPDO 4)	-	-
	0h	Number of mapped application objects in PDO	rw	Unsigned8
Number of valid mapping entries. Can be between 0 and 8.				
	1h-8h	PDO Mapping Entry 1-8	rw	Unsigned32
Contains the mapping for TxPDO 4 See 1600h sub 1-8h for additional details.				

6.2 Manufacturer specific Profile Area (2000h – 5FFFh)

6.2.1 UPID Commands

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

Index	Sub-Index	Description	Access Type	Data Type
2000h + UPID	01h	RAM Value	rw	Bool - Unsigned32

Read / Write the RAM Value of a UPID. Any UPID from a Boolean type up to an unsigned32 type can be read or written.

Read RAM Value by UPID

COB-ID 600 + Node-ID, SDO Read from PLC to LinMot Drive:

	SDO CS	Index		Sub-Index				
Data	40h	yyh	yyh	01h	-	-	-	-
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

yy yy: 2000h + UPID

Write RAM Value by UPID

COB-ID 600 + Node-ID, SDO Write from PLC to LinMot Drive:

	SDO CS	Index		Sub-Index	Data		Data	
Data	23h	yyh	yyh	01h	xxh	xxh	xxh	xxh
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

yy yy: 2000h + UPID

xx xx xx xx: Value to write (size depends on the UPID that will be written)

Index	Sub-Index	Description	Access Type	Data Type
2000h + UPID	02h	ROM Value	rw	Bool - Unsigned32

Read / Write the ROM Value of a UPID. Any UPID from a Boolean type up to an unsigned32 type can be read or written. If a value in the ROM is changed, it is not immediately reflected in the RAM. Values are read from the ROM to the RAM on startup of the drive. Use the “RAM/ROM Write” command (sub-index 06h) to change both values at the same time.

Read ROM Value by UPID

COB-ID 600 + Node-ID, SDO Read from PLC to LinMot Drive:

	SDO CS	Index		Sub-Index				
Data	40h	yyh	yyh	02h	-	-	-	-
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

yy yy: 2000h + UPID

Write ROM Value by UPID

COB-ID 600 + Node-ID, SDO Write from PLC to LinMot Drive:

	SDO CS	Index		Sub-Index	Data		Data	
Data	23h	yyh	yyh	01h	xxh	xxh	xxh	xxh

Index	Sub-Index	Description	Access Type	Data Type
Byte	01 (LSB)	02 03 04 05 06 07 08 (MSB)		

yy yy: 2000h + UPID

xx xx xx xx: Value to write (size depends on the UPID that will be written)

Index	Sub-Index	Description	Access Type	Data Type
2000h + UPID	03h	Min Value	ro	Bool - Unsigned32

The minimal possible value of the UPID is returned.

Read Min Value by UPID

COB-ID 600 + Node-ID, SDO Read from PLC to LinMot Drive:

	SDO CS	Index	Sub-Index				
Data	40h	yyh	yyh	03h	-	-	-
Byte	01 (LSB)	02	03	04	05	06	07 08 (MSB)

yy yy: 2000h + UPID

Index	Sub-Index	Description	Access Type	Data Type
2000h + UPID	04h	Max Value	ro	Bool - Unsigned32

The maximal possible value of the UPID is returned.

Read Max Value by UPID

COB-ID 600 + Node-ID, SDO Read from PLC to LinMot Drive:

	SDO CS	Index	Sub-Index				
Data	40h	yyh	yyh	04h	-	-	-
Byte	01 (LSB)	02	03	04	05	06	07 08 (MSB)

yy yy: 2000h + UPID

Index	Sub-Index	Description	Access Type	Data Type
2000h + UPID	05h	Default Value	ro	Bool - Unsigned32

The default value of the UPID is returned.

Read Default Value by UPID

COB-ID 600 + Node-ID, SDO Read from PLC to LinMot Drive:

	SDO CS	Index	Sub-Index				
Data	40h	yyh	yyh	05h	-	-	-
Byte	01 (LSB)	02	03	04	05	06	07 08 (MSB)

yy yy: 2000h + UPID

Index	Sub-Index	Description	Access Type	Data Type
2000h + UPID	06h	RAM/ROM Write	wo	Bool - Unsigned32

Write the RAM and ROM Value of a UPID. Any UPID from a Boolean type up to an unsigned32 type can be written.

Index	Sub-Index	Description	Access Type	Data Type
-------	-----------	-------------	-------------	-----------

Write RAM/ROM Value by UPID

COB-ID 600 + Node-ID, SDO Write from PLC to LinMot Drive:

	SDO CS	Index		Sub-Index	Data		Data	
Data	23h	yyh	yyh	06h	xxh	xxh	xxh	xxh
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

yy yy: 2000h + UPID

xx xx xx xx: Value to write (size depends on the UPID that will be written)

Index	Sub-Index	Description	Access Type	Data Type
2000h	20h	Start Getting UPID List	wo	Unsigned16

With this command, the starting UPID can be set from which the command “Get Next UPID List item” begins returning info when called. This command has to be sent at least once before information on UPIDs can be retrieved via the “Get Next UPID List item” command.

Start getting UPID List

COB-ID 600 + Node-ID, SDO Write from PLC to LinMot Drive:

	SDO CS	Index		Sub-Index	Data		Data	
Data	23h	yyh	yyh	20h	xxh	xxh	xxh	xxh
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

xx xx xx xx: Any Data

yy yy: 2000h + UPID

Index	Sub-Index	Description	Access Type	Data Type
2000h	21h	Get Next UPID List item	ro	Unsigned 32

With this command information on UPIDs can be read. After the initialization with the command “Start getting UPID List”, information on UPIDs can be read with this command. The command can be repeatedly issued. With each new command, the information on the next existing UPID is sent. When the end of the list is reached, the UPID FFFFh is sent.

Get Next UPID List item

COB-ID 600 + Node-ID, SDO Read from PLC to LinMot Drive:

	SDO CS	Index		Sub-Index				
Data	40h	yyh	yyh	21h	-	-	-	-
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

yy yy: 2000h + UPID

Return Value

COB-ID 580 + Node-ID, Response from LinMot Drive to PLC:

	SDO CS	Index		Sub-Index	Address Usage		UPID found	
Data	42h	yyh	yyh	21h	yyh	yyh	xxh	xxh
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

yy yy: Address Usage

xx xx: UPID which was found

Index	Sub-Index	Description	Access Type	Data Type
-------	-----------	-------------	-------------	-----------

Address Usage is interpreted as follows:

This Parameter is used for security features. Parameter is included when calculating the hash table.	13	14	15 (MSB)
	12	11	10
	9	8	7
	6	5	4
Live Parameter	3	2	1
	0 (LSB)		

Index	Sub-Index	Description	Access Type	Data Type
2000h	22h	Start Getting Modified UPID List	wo	Unsigned16

This command is used in the same way as the “Start Getting UPID List” command (2000h sub 20h). Only UPIDs with values that differ from their default values are returned.

Index	Sub-Index	Description	Access Type	Data Type
2000h	23h	Get Next Modified UPID List item	ro	Unsigned32

This command is used the in same way as the “Get Next UPID List item” command (2000h sub 21h). Only UPIDs with values that differ from their default values are returned.

6.2.2 System Commands

Index	Sub-Index	Description	Access Type	Data Type
2000h	07h	Set ROM to default (OS)	wo	Unsigned8 - Unsigned32

Set all parameters of the OS to default values. The execution of this command can take several seconds. Any data can be written for the command to be executed.

Set ROM to default (OS)

COB-ID 600 + Node-ID, SDO Write from PLC to LinMot Drive:

	SDO CS	Index		Sub-Index	Data			
Data	23h	00h	20h	07h	xxh	xxh	xxh	xxh
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

xx xx xx xx: Any Data

Index	Sub-Index	Description	Access Type	Data Type
2000h	08h	Set ROM to default (MC SW)	wo	Unsigned8 - Unsigned32

Index	Sub-Index	Description	Access Type	Data Type
-------	-----------	-------------	-------------	-----------

Set all parameters of the MC SW to default values. The execution of this command can take several seconds. Any data can be written for the command to be executed.

Set ROM to default (MC SW)

COB-ID 600 + Node-ID, SDO Write from PLC to LinMot Drive:

	SDO CS	Index		Sub-Index	Data			
Data	23h	00h	20h	08h	xxh	xxh	xxh	xxh
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

xx xx xx xx: Any Data

Index	Sub-Index	Description	Access Type	Data Type
2000h	09h	Set ROM to default (Interface)	wo	Unsigned8 - Unsigned32

Set all parameters of the Interface to default values. The execution of this command can take several seconds. Any data can be written for the command to be executed.

Set ROM to default (Interface)

COB-ID 600 + Node-ID, SDO Write from PLC to LinMot Drive:

	SDO CS	Index		Sub-Index	Data			
Data	23h	00h	20h	09h	xxh	xxh	xxh	xxh
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

xx xx xx xx: Any Data

Index	Sub-Index	Description	Access Type	Data Type
2000h	0Ah	Set ROM to default (Application)	wo	Unsigned8 - Unsigned32

Set all parameters of the Application to default values. The execution of this command can take several seconds. Any data can be written for the command to be executed.

Set ROM to default (Application)

COB-ID 600 + Node-ID, SDO Write from PLC to LinMot Drive:

	SDO CS	Index		Sub-Index	Data			
Data	23h	00h	20h	0Ah	xxh	xxh	xxh	xxh
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

xx xx xx xx: Any Data

Index	Sub-Index	Description	Access Type	Data Type
2000h	0Bh	Reset Drive	wo	Unsigned8 - Unsigned32

Initiates a software reset of the drive. Any data can be written for the command to be executed.

Reset Drive

COB-ID 600 + Node-ID, SDO Write from PLC to LinMot Drive:

Index	Sub-Index	Description						Access Type	Data Type
	SDO CS	Index		Sub-Index		Data			
Data	23h	00h	20h	0Bh	xxh	xxh	xxh	xxh	
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)	

xx xx xx xx: Any Data

Index	Sub-Index	Description						Access Type	Data Type
2000h	35h	Stop MC and APPL Software						wo	Unsigned8 - Unsigned32

MC SW and Application SW are stopped. Any data can be written for the command to be executed.

Stop MC and APPL Software

COB-ID 600 + Node-ID, SDO Write from PLC to LinMot Drive:

	SDO CS	Index		Sub-Index		Data			
Data	23h	00h	20h	35h	xxh	xxh	xxh	xxh	
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)	

xx xx xx xx: Any Data

Index	Sub-Index	Description						Access Type	Data Type
2000h	36h	Start MC and APPL Software						wo	Unsigned8 - Unsigned32

MC SW and Application SW are started. Any data can be written for the command to be executed.

Start MC and APPL Software

COB-ID 600 + Node-ID, SDO Write from PLC to LinMot Drive:

	SDO CS	Index		Sub-Index		Data			
Data	23h	00h	20h	36h	xxh	xxh	xxh	xxh	
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)	

xx xx xx xx: Any Data

6.2.3 Curve Service Commands

See the "LinMot 1100 Drive Configuration over Fieldbus Interfaces" for additional detail on the use of curve commands and a description of the content of the curve info and data blocks.

Index	Sub-Index	Description						Access Type	Data Type
2000h	40h	Curve Service: Save to Flash (only available on SG5)						wo	Unsigned8 - Unsigned32

All curves are saved from the RAM to the flash and are thus permanently saved. MC SW and application have to be stopped in order for this command to work (see command 2000h sub 35: Stop MC and Application Software). Any data can be written for the command to be executed.

Curve Service: Save to Flash

COB-ID 600 + Node-ID, SDO Write from PLC to LinMot Drive:

Index	Sub-Index	Description						Access Type	Data Type
	SDO CS	Index		Sub-Index	Data				
Data	23h	00h	20h	40h	xxh	xxh	xxh	xxh	
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)	

xx xx xx xx: Any Data

Index	Sub-Index	Description						Access Type	Data Type
2000h	41h	Curve Service: Delete all Curves						wo	Unsigned8 - Unsigned32

All curves in the RAM (SG5) are deleted. This does NOT delete curves from the flash on SG5. On SG7 devices the curves are deleted directly from the flash. After a system reset, the curves are loaded again from the flash to the RAM on SG5 devices. Any data can be written for the command to be executed.

Curve Service: Delete all Curves

COB-ID 600 + Node-ID, SDO Write from PLC to LinMot Drive:

	SDO CS	Index		Sub-Index	Data				
Data	23h	00h	20h	41h	xxh	xxh	xxh	xxh	
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)	

xx xx xx xx: Any Data

Index	Sub-Index	Description						Access Type	Data Type
2000h	42h	Curve Service: Poll Flash (only available on SG5)						ro	Unsigned8

Read Parameter to get the status of a flash operation:

Result = 00h : State = Idle

Result = 04h : State = Busy

This command can be used to check if a flash operation is still ongoing (e.g. command 2000h sub 40h: Curve Service: save to flash)

Curve Service: Poll Flash

COB-ID 600 + Node-ID, SDO Read from PLC to LinMot Drive:

	SDO CS	Index		Sub-Index					
Data	40h	00h	20h	42h	-	-	-	-	
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)	

Return Value

COB-ID 580 + Node-ID, Response from LinMot Drive to PLC:

	SDO CS	Index		Sub-Index	Result				
Data	42h	00h	20h	42h	xxh	-	-	-	
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)	

xx: Result

Index	Sub-Index	Description						Access Type	Data Type
2000h	43h	Curve Service: Get Last Curve Service Command Result						ro	Unsigned32

Index	Sub-Index	Description	Access Type	Data Type
-------	-----------	-------------	-------------	-----------

This command is used to get the results of curve service commands which are initiated with an SDO write command from the PLC.

The result of the last executed curve service command is given in the following format:

Get Last Curve Service Command Result

COB-ID 600 + Node-ID, SDO Read from PLC to LinMot Drive:

	SDO CS	Index		Sub-Index				
Data	40h	00h	20h	43h	-	-	-	-
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

Return Value

COB-ID 580 + Node-ID, Response from LinMot Drive to PLC:

	SDO CS	Index		Sub-Index	Result	CSCIndex		CSCsub-index
Data	42h	00h	20h	43h	zzh	yyh	yyh	xxh
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

zz: Result of the executed command. See the corresponding command for details on how to interpret these results, as its meaning differs from command to command.

yy yy: Index of the last executed curve service command which can have a result.

xx: Sub-Index of the last executed curve service command which can have a result.

Index	Sub-Index	Description	Access Type	Data Type
2000h + CurveID	50h	Curve Service: Add Curve	wo	Unsigned32

With this command a curve with the ID "CurveID" will be created. Up to 100 curves can be programmed into the drive. If a curve with the same ID already exists, an error will be generated which can be checked with the "Get Last Curve Service Command Result" command:

00h: No Error

D4h: Curve already exists

Curve Service: Add Curve

COB-ID 600 + Node-ID, SDO Write from PLC to LinMot Drive:

	SDO CS	Index		Sub-Index	InfoBlockSize		DataBlockSize	
Data	23h	CurveID	20h	50h	xxh	xxh	yyh	yyh
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

xx xx: Size of the curve info block in bytes

yy yy: Size of the curve data block in bytes

Index	Sub-Index	Description	Access Type	Data Type
2000h + CurveID	53h	Curve Service: Add Curve Data (32 Bit)	wo	Unsigned32

The Curve Data Block can be written in increments of 4 Bytes at a time. This way one setpoint (32Bit) can be written at a time. To write the Data Block, this command has to be repeatedly called, with each call containing the next setpoint of the Data Block. With the "Get Last Curve Service Command Result" command, one can check if the Info Block has already been written:

Index	Sub-Index	Description	Access Type	Data Type
-------	-----------	-------------	-------------	-----------

00h: Data Block is finished
 04h: Data Block is not finished
 D0h: Error: Data Block was already finished

Curve Service: Add Curve Data (32Bit)

COB-ID 600 + Node-ID, SDO Write from PLC to LinMot Drive:

	SDO CS	Index		Sub-Index	InfoBlock Data			
Data	23h	CurveID	20h	53h	xxh	xxh	xxh	xxh
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

xx xx xx xx: Curve data block data: one setpoint as a 32Bit value

Index	Sub-Index	Description	Access Type	Data Type
2000h + CurveID	54h	Curve Service: Add Curve Info Block (32 Bit)	wo	Unsigned32

The Curve Info Block can be written in increments of 4 bytes at a time.
 To write the info block, this command has to be repeatedly called, with each call containing the next 4 bytes of the info block. With the "Get Last Curve Service Command Result" command, one can check if the info block has already been written:

00h: Info Block is finished
 04h: Info Block is not finished
 D0h: Error: Info Block was already finished

Curve Service: Add Curve Info Block (32Bit)

COB-ID 600 + Node-ID, SDO Write from PLC to LinMot Drive:

	SDO CS	Index		Sub-Index	InfoBlock Data			
Data	23h	CurveID	20h	54h	xxh	xxh	xxh	xxh
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

xx xx xx xx: Curve info block data

Index	Sub-Index	Description	Access Type	Data Type
2000h + CurveID	60h	Curve Service: Get Curve	ro	Unsigned32

The "Get Curve" command has to be executed first in order to read a curve from the drive via SDO. With the commands "Get Curve Info Block" and "Get Curve Data Block" the corresponding blocks of the curve can be read afterwards.

Curve Service: Get Curve

COB-ID 600 + Node-ID, SDO Read from PLC to LinMot Drive:

	SDO CS	Index		Sub-Index				
Data	40h	CurveID	20h	60h	-	-	-	-
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

Return Value

COB-ID 580 + Node-ID, Response from LinMot Drive to PLC:

Index	Sub-Index	Description					Access Type	Data Type
	SDO CS	Index		Sub-Index	Result	CSInfo BlockSize	CSDData BlockSize	
Data	42h	CurveID	20h	60h	xxh	yyh	zzh	zzh
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

xx: Result: 00h = Curve exists
D4h = Curve does not exist
yy: Curve Info Block Size in Bytes
zz zz: Curve Data Block Size in Bytes

Index	Sub-Index	Description	Access Type	Data Type
2000h + CurveID	61h	Curve Service: Get Curve Info Block	ro	Unsigned32

The Curve Info Block can be read in increments of 4 Bytes.

To read the Info Block, this command has to be repeatedly called, with each call one can read the next 4 Bytes of the Info Block.

With the "Get Last Curve Service Command Result" command, one can check if the Info Block has already been read:

00h: Info Block is finished

04h: Info Block is not finished

D0h: Error: Info Block was already finished

Curve Service: Get Curve Info Block

COB-ID 600 + Node-ID, SDO Read from PLC to LinMot Drive:

	SDO CS	Index		Sub-Index				
Data	40h	CurveID	20h	61h	-	-	-	-
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

Return Value

COB-ID 580 + Node-ID, Response from LinMot Drive to PLC:

	SDO CS	Index		Sub-Index	InfoBlock Data			
Data	42h	CurveID	20h	61h	xxh	xxh	xxh	xxh
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

xx xx xx xx: Info Block Data

Index	Sub-Index	Description	Access Type	Data Type
2000h + CurveID	62h	Curve Service: Get Curve Data	ro	Unsigned32

The Curve Data Block can be read in increments of 4 Bytes.

To read the Data Block, this command has to be repeatedly called, with each call one can read the next 4 Bytes of the Data Block.

With the "Get Last Curve Service Command Result" command, one can check if the Data Block has already been read:

00h: Data Block is finished

04h: Data Block is not finished

D0h: Error: Info Block was already finished

Index	Sub-Index	Description					Access Type	Data Type
Curve Service: Get Curve Data Block								
COB-ID 600 + Node-ID, SDO Read from PLC to LinMot Drive:								
	SDO CS	Index		Sub-Index				
Data	40h	CurveID	20h	62h	-	-	-	-
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)
Return Value								
COB-ID 580 + Node-ID, Response from LinMot Drive to PLC:								
	SDO CS	Index		Sub-Index	DataBlock Data			
Data	42h	CurveID	20h	62h	xxh	xxh	xxh	xxh
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)
xx xx xx xx: Data Block Data								

6.2.4 Error Log Commands

With these commands the error log of a drive can be read.

Index	Sub-Index	Description	Access Type	Data Type
2000h	70h	Get Error Log Entry Counter	ro	Unsigned32

This command returns the number of logged errors as well as the total number of occurred errors.

Get Error Log Entry Counter

COB-ID 600 + Node-ID, SDO Read from PLC to LinMot Drive:

	SDO CS	Index		Sub-Index				
Data	40h	00h	20h	70h	-	-	-	-
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

Return Value

COB-ID 580 + Node-ID, Response from LinMot Drive to PLC:

	SDO CS	Index		Sub-Index	NrOfLoggedErr		NrOfOccErr	
Data	42h	00h	20h	70h	xxh	xxh	yyh	yyh
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

xx xx: Number of logged errors

yy yy: Number of occurred errors

Index	Sub-Index	Description	Access Type	Data Type
2000h + EntryNr	71h	Get Error Log Entry Error Code	ro	Unsigned32

This command returns the corresponding error code to the entry number.

Get Error Log Entry Error Code

COB-ID 600 + Node-ID, SDO Read from PLC to LinMot Drive:

	SDO CS	Index		Sub-Index				
Data	40h	EntryNr	20h	71h	-	-	-	-
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

Return Value

COB-ID 580 + Node-ID, Response from LinMot Drive to PLC:

	SDO CS	Index		Sub-Index	SourceID		Error Code	
Data	42h	EntryNr	20h	71h	xxh	xxh	yyh	yyh
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

xx xx: SourceID: ID of the part of the firmware which triggered the error:

- 1: OS
- 2: Motion Control Software
- 3: Interface (e.g. CANopen)
- 4: Application (e.g. EasySteps)

yy yy: Error Code: Further Information on the meaning of the error codes can be found in the manuals of the respective firmware parts.

Index	Sub-Index	Description	Access Type	Data Type
2000h + EntryNr	72h	Get Error Log Entry Time low	ro	Unsigned32

This command returns the lower 32 bits of the drive's system time when the error has occurred.

Get Error Log Entry Time low

COB-ID 600 + Node-ID, SDO Read from PLC to LinMot Drive:

	SDO CS	Index		Sub-Index				
Data	40h	EntryNr	20h	72h	-	-	-	-
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

Return Value

COB-ID 580 + Node-ID, Response from LinMot Drive to PLC:

	SDO CS	Index		Sub-Index	Time Low			
Data	42h	EntryNr	20h	72h	xxh	xxh	xxh	xxh
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

xx xx xx xx: Lower 32 Bits of the system time the error occurred.

Index	Sub-Index	Description	Access Type	Data Type
2000h + EntryNr	73h	Get Error Log Entry Time high	ro	Unsigned32

This command returns the higher 32 bits of the drive's system time when the error happened.

Get Error Log Entry Time high

COB-ID 600 + Node-ID, SDO Read from PLC to LinMot Drive:

	SDO CS	Index		Sub-Index				
Data	40h	EntryNr	20h	73h	-	-	-	-
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

Return Value

COB-ID 580 + Node-ID, Response from LinMot Drive to PLC:

	SDO CS	Index		Sub-Index	Time High			
Data	42h	EntryNr	20h	73h	xxh	xxh	xxh	xxh
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

xx xx xx xx: Higher 32 Bits of the system time the error occurred.

6.2.5 Command Table Commands

See the “LinMot 1100 Drive Configuration over Fieldbus Interfaces” for additional detail on the use of the command table and a description of the CT entry format.

Index	Sub-Index	Description	Access Type	Data Type
2000h	80h	CT: Save to Flash (only available on SG5)	wo	Unsigned8 - Unsigned32

Write any data with this command to save the command table which is in the RAM to the FLASH. The command table is loaded on startup from the FLASH to the RAM.
Any data can be written for the command to be executed.

Command Table: Save to Flash

COB-ID 600 + Node-ID, SDO Write from PLC to LinMot Drive:

	SDO CS	Index		Sub-Index	InfoBlock Data			
Data	23h	00h	20h	80h	xxh	xxh	xxh	xxh
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

xx xx xx xx: Any data

Index	Sub-Index	Description	Access Type	Data Type
2000h	80h	CT: Poll Flash (only available on SG5)	ro	Unsigned8

Read Parameter to get the status of a flash operation:

Result = 00h: State = Idle

Result = 04h: State = Busy

This command can be used to check if a flash operation is still ongoing (e.g. command 2000h sub 80: CT: save to flash)

Command Table: Poll Flash

COB-ID 600 + Node-ID, SDO Read from PLC to LinMot Drive:

	SDO CS	Index		Sub-Index				
Data	40h	00h	20h	80h	-	-	-	-
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

Return Value

COB-ID 580 + Node-ID, Response from LinMot Drive to PLC:

	SDO CS	Index		Sub-Index	Result			
Data	42h	00h	20h	80h	xxh	-	-	-
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

xx: Result

Index	Sub-Index	Description	Access Type	Data Type
2000h	81h	CT: Delete all Entries	wo	Unsigned32

Write anything to delete the complete Command Table in the RAM on SG5, or in the FLASH on SG7. On SG5 drives the command “CT: Save to Flash” has to be issued afterwards to save the CT permanently.

Command Table: Delete all Entries

COB-ID 600 + Node-ID, SDO Write from PLC to LinMot Drive:

Index	Sub-Index	Description						Access Type	Data Type
	SDO CS	Index		Sub-Index	Data				
Data	23h	00h	20h	81h	xxh	xxh	xxh	xxh	
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)	

xx xx xx xx: Any data

Index	Sub-Index	Description						Access Type	Data Type
2000h + EntryNr	82h	CT: Delete Entry (Entry Nr.)						wo	Unsigned32

Write anything to delete the CT entry with the corresponding number in the RAM. The ROM entry of the CT entry is not deleted this way.

Command Table: Delete Entry (Entry Nr.)

COB-ID 600 + Node-ID, SDO Write from PLC to LinMot Drive:

	SDO CS	Index		Sub-Index	Data				
Data	23h	EntryNr	20h	82h	xxh	xxh	xxh	xxh	
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)	

xx xx xx xx: Any data

Index	Sub-Index	Description						Access Type	Data Type
2000h + EntryNr	83h	CT: Write Entry (Entry Nr.)						wo	Unsigned32

This command has to be executed first if one wants to write a CT entry to the RAM (SG5) or FLASH (SG7). This command writes the block size of the CT entry. Afterwards the data for the entry can be written with the command "CT: Write Entry Data". The result of this command can be checked with the "CT: Get Last CT Service Command Result" command:

00h: No Error
D1h: Invalid block size
D4h: Invalid entry number

Command Table: Write Entry (Entry Nr.)

COB-ID 600 + Node-ID, SDO Write from PLC to LinMot Drive:

	SDO CS	Index		Sub-Index	Block Size				
Data	23h	EntryNr	20h	83h	xxh	xxh	-	-	
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)	

xx xx: Block size of CT entry

Index	Sub-Index	Description						Access Type	Data Type
2000h + EntryNr	84h	CT: Write Entry Data						wo	Unsigned32

The CT entry data can be written in increments of 4 Bytes.
To write the entry data, this command has to be repeatedly called, while each call contains the next 4 bytes of data.

Index	Sub-Index	Description	Access Type	Data Type
-------	-----------	-------------	-------------	-----------

The entry will be activated when the last byte of the entry data has been written. This can be checked with the "CT: Get Last CT Service Command Result" command:

00h: Entry Data Block is finished

04h: Entry Data Block is not finished

D0h: Error: Entry Data Block was already finished

Command Table: Write Entry Data

COB-ID 600 + Node-ID, SDO Write from PLC to LinMot Drive:

	SDO CS	Index		Sub-Index	CT Entry Data			
Data	23h	EntryNr	20h	84h	xxh	xxh	xxh	xxh
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

xx xx xx xx: CT entry Data

Index	Sub-Index	Description	Access Type	Data Type
2000h + EntryNr	85h	CT: Get Entry (Entry Nr.)	ro	Unsigned32

Read the block size of a CT Entry.

Command Table: Get Entry (Entry Nr.)

COB-ID 600 + Node-ID, SDO Read from PLC to LinMot Drive:

	SDO CS	Index		Sub-Index				
Data	40h	EntryNr	20h	85h	-	-	-	-
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

Return Value

COB-ID 580 + Node-ID, Response from LinMot Drive to PLC:

	SDO CS	Index		Sub-Index	Block Size			
Data	42h	EntryNr	20h	85h	xxh	xxh	-	-
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

xx xx: Block size

Index	Sub-Index	Description	Access Type	Data Type
2000h + EntryNr	86h	CT: Get Entry Data	ro	Unsigned32

The CT entry data can be read in increments of 4 Bytes.

To read the entry data, this command has to be repeatedly called, while the response to each call contains the next 4 bytes of data.

Command Table: Get Entry Data

COB-ID 600 + Node-ID, SDO Read from PLC to LinMot Drive:

	SDO CS	Index		Sub-Index				
Data	40h	EntryNr	20h	86h	-	-	-	-
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

Index	Sub-Index	Description	Access Type	Data Type
-------	-----------	-------------	-------------	-----------

Return Value

COB-ID 580 + Node-ID, Response from LinMot Drive to PLC:

	SDO CS	Index		Sub-Index	Entry Data			
Data	42h	EntryNr	20h	86h	xxh	xxh	xxh	xxh
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

xx xx xx xx: Entry data

Index	Sub-Index	Description	Access Type	Data Type
2000h	87h	CT: Get Entry List (Entry 0..31)	ro	Unsigned32

With this command a bitfield is read, which indicates the presence of a CT entry (0 = CT entry present, 1 = No CT entry present).

CT: Get Entry List (Entry 0..31)

COB-ID 600 + Node-ID, SDO Read from PLC to LinMot Drive:

	SDO CS	Index		Sub-Index				
Data	40h	00h	20h	87h	-	-	-	-
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

Return Value

COB-ID 580 + Node-ID, Response from LinMot Drive to PLC:

	SDO CS	Index		Sub-Index	Entry presence bitfield			
Data	42h	00h	20h	87h	xxh	xxh	xxh	xxh
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

xx xx xx xx: Entry presence bitfield

Index	Sub-Index	Description	Access Type	Data Type
2000h	88h	CT: Get Entry List (Entry 32..63)	ro	Unsigned32

See command 2000h sub 87h for details.

Index	Sub-Index	Description	Access Type	Data Type
2000h	89h	CT: Get Entry List (Entry 64..95)	ro	Unsigned32

See command 2000h sub 87h for details.

Index	Sub-Index	Description	Access Type	Data Type
2000h	8Ah	CT: Get Entry List (Entry 96..127)	ro	Unsigned32

See command 2000h sub 87h for details.

Index	Sub-Index	Description	Access Type	Data Type
2000h	8Bh	CT: Get Entry List (Entry 128..159)	ro	Unsigned32

See command 2000h sub 87h for details.

Index	Sub-Index	Description	Access Type	Data Type
2000h	8Ch	CT: Get Entry List (Entry 160..191)	ro	Unsigned32

See command 2000h sub 87h for details.

Index	Sub-Index	Description	Access Type	Data Type
2000h	8Dh	CT: Get Entry List (Entry 192..223)	ro	Unsigned32

See command 2000h sub 87h for details.

Index	Sub-Index	Description	Access Type	Data Type
2000h	8Eh	CT: Get Entry List (Entry 224..255)	ro	Unsigned32

See command 2000h sub 87h for details.

Index	Sub-Index	Description	Access Type	Data Type
2000h	8Fh	CT: Get Last CT Service Command Result	ro	Unsigned32

This command is used to get the results of command table commands which are initiated with an SDO write command from the PLC. The result of the last executed command table service command is returned in the following format:

Get Last Command Table Service Command Result

COB-ID 600 + Node-ID, SDO Read from PLC to LinMot Drive:

	SDO CS	Index		Sub-Index				
Data	40h	00h	20h	8Fh	-	-	-	-
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

Return Value

COB-ID 580 + Node-ID, Response from LinMot Drive to PLC:

	SDO CS	Index		Sub-Index	Result	CSCindex		CSCsub-index
Data	42h	00h	20h	8Fh	zzh	yyh	yyh	xxh
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

zz: Result of the executed command. See the corresponding command for details on how to interpret these results, as its meaning differs from command to command.

yy yy: Index of the last executed CT service command which can have a result.

xx: Sub-Index of the last executed CT service command which can have a result.

7 Examples

7.1 Homing and motion commands

For details on the use of motion commands, consult the manual "Usermanual MotionCtrlSW 1100".

The following example shows the homing procedure and execution of a motion command via CANopen with the default PDO mapping:

1. Homing (Control Word = 083Fh)

RxPDO 1

	ControlW ord		MC Header			MC Par Bytes 0..3		
Data	3Fh	08h	00h	00h	00h	00h	00h	00h
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

2. Enter Operational State (Control Word = 003Fh)

RxPDO 1

	ControlW ord		MC Header			MC Par Bytes 0..3		
Data	3Fh	00h	00h	00h	00h	00h	00h	00h
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

3. Execute Motion Command : VAI 16Bit Go To Pos (090xh)

CMD Header	→					0901h
Par Byte 0...1	→	Target Position :	50mm		01F4h	
Par Byte 2...3	→	Maximal Velocity :	1m/s		03E8h	
Par Byte 4...5	→	Acceleration :	10m/s ²		0064h	
Par Byte 6...7	→	Deceleration :	10m/s ²		0064h	

RxPDO 1

	ControlW ord		MC Header			MC Par Bytes 0..3		
Data	3Fh	00h	01h	09h	F4h	01h	E8h	03h
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

RxPDO 2

		MC Par Bytes 4..7				MC Par Bytes 8..11		
Data	64h	00h	64h	00h	00h	00h	00h	00h
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

In the LinMot-Talk1100 Control Panel, one can check the last executed motion command by pressing the «Read Command» button. It should look like this now that the command has been executed:

Motion Command Interface																																															
Enable Manual Override: ☐ -10 mm -1 mm +1 mm +10 mm																																															
Command Category: Velocity-Acceleration Interpolator (VAI) 16Bit ▾																																															
Command Type: VAI 16Bit Go To Pos (090xh) ▾																																															
Count Nibble (Toggle Bits): 1h ▾ ☐ Auto Increment Count Nibble																																															
<table border="1" style="width: 100%; border-collapse: collapse; text-align: left;"> <thead> <tr> <th style="width: 10%;">Name</th> <th style="width: 5%;">Offs.</th> <th style="width: 25%;">Description</th> <th style="width: 15%;">Scaled Value</th> <th style="width: 15%;">Int. Value (Dec)</th> <th style="width: 30%;">Int. Value (Hex)</th> </tr> </thead> <tbody> <tr> <td>Header</td> <td>0</td> <td>090xh: VAI 16Bit Go To Pos</td> <td>2305</td> <td>2305</td> <td>0901h</td> </tr> <tr> <td>1. Par</td> <td>2</td> <td>Target Position</td> <td>50 mm</td> <td>500</td> <td>01F4h</td> </tr> <tr> <td>2. Par</td> <td>4</td> <td>Maximal Velocity</td> <td>1 m/s</td> <td>1000</td> <td>03E8h</td> </tr> <tr> <td>3. Par</td> <td>6</td> <td>Acceleration</td> <td>10 m/s²</td> <td>100</td> <td>0064h</td> </tr> <tr> <td>4. Par</td> <td>8</td> <td>Deceleration</td> <td>10 m/s²</td> <td>100</td> <td>0064h</td> </tr> <tr> <td colspan="6" style="height: 20px;"></td> </tr> </tbody> </table> Read Command Send Command						Name	Offs.	Description	Scaled Value	Int. Value (Dec)	Int. Value (Hex)	Header	0	090xh: VAI 16Bit Go To Pos	2305	2305	0901h	1. Par	2	Target Position	50 mm	500	01F4h	2. Par	4	Maximal Velocity	1 m/s	1000	03E8h	3. Par	6	Acceleration	10 m/s ²	100	0064h	4. Par	8	Deceleration	10 m/s ²	100	0064h						
Name	Offs.	Description	Scaled Value	Int. Value (Dec)	Int. Value (Hex)																																										
Header	0	090xh: VAI 16Bit Go To Pos	2305	2305	0901h																																										
1. Par	2	Target Position	50 mm	500	01F4h																																										
2. Par	4	Maximal Velocity	1 m/s	1000	03E8h																																										
3. Par	6	Acceleration	10 m/s ²	100	0064h																																										
4. Par	8	Deceleration	10 m/s ²	100	0064h																																										

8 Reset Parameters to default values

There are three options to reset the parameters of a LinMot drive to default values:

1. By manipulating the two switches S1 and S2 (resets ALL parameters):
 1. Power off the drive
 2. Set the switches to FFh or set the Para Def. switch to on
 3. Power on the drive (Error and Warn LEDs flash alternating)
 4. Set the switches to 00h or set the Para Def. switch to off
 5. Wait until Enable and Warn LED start to turn off and on
 6. Power off the drive

(not available on all drive types)

2. By writing index 2000h sub-index 7h, 8h, 9h, Ah of the object dictionary.
After resetting the ROM values, a reset should be performed either by sending a "NMT Reset" command or by turning the drive off and on again.
This has to be done to reload the RAM values from the ROM.
3. Reinstalling the firmware will always reset all parameters to default values

9 Configuration of the drive with an EDS File

The EDS file for the LinMot drives is compliant with the standard:
"CiA 306 DS V1.3: Electronic data sheet specification for CANopen".
Visit <http://www.can-cia.org/> for detailed information.

The EDS file is part of the Lintalk1100 software which can be downloaded from <http://www.LinMot.com>.

The EDS file is located at "..\Firmware\Interfaces\CanOpen\EDS" in the installation folder of the LinMot-Talk software.

Consult the user manual of your PLC for details on how to use an EDS file with it.



Attention: If an EDS file is used, in most cases the PLC will automatically download this configuration via SDO commands to the drive. This is done before the drive is set to the operational state. Any configuration settings that have been done in the LinMot-Talk1100 software are overwritten this way!

9.1 Configuring a PDO variable by UPID with the EDS file

For every PDO a maximum of 4 parameters can be mapped by their UPIDs.
If a parameter is configured to a PDO via its UPID, the used space in the PDO is dependent on the data type of the configured parameter. If a boolean variable is configured, one byte of the PDO is used.

9.1.1 Setting the UPIDs of the parameter to map to a PDO

The UPIDs to map can be set via the dictionary entries 4F01h sub 1-4h for RxPDO1 to 4F08h sub 1-4h for TxPDO4. The drive automatically maps those parameters to the PDOs. If too much data would be mapped to one PDO, an error is generated.

9.1.2 Getting UPID PDO data into PLC variables

Since any parameter with a UPID can be mapped this way, it is not possible to reflect this with the EDS file. The user has to configure the PDO mapping on the PLC with dummy variables for the UPIDs. This way the PLC recognizes that data will be transmitted at the according bytes in the PDO. For every PDO there are several of those placeholders (Objects 4F01h sub 5-Ah for RxPDO1 to 4F08h sub 5-Ah for TxPDO4). The mapping entries in the object dictionary contain the entries for mapped UPIDs (4F01h – 4F08h) and NOT the placeholder-objects for the PLC.

9.1.3 Example

Configuration of TxPDO4 to transmit the following parameters:

- X4.4 Analog Voltage (UPID 1CA4h), UInt16
- Diff Analog Voltage (UPID 1CA6h), Sint16
- Difference Velocity (UPID 1B91h), Sint32

1. Configuring the UPIDs:

Object dictionary entry to write	Value
4F08h sub 1h (TPDO4 UPIDs 1)	1CA4h
4F08h sub 2h (TPDO4 UPIDs 2)	1CA6h
4F08h sub 3h (TPDO4 UPIDs 3)	1B91h

2. Set the PDO mapping in the PLC:

Object dictionary entry to map	Map entry to
4F08h sub 7h (TPDO4 2 Byte UPID mapped)	TPDO4
4F08h sub 8h (TPDO4 2 Byte UPID mapped)	TPDO4
4F08h sub 9h (TPDO4 4 Byte UPID mapped)	TPDO4

3. The TxPDO4 now contains the following data:

TxPDO 4

	X4.4 Analog Voltage		Diff Analog Voltage		Difference Velocity			
Data	xxh	xxh	yyh	yyh	zzh	zzh	zzh	zzh
Byte	01 (LSB)	02	03	04	05	06	07	08 (MSB)

The PDO mapping entries in the object dictionary look like this:

Mapping entry	Value
1A03h sub 1h (Transmit PDO Mapping Parameter 3: PDO mapping entry 1)	4F080110h
1A03h sub 2h (Transmit PDO Mapping Parameter 3: PDO mapping entry 2)	4F080210h
1A03h sub 3h (Transmit PDO Mapping Parameter 3: PDO mapping entry 3)	4F080320h

10 RT LEDs

Error Codes

RT BUS
ERROR  OK

OK	RT Bus Error	Description
Flickering	Flickering	AutoBitrate Detection is active
Single Flash	-	NMT State is „Stopped“
Blinking	-	NMT State is „Preoperational“
On	-	NMT State is „Operational“
-	On	Bus is in “Bus off” State. Check error message entry for details.
-	Double Flash	Nodeguarding or Heratbeat related error
-	Blinking	Invalid PDO Configuartion

Off:	constantly off.
On:	constantly on.
Flickering:	equal on and off times with a frequency of approximately 10 Hz.
Blinking:	equal on and off times with a frequency of approximately 2,5 Hz.
Single Flash:	one short flash followed by a long off phase.
Double Flash:	a sequence of two short flashes, separated by an off phase. The sequence is finished by a long off phase.
Triple Flash:	a sequence of three short flashes, separated by an off phase. The sequence is finished by a long off phase.
Quadruple Flash:	a sequence of three short flashes, separated by an off phase. The sequence is finished by a long off phase.

11 Interface Error Codes

Please refer to “Usermanual Motion Control Software” for the error codes of the MC software. The CANopen interface has the following additional error codes:

Error Code	Error Description	Recommended Actions
C1h	The drive is not compatible with CANopen	The drive does not support CANopen interface software. Download an appropriate firmware to the drive.
C2h	The configured ID is not valid (switches or parameter)	Select a valid node address.
C5h	CANopen Error: Bus error	Check CAN termination, baud rate and cabling.
C6h	CANopen Error: general Bus error	Check CAN termination, baud rate and cabling.
C7h	CANopen Error: Bus error, stuff error	Check CAN termination, baud rate and cabling.
C8h	CANopen Error: Bus error, form error	Check CAN termination, baud rate and cabling.
C9h	CANopen Error: Bus error, ack error	Check CAN termination, baud rate and cabling.
CAh	CANopen Error: Bus error, bit 1 error	Check CAN termination, baud rate and cabling.
CBh	CANopen Error: Bus error, bit 0 error	Check CAN termination, baud rate and cabling.
CCh	CANopen Error: Bus error, CRC error	Check CAN termination, baud rate and cabling.
CDh	CANopen Error: Error Control Timeout	CANopen Timeout. Is the master running?
CFh	CANopen Error: Invalid ID by Hex Switch S1	Invalid baud rate selected by S1. Check S1. Only 1..4 are valid settings.
D0h	CANopen Error: Invalid Mapping in TxPDO 1	More than 8 byte data mapped into TPDO 1. Verify the mapping (by UPID should be 0 to be deactivated).
D1h	CANopen Error: Invalid Mapping in TxPDO 2	More than 8 byte data mapped into TPDO 2. Verify the mapping (by UPID should be 0 to be deactivated).
D2h	CANopen Error: Invalid Mapping in TxPDO 3	More than 8 byte data mapped into TPDO 3. Verify the mapping (by UPID should be 0 to be deactivated).
D3h	CANopen Error: Invalid Mapping in TxPDO 4	More than 8 byte data mapped into TPDO 4. Verify the mapping (by UPID should be 0 to be deactivated).
D4h	CANopen Error: Invalid Mapping in RxPDO 1	More than 8 byte data mapped into RPDO 1. Verify the mapping (by UPID should be 0 to be deactivated).
D5h	CANopen Error: Invalid Mapping in RxPDO 2	More than 8 byte data mapped into RPDO 2. Verify the mapping (by UPID should be 0 to be deactivated).

Error Code	Error Description	Recommended Actions
D6h	CANopen Error: Invalid Mapping in RxPDO 3	More than 8 byte data mapped into RPDO 3. Verify the mapping (by UPID should be 0 to be deactivated).
D7h	CANopen Error: Invalid Mapping in RxPDO 4	More than 8 byte data mapped into RPDO 4. Verify the mapping (by UPID should be 0 to be deactivated).
D8h	CANopen Error: Invalid UPID in TxPDO 1 Mapping	Check the UPID, which is configured by "mapping by UPID".
D9h	CANopen Error: Invalid UPID in TxPDO 2 Mapping	Check the UPID, which is configured by "mapping by UPID".
DAh	CANopen Error: Invalid UPID in TxPDO 3 Mapping	Check the UPID, which is configured by "mapping by UPID".
DBh	CANopen Error: Invalid UPID in TxPDO 4 Mapping	Check the UPID, which is configured by "mapping by UPID".
DCh	CANopen Error: Invalid UPID in RxPDO 1 Mapping	Check the UPID, which is configured by "mapping by UPID".
DDh	CANopen Error: Invalid UPID in RxPDO 2 Mapping	Check the UPID, which is configured by "mapping by UPID".
DEh	CANopen Error: Invalid UPID in RxPDO 3 Mapping	Check the UPID, which is configured by "mapping by UPID".
DFh	CANopen Error: Invalid UPID in RxPDO 4 Mapping	Check the UPID, which is configured by "mapping by UPID".

Contact & Support

SWITZERLAND

NTI AG

Bodenaeckerstrasse 2
CH-8957 Spreitenbach

Sales and Administration:

+41 56 419 91 91
office@linmot.com

Tech. Support:

+41 56 544 71 00
support@linmot.com
<http://www.linmot.com/support>

Tech. Support (Skype):

support.linmot

Fax:

+41 56 419 91 92

Web:

<http://www.linmot.com>

USA

LinMot USA Inc.

N1922 State Road 120, Unit 1
Lake Geneva, WI 53147
USA

Phone:

262-743-2555

E-Mail:

usasales@linmot.com

Web:

<http://www.linmot-usa.com/>

Please visit <http://www.linmot.com/contact> to find the distribution close to you.

Smart solutions are...

