LinMot®

Third generation sercos bus interface for SG5 and SG6

Manual

sercos

the automation bus

This document applies to the following devices:

- **E1250-SC-xx (SG5)**
- **E1450-SC-xx-xS (SG5)**
- **B8050-ML-SC-xxx (SG5)**
- **MB8050-ML-SC-xxx (SG5)**

- **C1250-SC-xx-xS-xxx (SG6)**
- **C1250-MI-xx-xS-xxx (SG6)**

(with sercos Interface SW installed)

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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.

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1 System Overview

The LinMot C1250-SC-xx-xS-xxx, C1250-MI-xx-xS-xxx, E1250-SC-xx, E1450-SC-xx-xS and (M)B8050-ML-SC devices are sercos slaves with the following parameters:

Device Property	Value	
sercos generation	Third generation	
sercos version	SC: sercos III V1.1.2; MI: sercos III V1.3.2	
Hot-Plug support	only on MI-devices	
SERCON100 image version	V2.11 (SC only)	
Supported profiles and telegram types[1]	E1x50-SC-xx-xx, C1x50-SC-xx-xx	FSP_DRIVE, FSP_IO
	C1x50-MI-xx-xx	FSP_DRIVE
	B8050-ML-SC, MB8050-ML-SC	FSP_IO
Minimal sercos cycle time	250 µs	
Vendor Device ID	'0150-1764' (E1250-SC-UC) '0150-1785' (E1450-SC-QN-0S) '0150-2357' (E1450-SC-QN-1S) '0150-1881' (B8050-ML-SC) '0150-2032' (MB8050-ML-SC) '0150-1887' (C1250-SC-XC-0S-000) '0150-2349' (C1250-SC-XC-1S-000) '0150-1887' (C1250-SC-XC-0S-C00) '0150-2349' (C1250-SC-XC-1S-C00) '0150-30149' (C1250-MI-XC-0S-000) '0150-30169' (C1250-MI-XC-1S-000) '0150-30149' (C1250-MI-XC-0S-C00) '0150-30169' (C1250-MI-XC-1S-C00)	
Vendor Code	342 (0156h)	

[1]See chapter „5 Supported Profiles and Telegram Types„ for details

For further information on sercos please visit: http://www.sercos.org/

Note: The LinMot sercos drives always operate in position control mode when using the FSP-DRIVE profile, thus it is NOT recommended to use additional functionality like the command table, motion commands triggered by I/O etc., as this can lead to unpredictable system behavior. When using the FSP-IO profile everything can be used in combination, as the user has complete control over the system.

2 PLC Compatibility

		C1250 -MI-xx	C1250 -SC-xx	E1250 -SC-xx	E1450 -SC-xx	B8050-ML-SC
Schneider Electric PACDrive 3 (SW-Version 4.1 or higher required)						
FSP-IO	(with LinMot drive interface)	x	•	•	•	•
FSP-DRIVE	(with sercos drive profile)	•	•	•	•	x
Bosch Rexroth IndraControl / IndraMotion						

		C1250 -MI-xx	C1250 -SC-xx	E1250 -SC-xx	E1450 -SC-xx	B8050- ML-SC
FSP-IO	(with LinMot drive interface)	x	•	•	•	•
FSP-DRIVE	(with sercos drive profile)	•	•	•	•	x
Kistler maXYmos[1]						
FSP-DRIVE	(with sercos drive profile)	•	•	x	•	x

• **Working** **x Not Working or not supported** **? Untested**

[1]Depending on the Version of the maXYmos firmware, the parameter "Application Type (S-0-1302.0.3)" (UPID 2180h) has to be set to the value "2162" in order for the LinMot-Drive to work. Please restart both systems after changing the parameter.

3 Connecting to the sercos Network

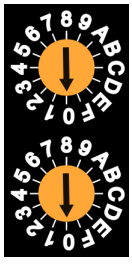
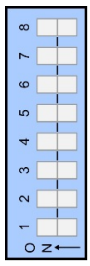
3.1 Pin Assignment of the Connectors X17-X18

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

X17 - X18	RealTime Ethernet Connector		
	Pin	Wire color code	Assignment 100 BASE-TX
	1 2 3 4 5 6 7 8 case	WHT/ORG ORG WHT/GRN BLU WHT/BLU GRN WHT/BRN BRN -	Rx+ Rx- Tx+ - - Tx- - - -
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”.		

3.2 Setting the sercos Address

The sercos address is set via the two ID-switches S1 and S2, where S1 sets the high digit and S2 the low digit. The address can have a value between 1 (01h) and 255 (FFh).

S1, S2		NodeID Selectors	
E12x0	C12x0 / E14x0		
		S1 (5..8) S2 (1..4)	Bus ID High (0 … F). Bit 5 is the LSB, bit 8 the MSB. Bus ID Low (0 … F). Bit 1 is the LSB, bit 4 the MSB. **Setting the ID high & low to 0xFF resets the drive to manufacturer settings!**

Note: The sercos address has no use with some identification modes like topology based addressing. If the switches are set to 0, the topology address is used as the sercos address when topology based addressing is configured in the PLC.

4 Sercos Parameters and Variables in LinMot-Talk

4.1 Parameters

The sercos interface has its own parameter tree branch (Parameters→sercos), which can be configured with the distributed LinMot-Talk software.
The LinMot-Talk software can be downloaded from http://www.linmot.com from the section “Download → Software and Manuals”.

sercos\ Application Type (S-0-1302.0.3)
This parameter contains the type of the drive application (e.g. main linear drive, pusher 001, X axis, etc.) The user can write this parameter if desired. It is used for identification purposes.

sercos\ Application Type (S-0-1302.0.3)		Default Value
String	Contains the type of the sub-device application as a string.	'LinMot Axis'

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

sercos\ Dis-/Enable		Default Value
Disable	Device runs without sercos interface.	-
Enable	Device runs with sercos interface.	X

Important: If the sercos bus interface is disabled, the integrated communication hardware is not powered! No messages will be sent to other devices connected to the sercos network via the LinMot device.

sercos\ sercos Address
In this section the sercos address can be configured.

sercos\ sercos Address		Default Value
sercos Address Source Select	Shows which source is selected to provide the sercos address.	By ID Switches S1 and S2
sercos Address Parameter Value	Value of the sercos address if ‘By Parameter’ is selected.	63

sercos\ sercos Address\ sercos Address Source Select
In this section the source of the sercos address can be configured.

sercos\ sercos Address\ sercos Address Source Select		Default Value
By ID Switches S1 and S2	The sercos address is determined by the switches S1 (ID HIGH) and S2 (ID LOW).	X
By Parameter	The sercos address is determined by the parameter ‘sercos Address Parameter Value’ in the LinMot-Talk software.	-

sercos\ IP Configuration
In this section the static IP Address, the Sub-Net mask and the default gateway can be configured.

sercos\ IP Configuration\ IP Configuration Mode
In this section the source of the sercos address can be configured.

sercos\ IP Configuration\ IP Configuration Mode		Default Value
Use static IP Address	Use the configured static IP address.	X
Use static IP w/Switches S1+2	Use the configured static IP address. The last byte of the address (e.g. 192.168.0.x) has the same value as the switches S1+2.	-

The static IP-Address is only active, if the PLC does NOT re-configure the IP settings with the procedure function command S-0-1048 “Activate network settings”.

sercos\ sercos Homing Mode[2]
In this section the sercos homing mode can be configured.

sercos\ sercos Homing Mode		Default Value
sercos Homing Mode Select	Shows which homing mode is selected.	Initiated by user (PLC or I/O)

[2]This parameter is only valid and in effect when the FSP_DRIVE profile is active.

sercos\ sercos Homing Mode\ sercos Homing Mode Select
In this section the sercos homing mode can be configured.

sercos\ sercos Homing Mode\ sercos Homing Mode Select		Default Value
Initiated by user (PLC or I/O)	The user has to initiate the homing procedure either via digital I/Os or via PLC commands.	X
AutoHoming	The drive automatically initiates the configured homing procedure as soon as it is enabled via the sercos drive control word.	-

Attention: Automatic homing can damage equipment and/or injure people. The user has to make sure that homing is safely possible (i.e. no mechanical obstruction) when enabling the drive.

sercos\ sercos Function Specific Profile\ sercos Function Specific Profile select
In this section the used sercos Function Specific Profile can be configured.

sercos\ sercos Function Specific Profile\ sercos Function Specific Profile select		Default Value C1250, E1250, E1450,	Default Value (M)B8050
Use FSP Drive	The device uses the Drive Profile	X	-
Use FSP IO	The device uses the IO Profile	-	X

sercos\ Monitoring Channels[3]
In this section the UPIDs of the parameters in the monitoring channels can be configured.
These allow the configuration of arbitrary UPIDs which then can be transmitted from the drive to the PLC in the AT process data.

sercos\ Monitoring Channels		Default Value
Channel 1 UPID	UPID of the Parameter to read from the drive in channel 1	0

sercos\ Monitoring Channels		Default Value
Channel 2 UPID	UPID of the Parameter to read from the drive in channel 2	0
Channel 3 UPID	UPID of the Parameter to read from the drive in channel 3	0
Channel 4 UPID	UPID of the Parameter to read from the drive in channel 4	0

[3]This parameter is only valid for SG6 drives

sercos\ Parameter Channels[3]
In this section the UPIDs of the parameters in the parameter channels can be configured.
These allow the configuration of arbitrary UPIDs which then can be transmitted from the PLC to the Drive in the MDT process data.

sercos\ Parameter Channels		Default Value
Channel 1 UPID	UPID of the Parameter to write to the drive in channel 1	0
Channel 2 UPID	UPID of the Parameter to write to the drive in channel 2	0
Channel 3 UPID	UPID of the Parameter to write to the drive in channel 3	0
Channel 4 UPID	UPID of the Parameter to write to the drive in channel 4	0

[3]This parameter is only valid for SG6 drives

4.2 Variables

Name	Type	Definition	Validity (FSP_IO, FSP_Drive)
sercos Address	UInt16	Current sercos address	Both
sercos Topology Address	UInt16	Current sercos topology address	Both
sercos Communication Phase	UInt16 Enum	Current sercos CP (NRT, CP0, CP1, CP2, CP3, CP4)	Both
Communication Cycle Time (S-0-1002)	UInt32	sercos cycle time in milliseconds	Both
IO Control (S-0-1500.0.01)	UInt16	sercos IO control word	FSP_IO
IO Status (S-0-1500.0.02)	UInt16	sercos IO status word	FSP_IO
Drive Control (S-0-0134)	UInt16	sercos drive control word	FSP_Drive
Drive Status (S-0-0135)	UInt16	sercos drive status word	FSP_Drive
Position Command Value (S-0-0047)	SInt32	Demand position	FSP_Drive
Position Feedback Value (S-0-0051)	SInt32	Actual position	FSP_Drive
Class 1 diagnostic (S-0-0011)	UInt32	sercos errors	Both
Manufacturer Class 1 diagnostic (S-0-0129)	UInt32	Manufacturer specific erros	Both
Class 2 diagnostic (S-0-0012)	UInt32	sercos warnings	Both
Manufacturer Class 2 diagnostic (S-0-0181)	UInt32	Manufacturer specific warnings	Both
Config Module Control	UInt16	Control word of the config module	Both
Config Module Index In	UInt16	Input index of the config module	Both
Config Module Value In	UInt32	Input value of the config module	Both

Name	Type	Definition	Validity (FSP_IO, FSP_Drive)
Config Module Status	UInt16	Status word of the config module	Both
Config Module Index Out	UInt16	Output index of the config module	Both
Config Module Value Out	UInt32	Output value of the config module	Both

5 Supported Profiles and Telegram Types

The C1250-SC-xx, E1250-SC-xx and E1450-SC-xx can be operated either as standard sercos drives utilizing the sercos drive profile or with the sercos IO profile using a LinMot custom drive interface for drive communication.

5.1 Function Specific Profile Drive (FSP_Drive)

5.1.1 Telegram Types

LinMot drives support the sercos standard telegram 4 in basic operation mode 3 (Position control using position feedback value 1 (motor feedback)).
The IDN S-0-0015 configures the telegram type where bits 2-0 with the value '100' indicate the use of standard telegram 4.

Standard telegram 4 (Telegram Type 4)	
MDT	S-0-0134: Drive control S-0-0047: Position command value
AT	S-0-0135: Drive status S-0-0051: Position feedback value 1 (motor feedback)

Configuration with an IDN list is also possible (telegram type 7).

Configuration with an IDN list (Telegram Type 7)	
MDT	S-0-0134: Drive control S-0-0047: Position command value P-0-0210: LinMot Configuration Module Control P-0-0211: LinMot Configuration Module Index In P-0-0212: LinMot Configuration Module Value In
AT	S-0-0135: Drive status S-0-0051: Position feedback value 1 (motor feedback) P-0-0100: LinMot StatusWord P-0-0101: LinMot StateVar P-0-0220: LinMot Configuration Module Status P-0-0221: LinMot Configuration Module Index Out P-0-0222: LinMot Configuration Module Value Out

Note: The order of the list's objects and its content have to be exactly as stated in the table above to work properly.

Note: For more information on the configuration module see chapter 8 Realtime IO Configuration Module.

Note: On C1250-MI drives only 12 IDNs can be configured in an IDN-List

5.2 Function Specific Profile IO (FSP_IO)

In order to work as an IO device, the parameter “sercos function specific profile” has to be set to “FSP_IO” (see chapter 4).

5.2.1 Drive Interface (C1250-SC-xx, E1250-SC-xx and E1450-SC-xx)

When using the C1250-SC-xx, E1250-SC-xx or the E1450-SC-xx with the function specific IO profile, the following interface is configured as cyclic real-time data:

Drive Interface		Data Type	UPID
MDT	ControlWord	UInt16	1D52h
	MC Cmd Header	UInt16	1DB0h
	MC Cmd Parameter Word 0	UInt16	1E40h (low 16Bit)
	MC Cmd Parameter Word 1	UInt16	1E40h (high 16Bit)
	MC Cmd Parameter Word 2	UInt16	1E41h (low 16Bit)
	MC Cmd Parameter Word 3	UInt16	1E41h (high 16Bit)
	MC Cmd Parameter Word 4	UInt16	1E42h (low 16Bit)
	MC Cmd Parameter Word 5	UInt16	1E42h (high 16Bit)
	MC Cmd Parameter Word 6	UInt16	1E43h (low 16Bit)
	MC Cmd Parameter Word 7	UInt16	1E43h (high 16Bit)
	MC Cmd Parameter Word 8	UInt16	1E44h (low 16Bit)
	MC Cmd Parameter Word 9	UInt16	1E44h (high 16Bit)
	Config Module Control	UInt16	211Bh
	Config Module Index Out	UInt16	211Ch
	Config Module Value Out	UInt32	211Dh
	Reserved	UInt32	-
AT	StateVar	UInt16	1B62h
	StatusWord	UInt16	1D51h
	WarnWord	UInt16	1D8Eh
	Config Module Status	UInt16	211Eh
	Config Module Index In	UInt16	211Fh
	Config Module Value In	UInt32	2120h
	DemandPosition	SInt32	1B8Ah
	ActualPosition	SInt32	1B8Dh
	DemandCurrent	SInt32	1B93h
	Reserved	UInt32	-

With this interface, an axis can be completely controlled and operated.
For a detailed description on how the LinMot motion command interface is used, how the LinMot state machine works etc., please consult the following user manuals:

- “Usermanual_MotionCtrlSW_SG5”
- “Drive_Configuration_over_Fieldbus_SG5”

5.2.2 Drive Interface ((M)B8050-ML-SC)

When using the B8050-ML-SC, the following interface is configured as cyclic real-time data per axis:

Drive Interface		Data Type
MDT	Axis_x_TX_ControlWord	UInt16
	Axis_x_TX_MC_Header	UInt16
	Axis_x_TX_MC_Par_Word_0	UInt16
	Axis_x_TX_MC_Par_Word_1	UInt16
	Axis_x_TX_MC_Par_Word_2	UInt16
	Axis_x_TX_MC_Par_Word_3	UInt16
	Axis_x_TX_MC_Par_Word_4	UInt16
	Axis_x_TX_MC_Par_Word_5	UInt16
	Axis_x_TX_MC_Par_Word_6	UInt16
	Axis_x_TX_MC_Par_Word_7	UInt16
	Axis_x_TX_MC_Par_Word_8	UInt16
	Axis_x_TX_MC_Par_Word_9	UInt16
	Axis_x_TX_Cfg_Module_Control	UInt16
	Axis_x_TX_Cfg_Module_Index_Out	UInt16
	Axis_x_TX_Cfg_Module_Value_Out	UInt32
AT	Axis_x_RX_StateVar	UInt16
	Axis_x_RX_StatusWord	UInt16
	Axis_x_RX_WarnWord	UInt16
	Axis_x_RX_DemandCurrent	SInt16
	Axis_x_RX_ActualPosition	SInt32
	Axis_x_RX_DemandPosition	SInt32
	Axis_x_RX_Reserved_Word_1	UInt16
	Axis_x_RX_Reserved_Word_2	UInt16
	Axis_x_RX_Reserved_Word_3	UInt16
	Axis_x_RX_Reserved_Word_4	UInt16
	Axis_x_RX_Cfg_Module_Status	UInt16
	Axis_x_RX_Cfg_Module_Index_In	UInt16
	Axis_x_RX_Cfg_Module_Value_In	UInt32

With this interface, an axis can be completely controlled and operated.
For a detailed description on how the LinMot motion command interface is used, how the LinMot state machine works etc., please consult the following user manuals:

- “Usermanual_MotionCtrlSW”
- “Drive_Configuration_over_Fieldbus_SG4”

5.2.3 Special Axis Errors for (M)B8050-ML-SC Systems

In some special cases the MC-Link controller modifies the status word and error codes in the process data to the PLC:

Error Codes	Description
0xA0	Axis not present
0xA1	Connection to axis has been lost

These errors are not logged in the ErrorLog of the (M)B8050, since they are not errors generated by that device. The (M)B8050 merely modifies the data sent to the PLC to indicate these errors there.

No Connection

A connection has never been established with the device, e.g. because no device is present or because of faulty cabling.

Process Data from the MC-Link Device to the PLC	Value	Despcription
Axis_x_RX_StateVar	0x04A0	Error 0xA0 is indicated
Axis_x_RX_StatusWord	0x0088	Error and warning flags are set
Axis_x_RX_WarnWord	0x4080	Not Homed and Intf warning flags are set
Axis_x_RX_DemandCurrent	0x0000	Demand current is indicated as 0

Connection Lost

A connection has once been established, but the device doesn't communicate anymore.

Process Data from the MC-Link Device to the PLC	Value	Despcription
Axis_x_RX_StateVar	0x04A1	Error 0xA1 is indicated
Axis_x_RX_StatusWord	0xXXXX | 0x0008	Last valid value is preserved and error flag is forced
Axis_x_RX_WarnWord	0xXXXX | 0x4000	Last valid value is preserved and Intf Warn flag is forced
Axis_x_RX_DemandCurrent	0xXXXX	Last valid value is preserved

6 Mapping of Errors and Warnings to C1D and C2D

6.1 Class 1 diagnostic C1D (S-0-0011)

The IDN S-0-0129 (Manufacturer class 1 diagnostic) always contains the LinMot error number of the most recent error. If a LinMot error is mapped to one of the C1D bits, this bit is set in case of that error. If another error occurs, bit 15 is set and the error code can be read via IDN S-0-0129.

C1D Bit	sercos C1D errors	LinMot error description	LinMot error	Drive (C1250, E1250, E1450)
Bit 15	manufacturer-specific error	See S-0-0129	-	All
Bit 14	reserved	-	-	All
Bit 13	over travel limit is exceeded	Err: Min Pos Undershot Err: Max Pos Overshot	0007h 0008h	All All
Bit 12	reserved	-	-	All
Bit 11	excessive position deviation	Err: Pos Lag Always Too Big Err: Pos Lag Standing Too Big	000Bh 000Ch	All All
Bit 10	power supply phase error	-	-	All
Bit 9	under voltage error	Err: X1 Pwr Voltage Too Low	0003h	All
Bit 8	over voltage error	Err: X1 Pwr Voltage Too High	0004h	All
Bit 7	over current error	Fatal Err: X1 Pwr Over Current	000Dh	C1250, E1250
Bit 6	error in the „commutation“ system	Fatal Err: X13 Signals Missing Fatal Err: X3 Hall Sig Missing	000Ah 0021h	All All
Bit 5	feedback error	Err: Sensor Alarm On X13	0025h	All
Bit 4	control voltage error	Err: X4 Logic Supply Too Low Err: X4 Logic Supply Too High	0001h 0002h	All All
Bit 3	cooling error shut-down	Err: Fan Driver Error	0043h	All
Bit 2	motor over temperature shut-down	Err: Motor Hot Sensor	0020h	All
Bit 1	amplifier over temperature shut-down	Err: Drive Ph1+ Too Hot Err: Power Module Too Hot Err: Drive Ph1- Too Hot Err: Motor Supply Too Hot Err: Drive Ph2+ Too Hot Err: Sensor Supply Too Hot Err: Drive Ph2- Too Hot Err: Drive Pwr Too Hot Err: Drive X3 Too Hot Err: Drive Core Too Hot	0010h 0010h 0011h 0011h 0012h 0012h 0013h 0014h 0016h 0017h	C1250, E1250 E1450 C1250, E1250 E1450 C1250, E1250 E1450 C1250, E1250 C1250, E1250 C1250, E1250 All
Bit 0	overload shut-down	Err: Motor Short Time Overload	0023h	All

Note: If an error is fatal, the error cannot be acknowledged. In that case, power cycling is required to clear the error.

6.2 Class 2 diagnostic C2D (S-0-0012)

The IDN S-0-0181 (Manufacturer class 2 diagnostic) always contains the LinMot WarnWord. If a bit of the LinMot WarnWord is set, that is not matched to a sercos C2D warning , bit 15 is set to indicate a manufacturer specific warning.

C2D Bit	sercos C2D warning	LinMot warning	Bit of LinMot WarnWord
Bit 15	Manufacturer specific warning	See S-0-0181	-
Bit 14	Reserved	-	-
Bit 13	Reserved	-	-
Bit 12	Communication warning	-	-
Bit 11	Excessive velocity deviation	-	-
Bit 10	Reserved	-	-
Bit 9	Undervoltage warning (bus voltage)	Motor Supply Voltage Low	2
Bit 8	Reserved	-	-
Bit 7	Reserved	-	-
Bit 6	Reserved	-	-
Bit 5	Reserved	-	-
Bit 4	Reserved	-	-
Bit 3	cooling error warning	-	-
Bit 2	motor over temperature warning	Motor Hot Sensor	0
Bit 1	amplifier over temperature warning	Drive Hot	6
Bit 0	overload warning	Motor Short Time Overload	1

7 Read/Write UPIDs via IDNs

Every parameter and variable in a LinMot system has its own UPID (Unique Parameter ID).
Every UPID is mapped to its own manufacturer specific IDN to access it via the sercos service channel.

UPIDs are mapped according to the following table:

UPID	IDNdec	IDNhex
0xHBLB	P-Y-0000.HB_{dec}.LB_{dec}	(0xHBLB0000 +(0x00008000 + 0x0000Y000))

HB: High Byte (hexadecimal), HBdec: High Byte (decimal)
LB: Low Byte (hexadecimal), LBdec: Low Byte (decimal)

Y = 0: RAM value of a UPID is accessed
Y = 1: ROM value of a UPID is accessed
Y = 2: RAM and ROM value of a UPID is accessed (only applicable when writing UPIDs)

(Note: Not every UPID has a RAM and a ROM Value)

Supported UPID functions via IDN access over the sercos service channel:

UPID Access	IDN Access
Read UPID value[3] (RAM or ROM value)	Read IDN Element 7: structure of operation data
Write UPID value (RAM and/or ROM value)	Write IDN Element 7: structure of operation data
Get minimum value of UPID	Read IDN Element 5: structure of minimum value
Get maximum value of UPID	Read IDN Element 6: structure of maximum value

[3] A maximum of 32 Bit of data can be read with each access. If for example a string should be read, one has to read every stringlet seperately (i.e. „Error Text“ with UPID 0x1D9B → read UPID 0x1D9C for the first 4 characters of the string, UPID 0x1D9D for the second 4 characters and so on).

8 Realtime IO Configuration Module

This software module can be used to access parameters by UPID, setting their values to default, read the error log and much more.
For a detailed description of the whole functionality, please refer to the manual
“Drive_Configuration_over_Fieldbus_SG5”.

The following IDNs are used for the configuration module:

IDN	Description	Data Direction
P-0-0210	LinMot Config Module Control	PLC → Drive
P-0-0211	LinMot Config Module Index In	PLC → Drive
P-0-0212	LinMot Config Module Value In	PLC → Drive
P-0-0220	LinMot Config Module Status	Drive → PLC
P-0-0221	LinMot Config Module Index Out	Drive → PLC
P-0-0222	LinMot Config Module Value Out	Drive → PLC

These IDNs are accessible over the sercos service channel or they can be directly mapped to the real-time process data (see chapter “5.1.1 Telegram Types” and “10.3.2 Configuration List including the IO Configuration Module”).

Example: Read the RAM value of a parameter

1. Write UPID of parameter to IDN P-0-0211
2. Write Config Module Control (Command: 110xh) to IDN P-0-0210
3. Read IDN P-0-0222 to get the RAM value of the parameter

Example: Write the RAM value of a parameter

1. Write UPID of parameter to IDN P-0-0211
2. Write value of parameter to IDN P-0-0212
3. Write Config Module Control (Command: 130xh) to IDN P-0-0210

9 Drive Homing

The homing mode can be configured with the LinMot-Talk software. All the different possibilities to start the homing procedure will trigger this configured homing mode.

Attention: Even though it is possible to use a LinMot motor without being referenced to the machine zero point, it is strongly advised not to, as this can lead to unpredictable system behavior.

It is recommended to use the drive controlled homing procedure command (IDN S-0-0148) when possible.

9.1 Using the Drive Controlled Homing Procedure Command

Relevant parameters:

IDN	Description
S-0-0147	Homing Parameter
S-0-0148	Drive Controlled Homing Procedure Command

By executing IDN S-0-0148 as a procedure command, the drive controlled homing is started. The procedure can only be executed successfully when the drive is already enabled (Drive Control Word (S-0-0134) = E000h).
Executing this command while the drive is not enabled will result in an error.

Note: Configured homing modes by IDN S-0-0147 will be ignored, the drive always executes the homing procedure which was configured with LinMot-Talk. The start inhibitor will be overridden automatically if necessary.

Note: Using this procedure function command is only possible when using the drive with the FSP-DRIVE profile.

9.2 Using the LinMot Control-/StatusWords

When using the FSP-IO profile, all of the necessary parameters are part of the real-time process data.
When using the FSP-DRIVE profile, all of the necessary parameters can be accessed via the sercos service channel.

Relevant parameters:

UPID	Description	IDN
1D52h	LinMot ControlWord (accessed via interface)	P-0-0000.29.82 (1D528000h)
1D51h	LinMot StatusWord	P-0-0000.29.81 (1D518000h)
1B62h	LinMot StateVar	P-0-0000.27.98 (1B628000h)

1. Check if the drive is in operational state “Operation Enabled” (StateVar = 08xxh)
2. If drive is in state 00xxh (“Not ready to Switch On”), toggle bit 0 of the LinMot ControlWord to override the start inhibitor.
3. Read LinMot ControlWord.
4. Modify read value by setting bit 11 (Home bit).
5. Initiate the homing procedure by writing the LinMot ControlWord back to the drive.
6. Check if homing is finished by reading the “Homed” bit (bit 11 of the LinMot StatusWord).
7. Reset bit 11 of the LinMot ControlWord.

10 Commissioning with Schneider PacDrive 3 controllers

The LinMot C1250-SC-xx, C1250-MI-xx, E1250-SC-xx and E1450-SC-xx drives can be integrated in an Schneider PacDrive 3 system with the use of the SercDrv object. This object uses the FSP_DRIVE profile.
For additional information consult the corresponding manuals from Schneider Electric.
This chapter describes how to configure this object for use with a LinMot system.
The subchapters cover the different parameter groups as they are presented in the configuration window for the SercDrv object.

10.1 General

Parameter	Value
Motor peak current	Maximum input current of the motor.
Drive peak current	Maximum output current the drive is able to deliver.

The required values can be found in the LinMot data book.

Example:
Linear guide LM01-23x80/160 with a mass of 610g and 749g of additional load mass
→ Input value for motor peak current: 4000 [mA] (@ 72VDC)
→ Input value for drive peak current: 32000 [mA]

10.2 Motor/Mechanic

As the LinMot motors are linear systems, the parameters of the SercDrv rotative system have to be chosen in a way that approximately maps this rotative system to a linear one.
With the following values for the parameters, a unit of position
(= FeedbackResolution / FeedConstant) is equivalent to 1mm:

Parameter	Value	Unit
GearIn	1	-
GearOut	1	-
FeedConstant	1000	[Units/Revolution]
FeedbackResolution	10`000`000	Inc. (=0,1[µm])
MaxRPM	See chapter 10.2.1	[1/min]
ModuloValue	0	Inc. (=0,1[µm])
J total	See chapter 10.2.2	[kg*cm^2]
Torque Constant	See chapter 10.2.3	[0,001*Nm/A]
Direction	right	-

10.2.1 MaxRPM

This value has direct influence on the maximum velocity. It has to be set in a way, that the resulting maximum velocity matches the value in the LinMot data book for max. speed.

Example:
Linear guide LM01-23x80/160 with a mass of 610[g] and 749[g] of additional load mass
→ Max. Speed (@72VDC) : 6,0 [m/s] = 360 [m/min]
→ Input value for MaxRPM: 360 [m/min] / 'FeedbackResolution' =
360 [m/min] / 1 [m] = 360 [1/min]

10.2.2 J total

As the moment of inertia J is not applicable in a linear system, one has to input the total moving mass of the linear system in [kg], considering the similarities of the following equations:

Rotational movement	
$M = J \bullet \alpha$	(M:Torque, J: moment of inertia, α: angular acceleration)

Linear movement	
$F = m \bullet a$	(F: force, m: mass, a: acceleration)

Example:
Linear guide LM01-23x80/160 with a mass of 610[g] and 749[g] of additional load mass
→ Total moving mass: 610[g] + 749[g] = 1359[g] = 1,359 [kg]
→ Input value for J total: 1,359 [kg*cm^2]

10.2.3 Torque constant

For linear motors, the force constant of the linear motor (unit: [N/A]) is used instead of the torque constant, since a torque constant is not applicable for a linear system.

Example:
Linear guide LM01-23x80/160 with a mass of 610[g] and 749[g] of additional load mass
→ Force constant: 11[N/A]
→ Input value for torque constant: 11000 [0,001*Nm/A]

10.3 Realtimechannel

10.3.1 Standard Telegram 4

Parameter	Value
TelegramType	4
PrimaryOperationMode	3
ConfigurationListAT	-
ConfigurationListATLength	2
PositionFeedbackValueOffset	0
ConfigurationListMDT	-
ConfigurationListMDTLength	2
PositionCommandValueOffset	0

10.3.2 Configuration List including the IO Configuration Module

If the Realtimechannel is configured with a list of IDNs the LinMot StatusWord, StateVar and the Realtime IO Configuration Module (see chapter “8 Realtime IO Configuration Module”) can be mapped directly as part of the real-time process data. The Monitoring / Parameter channels are also mapped. These allow the configuration of arbitrary UPIDs to be transmitted / received in the process data.

Parameter	Value
TelegramType	7

Parameter	Value
PrimaryOperationMode	3
ConfigurationListAT	'S-0-0051.0.0;P-0-0100.0.0;P-0-0101.0.0;P-0-0220.0.0; P-0-0221.0.0;P-0-0222.0.0;P-0-0301.0.0;P-0-0302.0.0;P-0-0303.0.0;P-0-0304.0.0'
ConfigurationListATLength	16
PositionFeedbackValueOffset	0
ConfigurationListMDT	'S-0-0047.0.0;P-0-0210.0.0;P-0-0211.0.0;P-0-0212.0.0;P-0-0311.0.0;P-0-0312.0.0;P-0-0313.0.0;P-0-0314.0.0'
ConfigurationListMDTLength	14
PositionCommandValueOffset	0

Note: The order of the list's objects and its content have to be exactly as stated in the table above to work properly.

Note: On C1250-MI drives only 12 IDNs can be configured in an IDN-List

10.3.3 Configuration List including motor feedback parameters

If the Realtimechannel is configured with a list of IDNs the LinMot StatusWord, StateVar, the velocity feedback (S-0-0040), torque/force feedback (S-0-0084) and the effective current (S-0-0389) can also be mapped directly as part of the real-time process data. The Monitoring / Parameter channels are also mapped. These allow the configuration of arbitrary UPIDs to be transmitted / received in the process data.

Parameter	Value
TelegramType	7
PrimaryOperationMode	3
ConfigurationListAT	'S-0-0051.0.0;P-0-0100.0.0;P-0-0101.0.0;S-0-0040.0.0;S-0-0084.0.0;S-0-0389.0.0;P-0-0301.0.0;P-0-0302.0.0;P-0-0303.0.0;P-0-0304.0.0'
ConfigurationListATLength	17
PositionFeedbackValueOffset	0
ConfigurationListMDT	'S-0-0047.0.0;P-0-0311.0.0;P-0-0312.0.0;P-0-0313.0.0;P-0-0314.0.0'
ConfigurationListMDTLength	10
PositionCommandValueOffset	0

Note: The order of the list's objects and its content have to be exactly as stated in the table above to work properly.

Note: On C1250-MI drives only 12 IDNs can be configured in an IDN-List

10.3.4 Configuration List including motor feedback parameters and Bipolar Torque Limit

If the Realtimechannel is configured with a list of IDNs the LinMot StatusWord, StateVar, the velocity feedback (S-0-0040), torque/force feedback (S-0-0084) the effective current (S-0-0389) and the bipolar torque limit (S-0-

0092) can also be mapped directly as part of the real-time process data. The Monitoring / Parameter channels are also mapped. These allow the configuration of arbitrary UPIDs to be transmitted / received in the process data.

Parameter	Value
TelegramType	7
PrimaryOperationMode	3
ConfigurationListAT	'S-0-0051.0.0;P-0-0100.0.0;P-0-0101.0.0;S-0-0040.0.0;S-0-0084.0.0;S-0-0389.0.0;P-0-0301.0.0;P-0-0302.0.0;P-0-0303.0.0;P-0-0304.0.0'
ConfigurationListATLength	17
PositionFeedbackValueOffset	0
ConfigurationListMDT	'S-0-0047.0.0;S-0-0092.0.0;P-0-0311.0.0;P-0-0312.0.0;P-0-0313.0.0;P-0-0314.0.0'
ConfigurationListMDTLength	11
PositionCommandValueOffset	0

Note: The order of the list's objects and its content have to be exactly as stated in the table above to work properly.

Note: On C1250-MI drives only 12 IDNs can be configured in an IDN-List

10.4 Identification

Identification of the LinMot drive is possible with all modes (0-4).

Vendor Information	
VendorCode	342 (0156h)
VendorDeviceID	'0150-1764' (E1250-SC-UC) '0150-1785' (E1450-SC-QN-0S) '0150-2357' (E1450-SC-QN-1S) '0150-1887' (C1250-SC-XC-0S-000) '0150-2349' (C1250-SC-XC-1S-000) '0150-1887' (C1250-SC-XC-0S-C00) '0150-2349' (C1250-SC-XC-1S-C00) '0150-30149' (C1250-MI-XC-0S-000) '0150-30169' (C1250-MI-XC-1S-000) '0150-30149' (C1250-MI-XC-0S-C00) '0150-30169' (C1250-MI-XC-1S-C00)

10.5 Code examples

This chapter provides sample code snippets in structured text for use with a PacDrive 3 system.

10.5.1 Homing

If StartHoming_PFC is set to 1, the homing procedure will be executed:

```
PROGRAM SR_Main
VAR
        i_stAxisId := DRV_SercDrv.stLogicalAddress;
        IDNDataOUT: DWORD;
        StartHoming_PFC: BOOL := 0;
        RetVAL: DINT;

END_VAR

...
// Start Homing via PFC
IF StartHoming_PFC THEN

        FC_ControllerEnableSet(i_stAxisId);

        RetVAL := FC_SercosWriteServiceData(
                i_stAxisId,
                148,
                7,
                ADR(IDNDataOUT),  // The Value of IDNDataOUT is not of importance and can be of arbitrary value
                4);

        StartHoming_PFC := 0;

END_IF
…
```

10.5.2 Write UPID (RAM value)

If StartWriteIDN is set to 1, the UPID will be written once:

```
PROGRAM SR_Main
VAR
        StartWriteIDN: BOOL := 0;
        RetVAL: DINT;
        i_stAxisId := DRV_SercDrv.stLogicalAddress;
        IDN: DWORD := 16#13A68000; // UPID 13A6h (Maximal Current)
        IDNDataOUT: DWORD := 3000; // Set Maximal Current to 3A
        NumBytetoWrite: WORD := 4; // write 4 bytes of data

END_VAR
...
// WriteIDN
IF StartWriteIDN THEN

        RetVAL:=FC_SercosWriteServiceData(
                i_stAxisId,
                IDN,
                5,
                ADR(IDNDataOUT),
                NumBytetoWrite);

                StartWriteIDN := 0;
END_IF
...
```

10.5.3 Read UPID (RAM value)

If StartReadIDN is set to 1, the UPID will be read once:

```
PROGRAM SR_Main
VAR
        StartReadIDN: BOOL := 0;
        RetVAL: DINT;
        i_stAxisId := DRV_SercDrv.stLogicalAddress;
        IDN: DWORD := 16#13A68000; // UPID 13A6h (Maximal Current)
        IDNDataIN: DWORD ; // read data value
        NumBytetoRead: WORD:= 4; // read 4 bytes of data
        ReadDataLen: UINT; // actual length of read data
        MaxReadDataLen: UINT; // actual maximum length of read data (i.e. max possible length of a string)

END_VAR

...
// ReadIDN
IF StartReadIDN THEN

        RetVAL:=FC_SercosReadServiceData(
                i_stAxisId,
                IDN,
                5,
                ADR(IDNDataIN),
                NumBytetoRead,
                ReadDataLen,
                MaxReadDataLen);

                StartReadIDN := 0;

END_IF
...
```

10.6 PLC programming example

An example project for Schneider Electric PACDrive PLCs, including a library with basic functions for LinMot drives, is available.
Please contact our support department for further information:

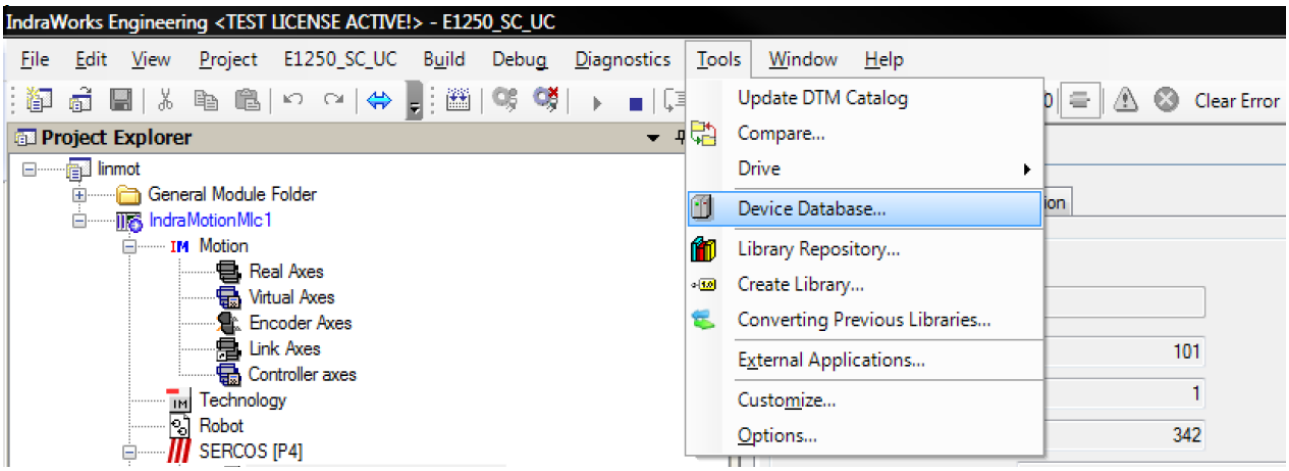
E-Mail: support@linmot.com
Phone: +41 (0)56 544 71 00
Skype: support.linmot

11 Commissioning with Bosch IndraLogic / IndraMotion PLCs

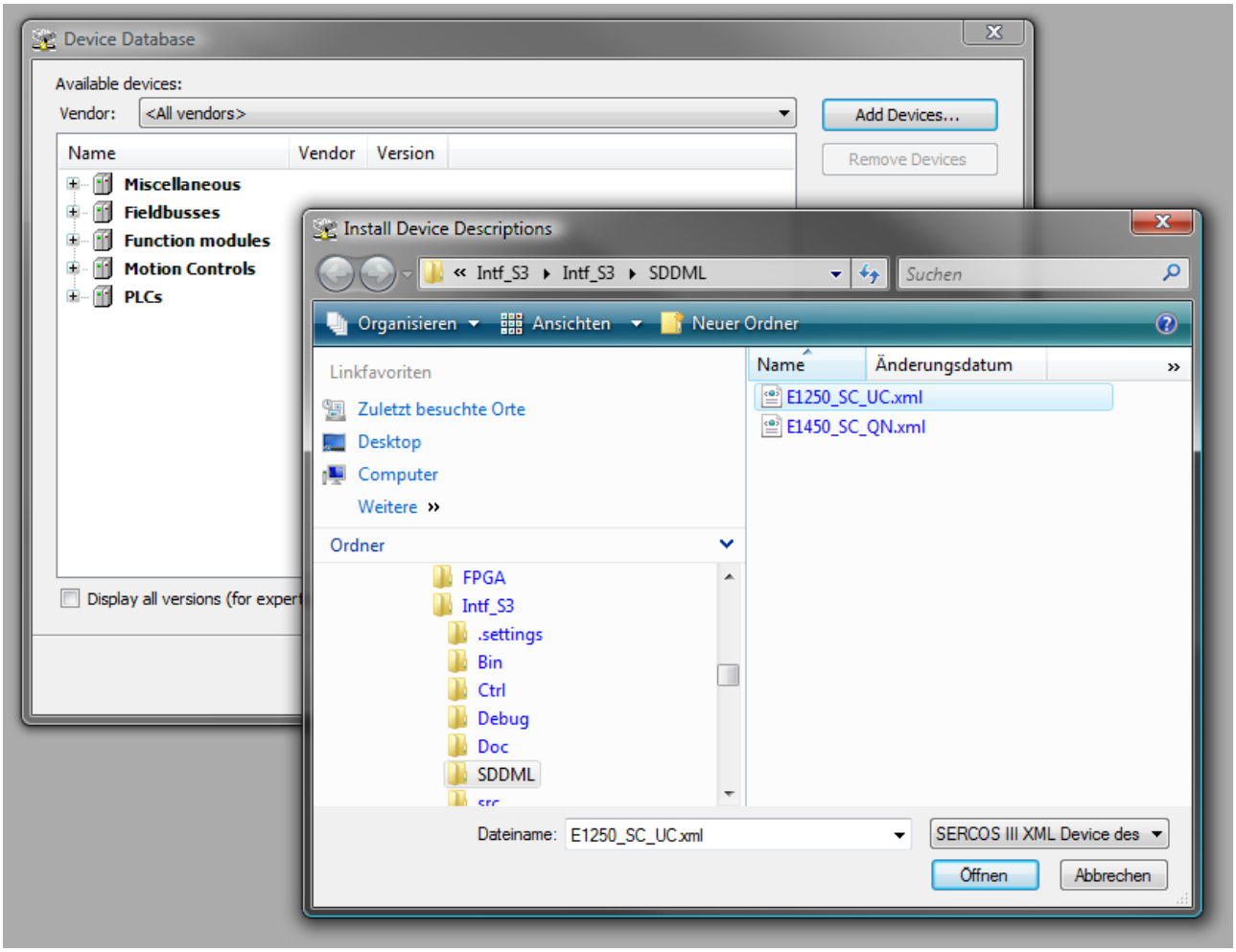
11.1 Integration as a sercos I/O device

11.1.1 Importing the SDDML-File

1. Open the device database:



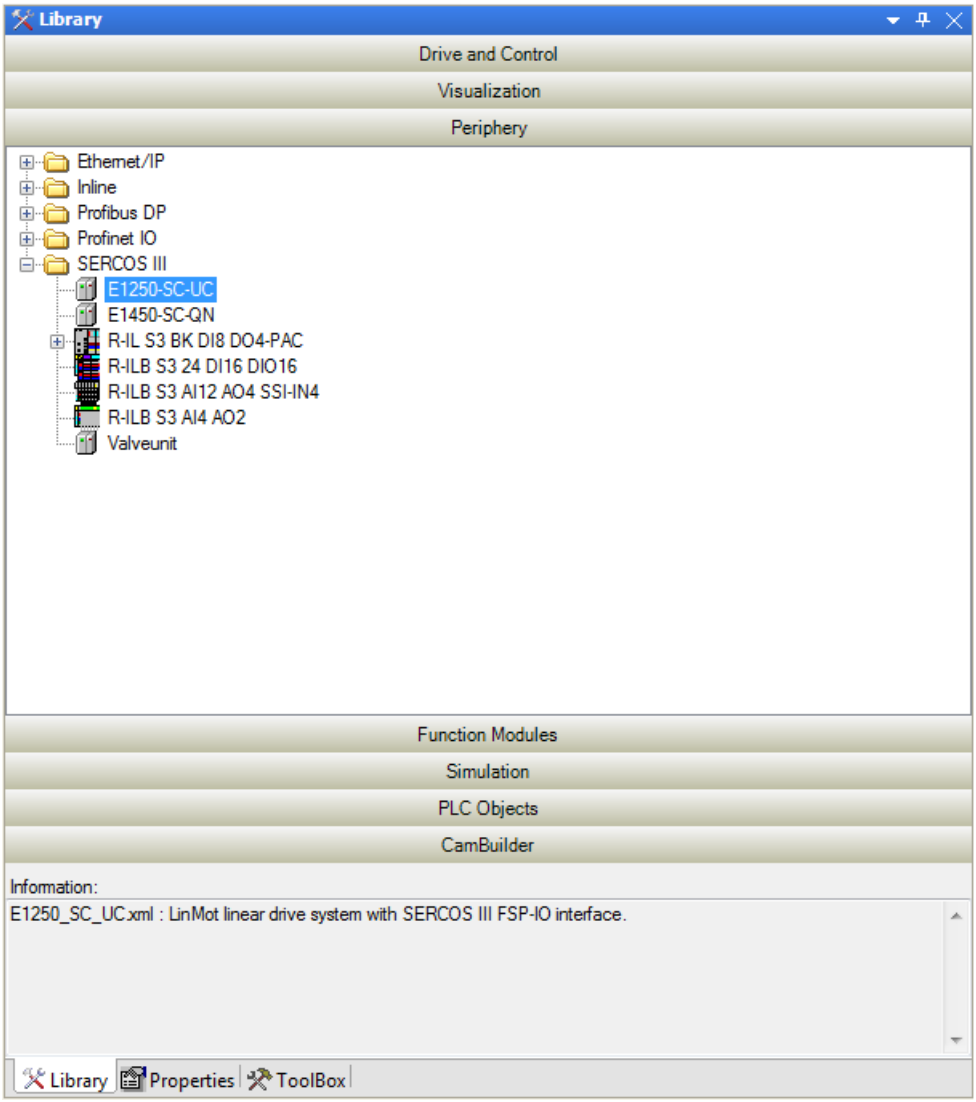
2. Add the LinMot device to the device database:



The SDDML-files are part of the LinMot-Talk installation. The default paths are:

“C:\Program Files\LinMot\LinMot-Talk x.x Build xxxxxxxx\Firmware\Interfaces\SERCOSIII\SDDML\”,
“C:\Program Files\LinMot\LinMot-Talk x.x Build xxxxxxxx\Firmware\Interfaces\SERCOSIII_ML\SDDML\”

3. The device is now available in the IndraWorks library:



11.1.2 PLC programming example

An example project for Bosch-Rexroth PLCs, including a library with basic functions for LinMot drives, is available.
Please contact our support department for further information:

E-Mail: support@linmot.com
Phone: +41 (0)56 544 71 00
Skype: support.linmot

11.2 Integration as a sercos drive

The LinMot C1250-SC-xx, C1250-MI-xx, E1250-SC-xx and E1450-SC-xx drives can also be integrated in an IndraLogic / IndraMotion system with the use of the SercosDrive object. This object uses the FSP_DRIVE profile and conforms to the sercos Pack Profile.

The drive is completely controlled using the the integrated functions and libraries from Bosch Rexroth which can be used with the SercosDrive object. For further information on using this object, please consult the according manuals from Bosch Rexroth.

12 Commissioning with Kistler maXYmos

12.1 General

- Depending on the Version of the maXYmos firmware, the parameter "Application Type (S-0-1302.0.3)" (UPID 2180h) has to be set to the value "2162" in order for the LinMot-Drive to work. Please restart both systems after changing the parameter.
- The integrated positioning sensor system in LinMot linear motors is not absolute. The motor thus needs to be homed after every powerup. Drive-based homing can be triggered via the appropriate functions in the Kistler maXYmos. the desired homing mode can be configured withe the LinMot-Talk SW.
- If several positioning commands are executed after one another, the next target position is loaded when the actual position is within the positioning window of the actual target position. The positioning window can be adjusted with the parameters found in "Motion Control SW -> Motor Configuration -> Monitoring -> Position Monitoring -> Status in Target Position" (UPIDs 1470h and 147Ch)
- If a noise deadband is configured (UPID 13A7h and 13BBh) the motor can stop before the target position is reached when it enters the noise deadband around the target position. This is dependant on the motor current needed to reach the target position.
- If the user wants to execute force controlled motions, it is highly advisable to configure an I gain in the PID controller (UPIDs 13A4h and 13B8h). If this is not done, the motor may not reach the target position/force.
- Acceleration / Deceleration of the movements can be adjusted with the values from the Predef VA/VAJ Interpolator (UPIDs 0x14BF and 0x14C0)

13 List of supported IDNs

13.1 sercos IDNs

IDN	Description	Validity (FSP_IO, FSP_Drive)
S-0-0011	Class 1 Diagnostic	Both
S-0-0012	Class 2 Diagnostic	Both
S-0-0014	Interface Status	Both
S-0-0015	Telegram type	FSP_Drive
S-0-0017	IDN-list of all operation data	Both
S-0-0021	IDN-list of invalid operation data for CP2	Both
S-0-0022	IDN-list of invalid operation data for CP3	Both
S-0-0030	Manufacturer version	Both
S-0-0032	Primary operation mode	FSP_Drive
S-0-0036	Velocity command value	FSP_Drive
S-0-0040	Velocity feedback value 1	FSP_Drive
S-0-0043	Velocity polarity	FSP_Drive
S-0-0044	Velocity data scaling type	FSP_Drive
S-0-0045	Velocity data scaling factor	FSP_Drive
S-0-0046	Velocity data scaling exponent	FSP_Drive
S-0-0047	Position command value	FSP_Drive
S-0-0051	Position feedback value 1	FSP_Drive

IDN	Description	Validity (FSP_IO, FSP_Drive)
S-0-0055	Position polarity parameter	FSP_Drive
S-0-0076	Position data scaling type	FSP_Drive
S-0-0077	Linear position data scaling factor	FSP_Drive
S-0-0078	Linear position data scaling exponent	FSP_Drive
S-0-0079	Rotational position resolution	FSP_Drive
S-0-0082[5 6]	Positive Torque Limit value	
S-0-0083[5 6]	Negative Torque Limit value	
S-0-0084[6]	Torque/Force feedback value	FSP_Drive
S-0-0085	Torque/Force polarity parameter	FSP_Drive
S-0-0086[6]	Torque/Force data scaling type	FSP_Drive
S-0-0092[5 6]	Bipolar Torque Limit value	FSP_Drive
S-0-0093	Torque/Force data scaling factor	FSP_Drive
S-0-0094	Torque/Force data scaling exponent	FSP_Drive
S-0-0095	Diagnostic message	Both
S-0-0099	Reset class 1 diagnostic	Both
S-0-0103	Modulo value	FSP_Drive
S-0-0116	Resolution of feedback value 1	FSP_Drive
S-0-0127	CP3 transition check	Both
S-0-0128	CP4 transition check	Both
S-0-0129	Manufacturer class 1 diagnostic	Both
S-0-0134	Drive control	FSP_Drive
S-0-0135	Drive status	FSP_Drive
S-0-0139	Parking axis procedure command	FSP_Drive
S-0-0142	Application Type	Both
S-0-0147	Homing parameter	FSP_Drive
S-0-0148	Drive controlled homing procedure command	FSP_Drive
S-0-0160	Acceleration data scaling type	Both
S-0-0161	Acceleration data scaling factor	Both
S-0-0162	Acceleration data scaling exponent	Both
S-0-0164	Acceleration feedback value 1	FSP_Drive
S-0-0181	Manufacturer class 2 diagnostic	Both
S-0-0187	List of configurable Data in the AT	Both
S-0-0188	List of configurable Data in the MDT	Both
S-0-0192	IDN-List of all backup operation data	Both
S-0-0256	Multiplication factor 1	Both
S-0-0262	Load Defaults procedure command[4]	Both
S-0-0277	Position feedback 1 type	Both
S-0-0389	Effective current	FSP_Drive

IDN	Description	Validity (FSP_IO, FSP_Drive)
S-0-0390	Diagnostic number	Both
S-0-0398	IDN list of configurable real-time bits as producer	Both
S-0-0399	IDN list of configurable real-time bits as consumer	Both
S-0-0403	Position feedback value status	FSP_Drive
S-0-0420	Activate parameterization level procedure command	Both
S-0-0422	Exit parameterization level procedure command	Both
S-0-0423	IDN-list of invalid data for parameterization level	Both
S-0-0434	Serial number motor	Both
S-0-1000.0.0	SCP type & version	Both
S-0-1000.0.1	Active SCP type & version	Both
S-0-1002	Communication cycle time (tScyc)	Both
S-0-1003	Allowed MST losses in CP3/CP4	Both
S-0-1009	Device control (C-Dev) offset in MDT	Both
S-0-1010	Lengths of MDTs	Both
S-0-1011	Device status (S-Dev) offset in AT	Both
S-0-1012	Lengths of ATs	Both
S-0-1013	SVC offset in MDT	Both
S-0-1014	SVC offset in AT	Both
S-0-1017	NRT transmission time	Both
S-0-1019	MAC address	Both
S-0-1020	IP address	Both
S-0-1021	Network mask	Both
S-0-1022	Gateway address	Both
S-0-1026	Version of communication hardware	Both
S-0-1027.0.1	Requested MTU	Both
S-0-1027.0.2	Effective MTU	Both
S-0-1035	Error counter port1 and port2	Both
S-0-1040	sercos address	Both
S-0-1044	Device control (C-Dev)	Both
S-0-1045	Device status (S-Dev)	Both
S-0-1046	List of sercos addresses in device	Both
S-0-1048	Activate network settings procedure command	Both
S-0-1050.x.01	Connection setup	Both
S-0-1050.x.02	Connection number	Both
S-0-1050.x.03	Telegram assignment	Both
S-0-1050.x.04	Max. length of connection	Both
S-0-1050.x.05	Current length of connection	Both
S-0-1050.x.06	Configuration list	Both

IDN	Description	Validity (FSP_IO, FSP_Drive)
S-0-1050.x.08	Connection control	Both
S-0-1050.x.10	Producer cycle time	Both
S-0-1050.x.11	Allowed data losses	Both
S-0-1050.x.20	IDN allocation of real-time bit	Both
S-0-1050.x.21	Bit allocation of real-time bit	Both
S-0-1051	Image of connection setups	Both
S-0-1300.0.1	Component name	Both
S-0-1300.0.2	Vendor name	Both
S-0-1300.0.3	Vendor code	Both
S-0-1300.0.4	Device name	Both
S-0-1300.0.5	Vendor device ID	Both
S-0-1300.0.7	Function revision	Both
S-0-1300.0.8	Hardware revision	Both
S-0-1300.0.9	Software revision	Both
S-0-1300.0.11	Order number	Both
S-0-1300.0.12	Serial number	Both
S-0-1300.0.13	Manufacturing date	Both
S-0-1300.0.20	Operational hours	Both
S-0-1301	List of GDP classes & version	Both
S-0-1302.0.1	FSP type & version	Both
S-0-1302.0.3	Application Type	Both
S-0-1350	Reboot procedure command	Both
S-0-1500.0.1	IO control	FSP_IO
S-0-1500.0.2	IO status	FSP_IO
S-0-1500.0.3	List of module type codes	FSP_IO
S-0-1500.0.5	IO container output data	FSP_IO
S-0-1500.0.9	IO container input data	FSP_IO
S-0-1500.0.32	IO Diagnostic message	FSP_IO

[4]Only the ROM Values of all UPIDs and IDNs are set to their default value. For them to become active, a system reset is necessary.
[5]SG6 Only
[6]Scaling method is set to percentage scaling (LSB = 0.1%)

13.2 Manufacturer specific IDNs

IDN	Description	Mappable in AT / MDT	Validity (FSP_IO, FSP_Drive)
P-0-0099	Reset Device[5]	MDT	Both
P-0-0100	LinMot StatusWord	AT	Both
P-0-0101	LinMot StateVar	AT	Both
P-0-0210	LinMot Config Module Control	MDT	Both

IDN	Description	Mappable in AT / MDT	Validity (FSP_IO, FSP_Drive)
P-0-0211	LinMot Config Module Index In	MDT	Both
P-0-0212	LinMot Config Module Value In	MDT	Both
P-0-0220	LinMot Config Module Status	AT	Both
P-0-0221	LinMot Config Module Index Out	AT	Both
P-0-0222	LinMot Config Module Value Out	AT	Both
P-0-0301	LinMot Monitoring Channel 1 Value	AT	FSP_Drive
P-0-0302	LinMot Monitoring Channel 2 Value	AT	FSP_Drive
P-0-0303	LinMot Monitoring Channel 3 Value	AT	FSP_Drive
P-0-0304	LinMot Monitoring Channel 4 Value	AT	FSP_Drive
P-0-0311	LinMot Parameter Channel 1 Value	MDT	FSP_Drive
P-0-0312	LinMot Parameter Channel 2 Value	MDT	FSP_Drive
P-0-0313	LinMot Parameter Channel 3 Value	MDT	FSP_Drive
P-0-0314	LinMot Parameter Channel 4 Value	MDT	FSP_Drive
P-0-0500	Stop Firmware Layers[6]	-	Both
P-0-0501	Start Firmware Layers[6]	-	Both
P-0-1000	Used FSP Type (0:FSP Drive, 1:FSP I/O)	-	Both
P-0-1234	Dummy IDN	-	Both

[5]Write anything to this IDN to initiate a device reset.
[6]Write the according bits to those IDNs to initiate stopping/starting of different FW layer parts.
The IDNs are automatically set back to 0 when the command is executed:
Bit 0: MC SW
Bit 1: INTF SW
Bit 2: APPL SW
i.e. write "5" to IDN P-0-0500 to stop the MCSW and the Application SW
Only available on SG6 devices.

13.3 IDN Structure and representation

Bit No.	Value	Description	Comments
31-24	0-255	Structure instance (SI)	-
23-16	0-127	Standard Structure element (SE)	-
	128-255	Product specific Structure element (SE)	-
15	0	Standard IDN (S-0-nnnn)	SE (0-127), SI and data block number determined by sercos
	1	Product specific IDN (P-0-nnnn)	Bits 31 to 0 determined by manufacturer
14-12	0-7	Parameter Set	-
11-0	0-4095	Data block number (if SI = SE = 0); Function group (if SI or SE is not 0)	-

Examples: S-0-0047 → 0000002Fh
S-0-1302.0.3 → 00030516h
P-0-0211 → 000080D3h

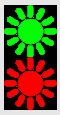
14 RT LEDs

C1250-SC

Error Codes		
	RT BUS ERROR  OK	
OK	**RT Bus Error**	**Description**
On	-	**Drive in CP 4**
Off	-	**Drive not in CP 4**
Flashing	-	**Drive in CP4 and in Loopback Mode:** Drive is at the end of a line and one of the ports is in loopback-mode.
-	On	**C1D Error:** One or more of the error bits in the C1D (S-0-0011) are set.
Flashing	Flashing	**Communication Warning:** Number of missed MST > S-0-1003

C1250-MI

Error Codes		
L3	L3  L4	
Color	**State**	**Description**
 (green)	On	**CP4:** Communication phase 4: Normal operation, no error
 (green)	Flashing (2 Hz)	**Loopback:** The network state has changed from „fast-forward“ to „loopback“
 (green/orange)	Flashing (1 x green/3s)	**CP3: Communication phase 3**
	(2 x green/3s)	**CP2: Communication phase 2**
	(1 x green/3s)	**CP1: Communication phase 1**

Error Codes		
 (orange)		**CP0: Communication phase 0**
 (orange/green)	Flashing (2 Hz)	**HP0:** Hot-plug mode
	(1 x orange/3s)	**HP1:** Hot-plug mode
	(2 x orange/3s)	**HP2:** Hot-plug mode
 (orange)		**Identification:** Invoked by Bit15 in the Device Control or SIP Identification Request
 (green/Red)	Flashing (2 Hz, min. 2s)	**MST losses ≥ (S-0-1003/2):** The communication warning is present in the device status
 (red/orange)	Flashing (2 Hz)	**Application error (C1D):** See GDP & FSP Status codes class error
 (red)	Flashing (2 Hz)	**Watchdog error:** Application is not running
 (red)	On	**Communication Error (C1D):** Error detected according to Sercos third generation Class 1 Diagnosis, see SCP Status codes class error
	Off	**NRT-Mode:** (Non Real-Time Mode) No Sercos Communication
	L4	

Error Codes		
-	-	This LED is not used

15 Interface Error Codes

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

Error Code	Error Description	Recommended Actions
C0h	Cfg Err: Invalid sercos Address	The defined sercos address with S1 & S2 is not in the valid range of 1..511

16 Troubleshooting

16.1 Analyzing Traffic in sercos Networks

To analyze the data traffic in a sercos network, the use of a network protocol analyzer is strongly recommended.
The Sercos Monitor is a free tool that allows a comprehensive and detailed analysis of the data traffic in Sercos III networks, easing development, testing and troubleshooting. More Information can be found here:
http://www.sercos.com/technology/sercos_monitor.htm

Attention: When using a network interface from a personal computer, make sure that any other protocols such as TCP/IP etc. are disabled for this interface. Transmission of any unwanted data frames from the personal computers operating system may lead to unpredictable behavior and/or errors in a connected sercos node.

16.2 Frequent Problems and Solutions

Problem	Possible Solution
Drive was not found by PLC	• Make sure that all the wiring is done correctly. Afterwards power down all devices including the PLC and start them up again.
Drive does not start up to CP4	• Make sure that all connected sercos devices have unique addresses when using this addressing mode. • Make sure that the topological addresses are configured correctly when using this addressing mode. • Make sure that the application type Strings (S-0-1302.0.3) are unique on all devices when using this addressing mode. • Make sure that the drive serial numbers are configured correctly on all devices when using this addressing mode.

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