

LinMot[®] Rockwell Automation[®] Motion

Application Note / How-to



© 2022 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

Table of Contents	3
Attachments / File List	6
Version History	7
Use of This Document	8
General	8
Recommended Documentation	9
LinMot	9
Rockwell Automation	9
1 System Overview	10
1.1 Network Topology	
1.2 Comparison	11
1.3 Limitations	11
2 Configuration and Connection of the LinMot Drive(s)	12
2.1 Configuration and Connection of the LinMot Drive	
2.2 Motor Configuration	
2.3 EDS Files	
2.4 EtherNet/IP Connection	
2.5 IP Address	
3 Controller Setup EtherNet/IP	14
3.1 RSLinx Classic	
3.2 Add a LinMot Drive to the I/O configuration using the EDS file	
4 Controller Overview	18
4.1 Task: p10ms	
4.1.1 Program: MainProgram	
4.1.2 Program: LMAxis1_Init & LMAxis2_Init	
4.2 Task: z_MotionGroupUpdate	
4.2.1 Program: LMAxis1_Lin_CmdPos & LMAxis2_Rot_CmdPos	
4.3 Motion Group: MotionGroup	
4.3.1 Add virtual axis (linear)	24
4.3.2 Add virtual axis (rotary)	
4.3.3 Absolute Position Sensor	
4.4 I/O Device: LMDrive	
5 Instructions	33
5.1 Overview	
5.2 Instruction Signatures	
5.3 Data Types	
5.3.1 tstLM_Axis	
5.4 Read and Write Instructions	
5.4.1 LM_LMDriveEDS_Read_78_64	
5.4.2 LM_LMDriveEDS_Write_78_64	
5.5 Motion State Instructions.	
5.5.1 MOTION Servo On (LM_MSO)	
5.5.2 Motion Servo Uff (LM_MSF)	
5.5.3 MOUON AXIS FAUIT RESET (LIM_MAFR)	
5.0 MIOLION MOVE INSTRUCTIONS	
5.6.2 CID Sume Command Desition (LM_AD) (CredDesition)	
5.0.2 GP Sync Command Position (LM_ADV_CMdPosition)	
5.0.3 GP Sync PVA Streaming (LIVI_ADV_PVATIME)	
0.0.4 INIOLION AXIS REDENINE POSILION (LIVI_IVIRPV)	

5.7 LinMot Parameter Instructions	
5.7.1 Read Parameter (LM_ParameterRead)	
5.7.2 Write Parameter (LM_ParameterWrite)	45
5.7.3 LinMot Drive Status (LM_DriveStatus)	
5.8 LinMot Config Instructions	
5.8.1 Config Assembly Init (LM_CFG_CAInit)	47
5.8.2 Get Error Text (LM_CFG_GetErrorText)	
5.8.3 Get String by UPID (LM_CFG_GetStringByUPID)	
5.8.4 Get Modified UPID List (LM_CFG_GetModUPIDList)	51
5.8.5 Write UPID List (LM_CFG_WriteUPIDList)	
5.8.6 Stop Start Default (LM_CFG_StopStartDefault)	53
5.8.7 Command Table Access (LM_CFG_CTAccess)	54
5.8.8 Curve Access (LM_CFG_CurveAccess)	55
5.9 Optional Instructions: Force / Torque Control	
5.9.1 Force / Torque Control Change Target Force (LM_FC_FCCTF)	
5.9.2 Force / Torque Control Standstill Tara (LM_FC_FCST)	
5.9.3 Go To Position Tara Diff Analog In -1010V (LM_FC_GTPT)	60
5.9.4 Go To Position Force / Torque Control High Limit (LM_FC_GTPFCHL)	
5.9.5 Go To Position Force / Torque Control Low Limit (LM_FC_GTPFCLL)	63
5.9.6 Go To Position Reset Force Control (LM_FC_GTPRFC)	64
5.10 Optional Instructions: Motion Move Instructions known from LinMot -IP Drives	
5.10.1 Motion Axis Stop (LM_MAS)	65
5.10.2 Motion Axis Home (LM_MAH)	
5.10.3 Motion Axis Jog (LM_MAJ)	67
5.10.4 Motion Axis Move (LM_MAM)	
5.10.5 Motion Axis Increment Actual Position (LM_MAIAP_I0)	
5.10.6 Motion Axis Time Curve (LM_MATC)	
5.10.7 Motion Axis Start Command Table (LM_MASC)	
5.10.8 Clear Event Evaluation (LM_ADV_CEE)	
6 Error Descriptions	74
6.1 Motion Instructions Errors	
6.2 Configuration Instructions Errors.	
7 Optional Example Programs	
7.1 Functionality Beside Synchronized Motion	
7.2 Example Projects for Non-Synchronized Motion	
7.2.1 CM Drive (C1250-CM, C1250-MI, C1251-MI)	
7.2.2 IP Drive (C1250-IP, E1250-IP) as AOP	
7.2.3 IP DIVE (C1450-IP, E1450-IP) as EDS	
Appendix I: LinMet Telk Configuration over EtherNet/IP	
9 Appendix I: Linwol-Tark Configuration over EtherNet/IP	01 21
9.1 Login with static IF address	
9.1.1 Settings on the PC	
9.1.2 Settings on the FC	
9.1.5 Login with dynamic IP address (DHCP)	
9.2 Login with dynamic in address (Diror)	04 ۵۸
9.2.1 Setting on PC	04 &5
9.2.2 Coding of F C.	20 AQ
9 3 IP address configuration with BOOTP/ DHCP Server	
9.3.1 Settings on the LinMot Drive	
9.3.2 Using the Software BOOTP/ DHCP Server	



Contact & Support	
Notes	94
10.2.2 Gear	
10.2.1 Homing	
10.2 Controller Logic	
10.1.1 Decrease Go to Initial Position Speed and Acceleration	
10.1 Drive Settings	
10 Appendix II: Master / Gantry System	92
9.3.3.1 Change the IP settings in the LinMot-Talk Software	91
9.3.3 Login with LinMot-Talk	
9.3.2.1 Search for the LinMot Drive in the Network	



Attachments / File List

The package of which this documentation is part of should contain the following files and folders:

General (documentation and demo projects):

\0185-0105-E_1V4_AN_LinMot_Rockwell_CIPSyncMotion.pdf \CIPSync_Demo_L320ERM_2Axes_V34_20220420.ACD \CIPSync_Demo_L320ERM_2Axes_V30_20220420.ACD

Instructions:

\AOI\

> Instructions as single exports

Program exports: \Exports\

ts\	
\p10ms	> Program exports of the p10ms task
\z_MotionGroupUpdate	> Program exports of the z_MotionGroupUpdate task
\Optional	> Example program exports for optional functionality

Drive EDS files:

\EDS\

- C1250-CM-XC-0S.eds
- C1250-CM-XC-1S.eds
- C1250-MICM-XC-0S.eds
- C1250-MICM-XC-1S.eds
- C1251-MICM-XC-2S.eds

Non motion demo projects:

\Misc\

- CM_EDS_NoMotion_Demo_L320ERM_V34_20220420.ACD
 > No motion demo for CM drives
- IP_AOP_NoMotion_Demo_L320ERM_V34_20220420.ACD
 > No motion demo for IP drives (C1250-IP)
- IP_EDS_NoMotion_Demo_L320ERM_V34_20220420.ACD
 > No motion demo for IP drives (E1250-IP, C1450-IP, E1450-IP)



Version History

Version	Date	Author	Description
1V0	March 20 th , 2019	fj	Initial Version
1V1	August 27 th , 2019	fj	- Optimized LM_ADV_PVATime: Integrated ADD64 instruction - Added PVAStatus flag in UDT tstLM_Axis which indicates whether virtual and physical axis are coupled or not
			 Added a new instruction where the EDS read&write and the PVATime instructions are nested (LM_ADV_CmdPosition)
			- Added force/torque control instructions
			 Added several instructions known from IP drives.
			 Moved CAInit instruction to the periodic task and cleaned code
			- Simplified demo project
			- Updated documentation
			- Added program exports to the package > check \Exports\
			- Corrected tag name in UDT: tstLM_Axis.ActualPosition
1V2	September 23 rd , 2019	fj	 LM_ADV_PVATime: PVAStatus was not always correctly reset
			 LM_LMDriveEDS_Read_78_64: Added CfgRWActive flag watchdog
			- LM_MAM: Added move types 2, 3 and 4
			- Added new instructions: LM_CFG_CTAccess & LM_CFG_CurveAccess
1V3	November 5 th , 2020	fj	- LM_MAM: added profile 3 (Sine) for move types 0 (absolute) and 1 (incremental)
			- LM_MAS: fixed wrong decelRate scaling
			 Added instruction LM_CFG_GetStringByUPID
			 Added instructions to support C1250-IP drives integrated using AOP (NO SYNCHRONIZED MOTION and with limitations!). LM_LMDriveAOP_Read_IP & LM_LMDriveAOP_Write_IP. No documentation of this instructions but an example project is available.
	September 6 th , 2021	fj	- Added note in chapter 5.6.3 CIP Sync PVA Streaming (LM_ADV_PVATime)
1V4	July 07 th , 2022	fj	- Added LM_MAH_MG instruction (2.0) support for master gantry homing on E1250-IP & E1450-IP drives
			 Added LM_LMDriveEDS_Read_IP instruction (2.0) support for E1250-IP & E1450-IP drives (EDS file import)
			- Added LM_LMDriveEDS_Write_IP instruction (2.0) support for E1250-IP & E1450-IP drives (EDS file import)
			- Added LM_LMDriveEDS_Write_IP_As27 instruction (2.0) support for E1250-IP & E1450-IP drives as Slave axis (EDS file import, ControlWord not transmitted)
			- Added LM_FC_FCST (2.0, force control standstill tara)
			- Added LM_FC_GTPT (2.0, go to pos tara)
			 Added LM_FC_FCCITF (2.0 preliminary, force/torque check in target force/torque)
			 Added instructions to read/write the drive configuration
			 LM_CFG_StopStartDefault: Fixed Mode 0 (Reboot) (version 2.0 > 2.1)
			- Added support for C1250-MI and C1251-MI (EDS files)
			- Updated example projects
			- Updated documentation
			- Updated/removed links in chapter Rockwell Automation



Use of This Document

Description:	LinMot [®] Rockwell Automation [®] Motion CIP Sync Demo
Drive:	C1250-CM-XC-0S-x00 C1250-CM-XC-1S-x00 C1250-MI-XC-1S-x00 C1251-MI-XC-2S-x00 All LinMot -IP drives (No CIP Sync Motion supported! Check chapters 7.2.2 and 7.2.3)
Classification:	[x] Application Note [] Installation Guide [] User Manual [] Documentation [] LinMot internally
Status:	Release

General

This application note shows how a LinMot CM interface (EtherNet/IP interface, e.g., C1250-CM-XC-xS drive) can be integrated and setup in a Rockwell Automation environment as a motion axis for coordinated motions.

Nevertheless, there are also instructions available (see chapters 5.9 and 5.10) that allow direct control of the physical axis.

Example projects can be downloaded from: <u>http://download.linmot.com/plc_lib/examples/Rockwell_CM/</u> (CIPSync_Demo...)

Components used:

- LinMot C1250-CM-XC-0S-000 (article number 0150-2900) with firmware 6.8 Build 20190315
- Allen-Bradley 5069-L320ERM CompactLogix[™] 5380 Controller, Revision 30.011
- Studio 5000 Logix Designer Version 30.01.00 Professional Edition



!!! Mandatory Prerequisites !!!

- Rockwell Automation controller revision must be V30 or later
- LinMot drive firmware must be 6.8 Build 20190315 or later
- LinMot drive firmware must be 6.11 Build 20220628 or later to use all functions



Hint:

The LinMot Drive is connected to a virtual axis. Virtual axes do not consume a motion axis. In principle, a Rockwell Automation controller without motion (-M) can be used.



Recommended Documentation

LinMot

Reading the following user manuals is essential to understand the communication between the Rockwell Automation controller and the LinMot drive. The manuals are included in the LinMot-Talk software (*Menu Manuals* \rightarrow *All Documents* or *Relevant Documents* if logged in to a drive) or can be downloaded from the LinMot eCatalogue (search by document reference): <u>http://shop.linmot.com</u>

User Manual	Document Reference
LinMot-Talk	<u>0185-1059</u>
Motion Control Software SG5 – SG7	<u>0185-1093</u>
Ethernet/IP CIP Sync	<u>0185-1165</u>
Drive Configuration Over Fieldbus SG5 – SG7	<u>0185-1074</u>
Application Notes	Document Reference
HT Config over Realtime	<u>0185-0142-E</u> / <u>0185-0142-D</u>
HT Oscilloscope	<u>0185-0132-E</u> / <u>0185-0132-D</u>
HT Position Loop Tuning	<u>0185-1156-E</u> / <u>0185-1156-D</u>
HT Closed Loop Force/Torque Tuning	<u>0185-0144-E</u> / <u>0185-0144-D</u>

Tools	Manuals	Help			
near_Axi	Para	meters and Variables	۲	🔶 OEF 📑 ᄣ 🔖 🖬 🍳 🖾 🏚 🗖 💼 🝳 🐉 🖇 🚺	
	Erro	rs		Value	
3)	Mot	tion Commands		C1250CMXC0S/V1RF	
	Rele	vant Documents	Þ	1185-1059-E_6V7_MA_LinMotTalk.pdf	
	All E	Documents	•	1185-1063-D_6V7_IG_Drives_C1250.pdf	
L		Article Number		0185-1063-E_6V11_IG_Drives_C1250.pdf	
		Firmware Release		1185-1093-E_6V7_MA_MotionCtrlSW-SG5-SG7.pdf	
MC File Name INTF File Name APPL File Name			1185-1055-E_1V12_MA_EC-Motors-with-LinMot-Drives.pdf		
			1185-1096-D_1V2_MA_TF_ForceControl.pdf		
			0185-1096-E_1V2_MA_TF_ForceControl.pdf		
				1165-1165-E_5V0_MA_EtherNet-IP.pdf	
				1185-1074-E_1V3_MA_Drive-Configuration-Over-Fieldbus-SG5-SG7.pdf	

Rockwell Automation

The following is an excerpt of the Rockwell Automation literature library concerning EtherNet/IP, CIP Sync, Motion, switches, and network architectures.

Design and Implementation Guides:

https://literature.rockwellautomation.com/idc/groups/literature/documents/qr/iasimp-qr019_-en-p.pdf https://literature.rockwellautomation.com/idc/groups/literature/documents/wp/enet-wp035_-en-p.pdf

Integrated Architecture and CIP Sync Configuration: https://literature.rockwellautomation.com/idc/groups/literature/documents/at/ia-at003 -en-p.pdf

Stratix[®] Switches:

https://literature.rockwellautomation.com/idc/groups/literature/documents/um/1783-um007_-en-p.pdf

OEM Network Guidelines:

https://literature.rockwellautomation.com/idc/groups/literature/documents/rm/enet-rm001_-en-p.pdf https://literature.rockwellautomation.com/idc/groups/literature/documents/rm/enet-rm002_-en-p.pdf

Troubleshoot EtherNet/IP Networks:

https://literature.rockwellautomation.com/idc/groups/literature/documents/at/enet-at003 -en-p.pdf

Integrated Motion on the EtherNet/IP Network: Configuration and Startup https://literature.rockwellautomation.com/idc/groups/literature/documents/um/motion-um003_-en-p.pdf



1 System Overview

1.1 Network Topology

The same network limitations for Rockwell Automation motion drives must be considered for LinMot drives. (Check the chapter recommended documentation > Rockwell Automation).

It is recommended to use a dedicated switch port for the LinMot drives.

A potential network topology is shown below.

In this application note two LinMot C1250-CM-XC-0S-000 drives are connected to a Rockwell Automation CompactLogix[™] L320ERM controller.





1.2 Comparison

The following table shows a comparison between the actual integration developed by LinMot & Rockwell Automation and between CIP Motion

	LinMot CIP Sync Motion	CIP Motion
Logix Version	V30 or later	V19 or later
Motion Update Rate	CUP min. 1ms	CUP min. 0.5ms
Configuration	Logix & LinMot-Talk	Logix
High network load?	no influence	no influence
Late packets?	no impact	no impact
Network topology	Integration in normal motion topology possible	Integration in normal motion topology possible
Actual values (D2C)	Actual values not synchronized with motion planner	Actual values synchronized with motion planner
Motion command (C2D)	Motion command synchronized with other motion	Motion command synchronized with other motion
DeviceLevelRing (DLR)	supported	supported
IEEE1588 – PTP V2	supported	supported

1.3 Limitations

- This is an application-based solution. LinMot CIP Sync Motion does not provide full CIP Motion integration!
- LinMot-Talk software required to configure drive/motor/tuning
- No CUR less than 1-2ms (up to processor generation L8/L7)
- No time changes during motion allowed (same with Kinetix[®] -> see KB or manuals¹)
- No ethernet topology changes (grandmaster change) during motion allowed
- Managed switch (Stratix[®] 5700/5400 -> CGP/CGN) recommended

¹ <u>https://rockwellautomation.custhelp.com/app/answers/detail/a_id/730060/page/1</u>

2 Configuration and Connection of the LinMot Drive(s)

2.1 Configuration and Connection of the LinMot Drive

The LinMot drive is configured using the LinMot-Talk software: http://www.linmot.com/download/linmot-talk-drive-configuration/

To login into the drive over Ethernet see chapter 9 Appendix I: LinMot-Talk Configuration over EtherNet/IP.

2.2 Motor Configuration

.inMot®

It is assumed that the motor connected to the drive is already configured.



Use the *Motor Wizard* inside LinMot-Talk to setup the motor (Menu -> Drive -> Motor Wizard):





Note:

If there is any doubt, reset the drive to default values and then configure the motor with the motor wizard. Be sure to save your actual configuration before this step!

Set drive to default values (E1100, E1200, E1400, B8050, MB8050, C1100-GP and C1250): Remove 24V supply from drive. Set both address selectors (S1 and S2) either rotary hex switches to F or all dip switches to 1 Restore 24V power to drive. The ERROR and WARN LEDs should blink alternately. Set both address selectors (S1 and S2) to 0. Wait until EN and WARN led blink together. Remove and restore 24V power to drive.

<u>Set drive to default values (C1x00, E1200 und E1400 series drives only):</u> In the LinMot-Talk Software the parameters can defaulted by selecting the "DEF" button:

🛅 t 🕽 🕀 🖂 😂 🖨 🗑	🛃 🛛 Lin1 on COM20 (USER)	💶 🕨 🗖	: 🔢 🌾 🧇	19 🕺 🗈 👍
Project	ü		🗸 🗡	C DEF
Control Panel	Name	Value	Raw Data	UPID ype
Parameters	🖃 OS			•
🔽 🛛 🍕 Variables	Motion Control SW			
	Ethernet/IP Intf			



2.3 EDS Files

Install the EDS file(s) that is part of the LinMot-Talk software/firmware you are using with the Rockwell Automation software "EDS Hardware Installation Tool":



The most recent device files are always part of the newest LinMot-Talk software. They are located by default:

EtherNet/IP: \\LinMot-Talk X.X Build XXXXXXX\Firmware\Interfaces\EtherNetIP_NX\EDS

2.4 EtherNet/IP Connection

The drive is connected to the EtherNet/IP network using the X17 & X18 connectors.

X17 – X18	RealTime Ethernet 10/100 Mbit/s
	X17 RT ETH In
	X18 RT ETH Out
RJ-45	

2.5 IP Address

The default IP address is 192.168.001.xxx, where the last byte xxx is defined via the two address selectors S1 & S2. S1 sets the high and S2 the low digit. E.g., S1 = 5, S2 = A -> 5A (hex) = 90 (dec) -> IP = 192.168.1.90





Attention:

The switch value **S1 = S2 = 0 (factory default setting)** is a special configuration which acquires the IP address via DHCP (e.g., for use with the BOOTP-DHCP Tool from Rockwell Automation)!



Note:

To set the IP address by parameter (assign a static IP address) login to the drive using LinMot-Talk. *Parameters > EtherNet/IP Intf > EtherNet Configuration*



3 Controller Setup EtherNet/IP

3.1 RSLinx Classic

After setting the IP address the new LinMot device should appear in RSLinx Classic as "Unrecognized Device".

If the EDS file is already installed, the LinMot drives will appear in RSLinx with its Device Type (e.g., IP 192.168.1.2).

🇞 RSLinx Classic Lite - [RSWho - 1]					
File View Communications Station	DDE/OPC Security	Window Help			
** \$* @					
Autobrowse Refresh	Browsing - node 192.168	.1.3 found			
	Address	Device Type	Online Name	Status	
표···· - · · · · · · · · · · · · · · · ·	192.168.1.153	5069-L320ERM LOGIX320ERM	5069-L320ERM/A	ОК	
🖻 器 AB_ETHIP-1, Ethernet	192.168.1.2	C1250-CM-XC-0S	C1250CMXC0S	OK	
🕀 🗐 192.168.1.153, 5069-L320ERM	192.168.1.3	C1250-CM-XC-0S	C1250CMXC0S	OK	
192.168.1.2, C1250-CM-XC-05					
192.168.1.3, C1250-CM-XC-05					



3.2 Add a LinMot Drive to the I/O configuration using the EDS file

1. The EDS files can be installed using the EDS Hardware Installation Tool:



Follow the wizard and install the EDS files from the location mentioned in chapter 2.3.

2. Add a new module by right clicking on Ethernet in the I/O configuration in the controller organizer:

💰 Logix Designer -	CompactLogixL18ER	M_App in LM_AOI_	Set_LogixV2
🛱 File Edit View	w Search Logic	Communications	Tools V
1 🖻 🖬 🎂	※ 🖻 💼 🕫 🤇	⊃⊮ errorid	
Offline No Forces No Edits	RUN OK Energy Storage I/O		Path: AB_I
Controller Organ	nizer er CompactLogixL18E Groups Instructions bes Model figuration tIO met New Module Discover Modules	RM_App ER	<u>- д ×</u> М_Арр



3. Choose the drive you want to add, and select "Create":

inmot			Clear Filters	Hide Filters 余
Module Typ 20 - Comm-t Analog CIP Motion	be Category Filters ER Safety Track Section		 Module Type Vendor Filters Advanced Energy Industries, Inc. Bray International, Inc Buerkert Fluid Control Systems Connex Composition 	
< Communicat	uon		Cognex Corporation	>
Catalog Number	Description C1250-CM-XC-0S	Ven LinMot	Category Generic Device (keyable)	^
LMDrive LMDrive LMDrive	C1250IPXC0S Servo Drive C1250IPXC1S Servo Drive	LinMot LinMot LinMot	Communication	
LMDrive LMDrive	C1250-MICM-XC-0S C1250-MICM-XC-1S C1251-MICM-XC-2S	LinMot LinMot LinMot	Generic Device (keyable) Generic Device (keyable) Generic Device (keyable)	

4. Open the properties of the module and set Name & Ethernet Address in the General tab:

General					
Type: Vendor: Parent: Name:	LMDrive C1250 LinMot Local LMAxis1)-CM-XC-0S		Ethernet Address	
Description:			~	 IP Address: Host Name: 	
Module Defin	ition				
Revision:		1.001			
Electronic Ke	eying:	Compatible Module			
Connections	s:	Exclusive Owner, CIP Sync, 0 Change	x e		



5. In the Connection tab set the RPI:

C	onnection						
	Name	Requested	Packet Interval (RPI) (ms)	Connection over EtherNet/IP	Input Trigger		
	Exclusive Owner, CIP Sync, 0x78/0x64	3.0 ≑	1.0 - 3200.0	Unicast 🗸	Cyclic	\sim	
	Inhibit Module						
	Major Fault On Controller If Connection Fails While in Run Mode						
	Module Fault						



Attention:

Set the RPI a little longer than the update period of the motion group base. The recommended RPI is the **Motion Group Update Period + 1ms**. E.g., 2ms + 1ms = **3ms**.

6. In the *Configuration* tab leave all values at 0 (zero). They are set by the LM_CFG_CAInit instruction. It is very important to setup the corresponding MESSAGE correctly > see chapter 4.1.2

	DΔ	Name	Value	Units	Style	
* (32	StreamPeriod	0		Decimal 🧹	Strea
* :	33	TimingModel	0		Decimal 🤍	Timin
* 4	44	CFG_ParMonChannelConfigID	0		Decimal 🧹	
- 4	45	ParamChannelUPID_0	0		Decimal 🗸	
- 4	46	ParamChannelUPID_1	0		Decimal 🗸	
- '	47	ParamChannelUPID_2	0		Decimal 🗸	
- 4	48	ParamChannelUPID_3	v 0		Decimal 🗸	
- 4	49	MonChannelUPID_0	0		Decimal 🗸	
	50	MonChannelUPID_1	0		Decimal 🗸	
	51	MonChannelUPID_2	✓ 0		Decimal 🗸	
	52	MonChannelUPID_3	✓ 0		Decimal 🧹	
* (65	MCSW_MaximalCurrentPositiveActive	✓ 0		Decimal 🗸	
* (66	MCSW_MaximalCurrentNegativeActive	0		Decimal 🧹	



4 Controller Overview

The following image shows the Controller Organizer of the LinMot CIP Sync Demo project.





Attention:

- Rockwell Automation controller revision must be V30 or later
- LinMot drive firmware must be 6.8 Build 20190315 or later



Note:

All programs shown in the following chapters are available as single program exports in the folders *\Exports\p10ms* and *\Exports\z_MotionGroupUpdate*



4.1 Task: p10ms

The **p10ms** task is the normal controller task where the general logic is implemented.

4.1.1 Program: MainProgram

The LinMot virtual axes (vLMAxis1_Lin and vLMAxis2_Rot) can be controlled in the **MainRoutine** with Rockwell motion commands and are coupled to the LinMot drives through the LM_ADV_CmdPosition AOI.

The virtual master axis (Master) is controlled in the **MainRoutine** through jogging. A CAM curve (MAPC) can be used to synchronize the LinMot virtual axes to the virtual master axis.

Task Properties:

🗳 Task Properties - p10ms 💿 💽 💌					
General Config	uration Program Schedule Monitor				
Туре:	Periodic				
Period:	10.000 ms				
Priority:	9 (Lower number yields higher priority)				
Watchdog:	500.000 ms				
Disable auto	omatic output processing to reduce task overhead				
🔲 Inhibit task					
	OK Abbrechen Übernehmen Hilfe				

In the sub-routine **LMAxis_Control** the LinMot instructions for the LinMot drives like LM_MSO, LM_MSF, LM_MAFR, LM_MRPv and LM_MAHv are called.

The virtual axis is homed at the same time as the LinMot physical axis using the LM_MAHv instruction (rung 3).

		Motion Axis Home (LinMot) and Motion Axis Home (Virtual Axis)						
- Homes the LinMot Axis and the Virtual Axis - Afterwards the LinMot physical axis is coupled with the Virtual Axis in the routineCmdPosition in task z_MotionGroupUpdate								
LMAxis_Home.1	LIM_MAHV LimMot Motion Axis Home & Virtual LM_MAHV_MI_LMAxisMAHV[1] Axis LMAxis01 (CN) <lmaxis1> VirtualAxis vLMAxis01 (P) <vlmaxis1_lin> Signature ID: B45F6928</vlmaxis1_lin></lmaxis1>	VLMAxis1_Lin_CmdPos.LMAxis_EnableStreaming ML_LMAxisMAHv[1].PC	VLMAxis1_Lin_CmdPos.LMAxis_EnableStreaming					
LMAxis_Home.2	LM_MAHv LinMot Motion Axis Home & Virtual LM_MAHv ML_LMAxisMAHv[2] Axis LMAxis02 (CN) VirtualAxis CN> (CR)	LLMAxis2_Rot_CmdPos.LMAxis_EnableStreaming MI_LMAxisMAHv[2].PC	LMAxis2_Rot_CmdPos.LMAxis_EnableStreaming					

After homing is completed, streaming is enabled and the LinMot physical axis is coupled with the virtual axis.



4.1.2 Program: LMAxis1_Init & LMAxis2_Init



Attention: The correct setup of the configuration assembly is essential for a working application.

The **Init** sub-routine is very important as it sets the required parameters for time synchronization and unit scaling.

That happens once at system start/restart when the connection to the LinMot drive is established. (Hint: The instruction executes on an enable false to true transition. That means it could be re-executed whenever required)

Init LinMot axis parameter	r	
Enable the instruction as soon as the connection to the	he LinMot drive is established	
bxis.DriveConnectionFaulted		
xis1.DriveConnectionFaulted>	LM_CFG_CAInit	
]/ [LinMot Config Assembly Init	
	LM_CFG_CAInit LMAxis_CAI	nit
	Axis LMAa	cis
	<lmaxis< td=""><td>1> C</td></lmaxis<>	1> C
	ConfigAssembly LMAxisConf	rig
	<lmaxis1:< td=""><td>°_Р</td></lmaxis1:<>	°_Р
	MotionGroup MotionGro	up
	Message LMAXISReco	or
	<lmaxis1_ca_recor< td=""><td>11></td></lmaxis1_ca_recor<>	11>
	PositionScalingNumerator 100	00
	PositionScalingDenominator	1
	MaximalCurrentPositiveActive	1
	MaximalCurrentNegativeActive	1
	TorqueLimitPositive 100	0.0
	TorqueLimitNegative -100	0.0
	ParameterChannel0UPID	0
	ParameterChannel1UPID	0
	ParameterChannel2UPID	0
	ParameterChannel3UPID	0
	MonitoringChannel0UPID	0
	MonitoringChannel1UPID	0
	MonitoringChannel2UPID	0
	MonitoringChannel3UPID	0
	ParMonChannelConfigID	1
	MonChannelConfigID	1 🗧

Mandatory parameters beside the in/out tags:

Tag Name	Description
PositionScalingNumerator	Numerator for unit scale. Also check chapters 4.3.1 & 4.3.2
PositionScalingDenominator	Denominator for unit scale. Also check chapters 4.3.1 & 4.3.2

Optional but recommended parameters:

Tag Name	Description
MaximalCurrentPositiveActive	Config Assembly: Activate maximal current positive in output assembly
MaximalCurrentNegativeActive	Config Assembly: Activate maximal current negative in output assembly
TorqueLimitPositive	Init value of torque limit positive. Should be 100.0 as initialization value
TorqueLimitNegative	Init value of torque limit negative. Should be -100.0 as initialization value



These configuration parameters are set active by sending a CIP Generic message (Set Attribute Single). The message must be setup as follows (as example LMAxis1):

lessage C	onfiguratio	n - LMAxisRec	LinM LM_ Axis Con Moti Mes	LM_CFG_ lot Con fig Assembly CFG_CAInit figAssembly onGroup sage <lma2 s1_CA_Reconf></lma2 	CAInit Init LMAxis_CAInit LMAxis <lmaxis1> LMAxisConfig <lmaxis1:c> MotionGroup LMAxisReconf kis1_CA_Reconf></lmaxis1:c></lmaxis1>	
Configurati Message	on Commur Type:	nication Tag		~	•	
Service Type:	Set Attribu	te Single	~	Source Element	: LMAxis1:C.Stre	amPe v

For the **Source Element** configuration, the first entry of the configuration assembly must be selected which is *LMAxis1:C.StreamPeriod* in this example

In the tab *Communication* the Path must be set to the corresponding I/O device (LMDrive LMAxis1 in this example):

Message Configuration - LMAxisReconf <lmaxis1_ca_reconf> X</lmaxis1_ca_reconf>	
Configuration Communication Tag	
Path: LMAxis1 Browse	
🕞 Broad 🔳 Message Path Browser 🛛 🕹 🗙	
Commun Path: LMAxis1	
CIP LMAxis1	
CIP V Source I/O Configuration	
Conr [0] 5069-L320ERM v31_CIPSync_Demo nection	
⊡器 A1/A2, Ethemet	
5069-L320ERM va0_CIPSync_Demo	
LMDrive LMAxis1	
○ Enable	
O Error Cod OK Cancel Help	
Error Path: L	



4.2 Task: z_MotionGroupUpdate

This task is triggered by the motion group execution and therefore runs in sync with the interpolation of the axes command values. This is essential to get the application properly running!

Task properties:

6	🖇 Task Pr	operties	- z_M	lotionGr	roupUpda	ite				
	General	Configura	ation	Program	n Schedul	e Mo	nitor			
	Туре:		Ever	it				~	2	
	Trigger:		Motio	on Group	Execution	ı		~		
	Tag:		MotionGroup			\sim]			
	Exec	vent occi	urs within	2.	000		ms			
	Priority:	1	-	(Lower n	umber	yields hi	ighe	r priority)		
	Watchde	og:	500.0	000	ms					
	Disable automatic output processing to reduce task overhead									
	🗌 Inhibi	it task								
				ОК	С	ancel		Ą	oply	Help

Optional: If the option "Execute task if no event occurs within" is enabled the time must be set the same as the Motion Group *Base Update Period*.

4.2.1 Program: LMAxis1_Lin_CmdPos & LMAxis2_Rot_CmdPos

In the routine **CmdPosition** the LM_ADV_CmdPosition & IOT instructions are called. The LM_ADV_CmdPosition instruction reads and writes the LinMot drive I/O data and sends the position, velocity and acceleration set points of the virtual motion axis to the drive.

	Application example	
0	LMAxis_EnableStreaming LMAxis_ServoActionStatus	_
	Couple the LinMot pyhsical axis with the virtual axis - This is done after the LinMot motor and the virtual axis have been homed (see routine LMAxis_x_Control in MainProgram)	
	EATTENTION: This rung must always enabled E	
1	Chcapsulation of the basic instructions for Stream immediate Output LM_AXip_CmdPosition LMAxis_cmdPosition (DN)- LMAxisComl LMAxisComl	
	<lmaxis1:01> -(IP) Axis LMAxis <lmaxis1> MotionGroup MotionGroup</lmaxis1></lmaxis1:01>	
	VirtualAxis vLMAxis <vlmaxis1_lin≻ EnableStreaming LMAxis_EnableStreaming 0 ←</vlmaxis1_lin≻ 	
	Signature ID: 0036C7F6	



Attention:

The LM_ADV_CmdPosition instruction must be always enabled!

The coupling between real and virtual axis can be enabled and disabled using the EnableStreaming tag.

The IOT instruction is important to immediately write the drive data to the outputs!



4.3 Motion Group: MotionGroup

In this application note three axes are defined in the motion group:

- 1. Master: virtual encoder from 0 to 360 degrees
- 2. vLMAxis1_Lin: a virtual motion axis coupled with a LinMot Drive linear axis
- 3. vLMAxis1_Rot: a virtual motion axis coupled with a LinMot Drive rotary axis

Motion Group Properties and Axis Schedule:

	Government Motion Group Properties - Motion Group				1	LM_LMDriveEDS_ AxisComIn
	Axis Assignment Attribute Tag					Axis
	Base Update Period: 2.0 ms (in 0.5 increments.)	Axis Schedule			L	
	Alternate 1 Update: 4.0 ms		******	********	******	*******
	Alternate 2 Update: 12.0 ms	🔩 Axis Schedule				
	General Fault Type: Non Major Fault $$	Update Period a	and Schedule			
1	Timing Model: Legacy	Base:		Alt	ternate 1:	
	Scan Times (elapsed time): Max: (us) Reset Max Last: (us) Average: (us) OK Abbrechen Obemehmer	2.0 ∨ m Master vLMAxis1_Lin vLMAxis2_Ro	t	>> 4.	.0 v ms	[
ł		Estimated Utiliz	ation - Motion		А	ctual Utilizatio
		Logix Controlle	er: 2.7	%		Logix Controller
		Task I/O Cycle	: 0.0	%		Task I/O Cyde:



Attention:

It is recommended to have the LinMot axis/axes scheduled in the Base task (fastest). The lower the update period the better the results regarding reactivity and positioning quality during motion.

For highly dynamic applications an update rate of less than 5ms is recommended.



4.3.1 Add virtual axis (linear)

Right-Click the motion group and select *New Axis* > *AXIS_VIRTUAL*:

Motion Groups	- · ·			
MotionG	New Axis	۰.	AXIS_	CONSUMED
	New Coordinate System		AXIS_	SERVO
	Monitor Group Tag		AXIS_	SERVO_DRIVE
📖 🗀 Ungroup			AXIS_	GENERIC
🗄 🧰 Add-On Insti	Fault Help		AXIS_	GENERIC_DRIVE
🖻 🔁 Data Types	Clear Motion Group Faults		AXIS_	CIP_DRIVE
⊜ User-Defi 题 tstLM 从	Cut	Ctrl+X	AXIS_	VIRTUAL

Set a name and check "Open AXIS_VIRTUAL Configuration":

New Tag		×
<u>N</u> ame:	vLMAxis1_Lin	Create 🛛 🔻
Description:	^	Cancel
	•	Help
	~	
<u>U</u> sage:	<controller></controller>	
Typ <u>e</u> :	Base ∨ <u>C</u> onnection	
Alias <u>F</u> or:	~	
Data <u>T</u> ype:	AXIS_VIRTUAL	
Para <u>m</u> eter Connection:	~	
Scope:	😰 v30_CIPSync_Test 🗸 🗸	
E <u>x</u> ternal Access:	Read/Write ~	
St <u>v</u> le:	~	
<u>C</u> onstant		
Seguencing]	
Open AXIS	VIRTUAL Configuration	
Open Paran	neter Connections	



Set the following parameters in the wizard:

Motion Group: MotionGroup ~ New Group
Update Period: 2.0
Output Cam Execution Targets:
Program Stop Action: Fast Stop ~
Master Delay Compensation
Master Position Filter Bandwidth: U. I Hertz
Position Units: mm
Average Velocity Timebase: 0.25 Seconds
Positioning Mode: Linear ~
Conversion Constant: 10000 Feedback Counts/1.0 mm
Position Unwind: 8000 Feedback Counts/Unwind
Mode: Active
Position: 0.0 mm
Sequence: Immediate
Set the dynamics according to your application and the motor capabilities:

Maximum Speed: 2000		mm/s		Manu	ial Adjust
Maximum Acceleration:	10000	mm/s^2			
Maximum Deceleration:	10000	mm/s^2			
Maximum Acceleration Jerk:	950000.0	mm/s^3	= 10% of Max Accel	Time	Calculate
Maximum Deceleration Jerk:	950000.0	mm/s^3	= 10% of Max Dece	Time	Calculate

For the final step, select the tag name and finish the wizard.



In the **Init** routine for this axis (see chapter 4.2.1) set the parameters of the LM_CFG_CAInit instruction to the following values:

PositionScalingNumerator to 10000 PositionScalingDenominator to 1





Note:

The LinMot linear motor has 0.1 um position resolution. Therefor for 1mm (1 motor rev) there are 10000 ticks.



4.3.2 Add virtual axis (rotary)

Right-Click the motion group and select *New Axis* > *AXIS_VIRTUAL*:

Motion Groups					
MotionG	New Axis	۱.	AXIS_CO	NSUMED	
	New Coordinate System		AXIS_SER	VO	
	Monitor Group Tag		AXIS_SER	VO_DRIVE	
📖 🗀 Ungroup			AXIS_GEN	VERIC	
🗄 🗀 Add-On Insti	Fault Help		AXIS_GEN	NERIC_DRIVE	
🖻 🖓 📩 Data Types	Clear Motion Group Faults		AXIS_CIP	DRIVE	
□·····	Cut	Ctrl+X	AXIS_VIR	TUAL	
00					

Set a name and check "Open AXIS_VIRTUAL Configuration":

New Tag		×
<u>N</u> ame:	vLMAxis2_Rot	Create 🛛 🔻
Description:	^	Cancel
		Help
	~	
<u>U</u> sage:	<controller></controller>	
Typ <u>e</u> :	Base ✓ Connection	
Alias <u>F</u> or:	~	
Data <u>T</u> ype:	AXIS_VIRTUAL	
Para <u>m</u> eter Connection:	×	
Scope:	🗊v30_CIPSync_Test 🗸 🗸	
External Access:	Read/Write ~	
St <u>v</u> le:	\sim	
 Constant		
Seguencing	g	
Open AXIS	_VIRTUAL Configuration	
Open Parar	meter Connections	



Set the following parameters in the wizard:

Motion Group: Update Period:	MotionGroup ··· New Group 2.0 ···
Output Cam Execution Tan Program Stop Action: Master Delay Compense Enable Master Position	gets: Fast Stop ~ ation Filter Filter Bandwidth: 0.1 Hertz
Position Units: Average Velocity Timebase	degrees E 0.25 Seconds
Positioning Mode: R Conversion Constant: 10 Position Unwind: 30	000 Feedback Counts/1.0 Position Units 50000 Feedback Counts/Unwind
Mode: Active Position: 0.0 Sequence: Immediate	degrees
Set the dynamics accord	ng to your application and the motor capabilities:

Maximum Speed:	7200	degrees/s		Manu	al Adjust
Maximum Acceleration:	72000	degrees/s^2			
Maximum Deceleration:	72000	degrees/s^2			
Maximum Acceleration Jerk:	13680000.0	degrees/s^3	= 10% of Max Accel	Time	Calculate
Maximum Deceleration Jerk:	13680000.0	degrees/s^3	= 10% of Max Decel	Time	Calculate

For the final step, select the tag name and finish the wizard.



In the **Init** routine for this axis (see chapter 4.2.1) set the *PositionScalingNumerator* and the *PositionScalingDenominator* according to the settings used in the LinMot-Talk motor wizard. It is important to note the number of ticks for one revolution of the motor.

Example 1: For the rotary part of a LinMot PR01/PR02... with rotary units selected in the Motor Wizard 360'000 ticks per revolution are set:

Therefore, the PositionScalingNumerator must be set to 360'000 and the PositionScalingDenominator to 360





Example 2: For a LinMot EC02-40x... motor with rotary units selected in the Motor Wizard 524'288 ticks per revolution are set:

Step 5/7: Position Feedback	
Motor Angle to Position Ratio	
Base of Angle Measuring: Sine/Cosine Sensor ~	
1 Revolution = 524288 Ticks:	
Positive Counting Direction: Clockwise ~	
External Position Measuring System (optional)	
Sensor Type: Vo Sensor V	

Or another motor set to the same amount of ticks:

ncoder				
Type:	Incremental ABZ Encoder (RS422)	~		
Positive Counting Direction	Clockwise	~		
Increments per Revolution	: 8192	(Encoder Increments x 4)		
	1 Increment			
Encoder Angle to Positi	on Ratio	_ A _ B _ Z		
1 Encoder Increment =	64	Ticks		
	52.4000			
1 Encoder Revolution =	524288	licks		

Therefore, the PositionScalingNumerator must be set to 524'288 and the PositionScalingDenominator to 360





For rotary axes the modulo functionality must be activated in the drive parameters.



In the Modulo Configuration set Modulo Mode to On, Minimal Position to 0° and Maximal Position to 360°.

This allows the LinMot drive to correctly interpret the command values sent from the Rockwell Automation controller.

4.3.3 Absolute Position Sensor

When motors with absolute position sensors (SSI; BiSS, EnDat, etc.) are used the homing mode on the drive must be set to "No Drive Homing".



Otherwise, the position may be shifted when executing the LM_MAHv to synchronize the virtual axis with the LinMot drive.



4.4 I/O Device: LMDrive

Add and setup the LinMot drive as shown in chapter 3.2.



5 Instructions

5.1 Overview

All instructions can be found as single L5X exports in the folder AOI of this package.

The following minimal instruction set is required for this application (coordinated motion using a LinMot CM drive coupled with a virtual motion axis):

- LM_LMDriveEDS_Read_78_64
- LM_LMDriveEDS_Write_78_64
- LM_MSO
- LM_MSF
- LM MAFR
- LM MAHv

•

- LM_ADV_PVATime
 - LM_ParameterRead
 - LM_ADV_CmdPostion
 - LM_LMDriveEDS_Read_78_64 & LM_LMDriveEDS_Write_78_64 & LM_ADV_PVATime LM_CFG_CAInit
- LM_ParameterRead

Optional instructions for parameter access or advanced functionality:

- LM_ParameterWrite
- LM_MRPv
- LM_CFG_GetErrorText / LM_CFG_GetStringByUPID
- LM_CFG_GetModUPIDList / LM_CFG_WriteUPIDList
- LM_CFG_StopStartDefault
- LM_CFG_CTAccess
- LM_CFG_CurveAccess

Optional instructions for closed loop force/torque control (on the physical axis only, no coordinated moves):

- LM_FC_FCCTF
- LM FC FCST
- LM FC GTPFCHL & LM FC GTPFCLL
- LM_FC_GTPRFC

Optional instructions to use motion functionality without being coupled with a virtual motion axis > on the physical axis only:

- LM_MAM
- LM_MAS
- LM_MAH & LM_MAH_MG
- LM_MAIAP_I0
- LM_MAJ
- LM_MASC
- LM_MATC



Notes:

If an instruction is integrated in another one this is indicated by *italic* font. E.g., see LM_ADV_PVATime where *LM_ParameterRead* is integrated.

When working with parameter/configuration instructions it is sometimes required to know if any other instructions is already accessing parameters.

For this reason, the axis structure *tstLM_Axis* contains a flag *CfgRWActive* that indicates a running parameter access.



5.2 Instruction Signatures

To allow the user to check if the original signed instructions are used following version, ID, and timestamp.

Instruction name	Version	Signature ID	Timestamp
LM ADV CmdPosition	Version 2.0	0036C7F6	2019-08-27T14:01:15.584Z
LM ADV PVATime	Version 2.2	C9E5CEAE	2019-09-23T09:47:18.533Z
LM LMDriveEDS Read 78 64	Version 2.2	6C238E01	2019-09-18T11:45:28.527Z
LM LMDriveEDS Write 78 64	Version 2.0	4F5B1F59	2019-03-14T15:33:22.103Z
LM MAFR	Version 2.0	CB16BA53	2019-03-14T15:34:46.343Z
_ LM MAHv	Version 2.0	B45F6928	2019-03-14T15:36:01.268Z
LM MAS	Version 2.2	DCCFA6FA	2020-11-05T07:22:01.000Z
LM MSF	Version 2.0	E80449EA	2019-03-14T15:37:56.726Z
LM MSO	Version 2.0	8545B4B3	2019-03-14T15:38:16.999Z
LM ParameterRead	Version 2.0	EEC49A0A	2019-03-18T06:37:20.693Z
_ LM ParameterWrite	Version 2.0	63E9E98A	2019-03-14T15:39:06.493Z
_			
LM DriveStatus	Version 2.1	C1E7C8AA	2019-08-27T14:08:28.164Z
LM CFG CAInit	Version 2.0	852AE15A	2019-03-14T15:29:52.232Z
LM CFG GetErrorText	Version 2.0	FDC70AD9	2019-03-18T06:28:56.627Z
LM CFG GetStringByUPID	Version 2.0	30F54DC9	2020-11-05T07:18:13.946Z
LM CFG GetModUPIDList	Version 2.0	09F030C7	2019-03-18T06:29:46.753Z
LM CFG StopStartDefault	Version 2.1	84717C75	2022-04-20T06:37:55.789Z
LM CFG WriteUPIDList	Version 2.0	F1BFDAEB	2019-03-18T06:31:28.117Z
LM CFG CTAccess	Version 2.0	0C466A8F	2019-09-18T12:30:35.562Z
LM CFG CurveAccess	Version 2.0	DD68406D	2019-09-18T12:29:24.729Z
LM FC FCCTF	Version 2.0	8418574B	2019-08-20T12:50:31.856Z
LM FC FCST	Version 2.0	31E73201	2022-07-06T05:15:28.872Z
LM FC GTPT	Version 2.0	B03E7239	2022-07-06T06:34:16.529Z
LM FC GTPFCHL	Version 2.0	4FA7BF47	2019-08-20T12:51:03.174Z
LM FC GTPFCLL	Version 2.0	6C4A43A7	2019-08-20T12:51:38.964Z
LM FC GTPRFC	Version 2.0	791B6BEE	2019-08-20T12:52:11.430Z
LM ADV CEE	Version 2.0	8A194FC6	2019-08-20T12:48:35.091Z
LM ADV CurrentCmdMode	Version 2.0	564D203B	2020-11-05T12:17:37.780Z
LM MAM	Version 2.3	1BA7C3C4	2020-11-05T07:22:38.855Z
_ LM MRPv	Version 2.0	77432C0C	2019-03-18T06:36:11.798Z
_ LM MRP	Version 2.0	AA5DB58C	2019-08-28T06:44:10.766Z
_ LM MAH	Version 2.0	3954BA0F	2019-08-20T12:58:01.654Z
_ LM MAH MG	Version 2.0	5B58F86A	2022-04-20T06:46:39.313Z
LM MAIAP IO	Version 2.0	01B89E43	2019-08-20T12:53:00.167Z
LM MAJ	Version 2.0	52F3E012	2019-08-28T06:11:16.360Z
LM MASC	Version 2.0	8EE9098B	2019-08-20T12:56:40.210Z
_ LM_MATC	Version 2.0	022BD204	2019-08-20T12:57:18.531Z
_			
LM LMDriveAOP Read IP	Version 2.0	22550FD2	2020-11-05T07:20:39.537Z
LM LMDriveAOP Write IP	Version 2.0	8F8A3A5D	2020-11-05T07:21:29.348Z
LM LMDriveEDS Read IP	Version 2.0	F77A8CF7	2022-04-20T06:45:15.610Z
LM LMDriveEDS Write IP	Version 2.0	7812D7E1	2022-04-20T06:45:39.555Z
LM LMDriveEDS Write IP As27	Version 2.0	EDF7F44D	2022-04-20T06:46:07 2327



5.3 Data Types

5.3.1 tstLM_Axis

The following table lists the members of the LinMot axis reference data type (UDT)

Name	D Type	Radix	Ext Access	Max	Min	Description	Eng. Unit
ControlWord	INT	Decimal	Read/Write			Internal: Drive Control Word	
MCHeader	INT	Decimal	Read/Write			Internal: Motion Command Header	
MCParaWord0	INT	Decimal	Read/Write			Internal: Motion Command Parameter Word 0	
MCParaWord1	INT	Decimal	Read/Write			Internal: Motion Command Parameter Word 1	
MCParaWord2	INT	Decimal	Read/Write			Internal: Motion Command Parameter Word 2	
MCParaWord3	INT	Decimal	Read/Write			Internal: Motion Command Parameter Word 3	
MCParaWord4	INT	Decimal	Read/Write			Internal: Motion Command Parameter Word 4	
MCParaWord5	INT	Decimal	Read/Write			Internal: Motion Command Parameter Word 5	
MCParaWord6	INT	Decimal	Read/Write			Internal: Motion Command Parameter Word 6	
MCParaWord7	INT	Decimal	Read/Write			Internal: Motion Command Parameter Word 7	
MCParaWord8	INT	Decimal	Read/Write			Internal: Motion Command Parameter Word 8	
MCParaWord9	INT	Decimal	Read/Write			Internal: Motion Command Parameter Word 9	
MCParaWord10	INT	Decimal	Read/Write			Internal: Motion Command Parameter Word 10	
MCParaWord11	INT	Decimal	Read/Write			Internal: Motion Command Parameter Word 11	
MCParaWord12	INT	Decimal	Read/Write			Internal: Motion Command Parameter Word 12	
MCParaWord13	INT	Decimal	Read/Write			Internal: Motion Command Parameter Word 13	
MCParaWord14	INT	Decimal	Read/Write			Internal: Motion Command Parameter Word 14	
MCParaWord15	INT	Decimal	Read/Write			Internal: Motion Command Parameter Word 15	
StatusWord	INT	Decimal	Read/Write			Internal: Drive Status Word	
StateVar	INT	Decimal	Read/Write			Internal: Drive State Var	
WarnWord	INT	Decimal	Read/Write			Internal: Drive Warn Word	
CfgControl	INT	Hex	Read/Write			Internal: Drive Config Module Control Word	
CfgIndexOut	INT	Hex	Read/Write			Internal: Drive Config Module Index Out	
CfgValueOut	DINT	Hex	Read/Write			Internal: Drive Config Module Value Out	
CfgStatus	INT	Hex	Read/Write			Internal: Drive Config Module Status Word	
CfgIndexIn	INT	Hex	Read/Write			Internal: Drive Config Module Index In	
CfgValueIn	DINT	Hex	Read/Write			Internal: Drive Config Module Value In	
DriveConnectionFaulted	BOOL	Decimal	Read/Write			Connection to drive faulted	
AxisFault	DINT	Hex	Read/Write			Bits used: 0 = Physical Axis Fault	
PhysicalAxisFault	BOOL	Decimal	Read/Write			The Physical Axis Fault bit is set. Check ErrorID	
AxisStatus	DINT	Hex	Read/Write			Bits used: 0 = Servo Action Status, 1 = Drive Enable Status	
ServoActionStatus	BOOL	Decimal	Read/Write			The ServoActionStatus bit attribute is set when the associated axis is under servo control. If the bit is not set, then servo action is disabled.	
DriveEnableStatus	BOOL	Decimal	Read/Write			The DriveEnableStatus bit attribute is set when the Drive Enable output of the associated physical axis is currently enabled. If the bit is not set, then physical servo axis Drive Enable output is currently disabled.	
MotionStatus	DINT	Hex	Read/Write			Motion Status	
JogStatus	BOOL	Decimal	Read/Write			Jog Status	
MoveStatus	BOOL	Decimal	Read/Write			Move Status	
HomingStatus	BOOL	Decimal	Read/Write			Homing Status	

LinMot®

LinMot[®] Rockwell Automation[®] Motion

StoppingStatus	BOOL	Decimal	Read/Write			Stopping Status	
AxisHomedStatus	BOOL	Decimal	Read/Write			Axis Homed Status	
PVAStatus	BOOL	Decimal	Read/Write			PVA Streaming Status	
ActualPosition	REAL	Float	Read/Write			Actual Position in Position Units	
CommandPosition	REAL	Float	Read/Write			Command Position in Position Units	
PositionError	REAL	Float	Read/Write			The error between commanded and actual position that is the output of the position loop-summing junction	on.
ActualVelocity	REAL	Float	Read/Write			Actual Velocity in Position Units / Sec	
CurrentFeedback	REAL	Float	Read/Write			Actual current applied to the axis in Ampere	
ErrorID	INT	Hex	Read/Write			Drive Error ID	
TorqueLimitPositive	REAL	Float	Read/Write	100	0	Motor positive Torque/Force Limit [0100% of max.]. If 0 the motor cannot move	%
TorqueLimitNegative	REAL	Float	Read/Write	0	-100	Motor negative Torque/Force Limit [0100% of max.]. If 0 the motor cannot move	%
PositionScalingNumerator	REAL	Float	Read/Write			Increments per motor rev	
PositionScalingDenominator	REAL	Float	Read/Write			Units per motor rev	
TimeStampDrvToCtrl	DINT[2]	Decimal	Read/Write			Internal: Time Stamp Drive to Controller	
TimeStampCtrlToDrv	DINT[2]	Decimal	Read/Write			Internal: Time Stamp Controller to Drive	
TimeOffsetDrvToCtrl	DINT[2]	Decimal	Read/Write			Internal: Time Offset Drive to Controller	
TimeOffsetCtrlToDrv	DINT[2]	Decimal	Read/Write			Internal: Time Offset Controller to Drive	
MonChannelConfigID	DINT	Decimal	Read/Write			Internal: Actual active monitoring configuration ID	
ParChannelConfigID	DINT	Decimal	Read/Write			Internal: Actual active parameter configuration ID	
CfgRWActive	BOOL	Decimal	Read/Write			Internal: A configuration instruction is active	


5.4 Read and Write Instructions

These instructions read and write the LinMot drive data transmitted over Ethernet/IP.



Attention: If the *LM_ADV_CmdPosition* instruction (chapter 5.6.2) is used (as shown in the example demo project), **DO NOT** use the following AOIs in the program logic: *LM_LMDriveEDS_Read_78_64 LM_LMDriveEDS_Write_78_64*

The *LM_LMDriveEDS_Read_78_64* and *LMDriveEDS_Write_78_64* AOIs are included inside the logic of the *LM_ADV_CmdPosition* AOI, so those instructions will appear in the AOI list in the controller organizer, however they must not be utilized outside of *the LM_ADV_CmdPosition* AOI.

5.4.1 LM_LMDriveEDS_Read_78_64

Reads the communication data (input assembly) of a LinMot drive.

Supported LinMot drives:

• C1250-CM-xx



Operand	Туре	Format	Description
LM_LMDriveEDS_Read_78_64	LM_LMDriveEDS_Read_78_64	Tag	Instance of the Add-on Instruction. Access instruction status parameters.
AxisComIn	_024D:LMDrive_A3FF6A28:I:0	Tag	LinMot axis input assembly
Axis	tstLM_Axis	Tag	LinMot axis reference

5.4.2 LM_LMDriveEDS_Write_78_64

Writes the communication data (output assembly) of a LinMot drive.

Supported LinMot drives:

• C1250-CM-xx



Operand	Туре	Format	Description
LM_LMDriveEDS_Write_78_64	LM_LMDriveEDS_Write_78_64	Tag	Instance of the Add-on Instruction. Access instruction status parameters.
AxisComOut	_024D:LMDrive_AD451A70:O:0	Tag	LinMot axis output assembly
Axis	tstLM_Axis	Tag	LinMot axis reference

5.5 Motion State Instructions

5.5.1 Motion Servo On (LM_MSO)

The LM_MSO instruction is the equivalent of the Rockwell Automation MSO instruction. Use this instruction to enable the drive amplifier and the axis' servo control loop.



Operand	Туре	Format	Description
LM_MSO	LM_MSO	Тад	Instance of the Add-on Instruction. Access instruction status parameters.
Axis	tstLM_Axis	Tag	LinMot axis reference.

LM_MSO Structure Descriptions

Enumerations	Description
EN (Enable)	It is set when the rung makes a false-to-true transition and remains set until the servo message transaction is completed and the rung goes false.
DN (Done)	It is set when the axis' servo action has been successfully enabled and the drive enable, and servo active status bits have been set.
ER (Error)	It is set to indicate that the instruction detected an error.

5.5.2 Motion Servo Off (LM_MSF)

The LM_MSF instruction is the equivalent for the Rockwell Automation MSF instruction. Use this instruction to disable the drive output for the specified axis and to deactivate the axis' servo loop.



Operand	Туре	Format	Description
LM_MSF	LM_MSF	Тад	Instance of the Add-on Instruction. Access instruction status parameters.
Axis	tstLM_Axis	Tag	LinMot axis reference.

LM_MSF Structure Descriptions

Enumerations	Description
EN (Enable)	It is set when the rung makes a false-to-true transition and remains set until the servo message transaction is completed and the rung goes false.
DN (Done)	It is set when the axis' servo action been successfully disabled, and the drive enable, and servo active status bits have both been cleared.
ER (Error)	It is set to indicate that the instruction detected an error.



5.5.3 Motion Axis Fault Reset (LM_MAFR)

The LM_MAFR instruction is the equivalent for the Rockwell Automation MAFR instruction. Use this instruction to clear all motion faults for an axis. This is the only method for clearing axis motion faults.

	LM M	AFR	1
_	LinMot Motio	n Axis Fault	
	LM MAFR	?	-(EN)-
	Axis	?	-(DN)-
			-(ER)
	Axis	?	-(DN) -(ER)

Operand	Туре	Format	Description
LM_MAFR	LM_MAFR	Тад	Instance of the Add-on Instruction. Access instruction status parameters.
Axis	tstLM_Axis	Tag	LinMot axis reference.

LM_MAFR Structure Descriptions

Enumerations	Description
EN (Enable)	It is set when the rung makes a false-to-true transition and remains set until the servo message transaction is completed and the rung goes false.
DN (Done)	It is set when the axis' faults have been successfully cleared.
ER (Error)	It is set to indicate that the instruction detected an error.

5.6 Motion Move Instructions

5.6.1 Motion Axis Home (LM_MAHv)

The LM_MAHv instruction is the equivalent for the Rockwell Automation MAH instruction. Use this instruction to home an axis.

The homing sequence can be selected during axis configuration (LinMot-Talk Motor Wizard). It's an active homing. The connected virtual axis is homed as well to the actual command position of the LinMot motor.



Operand	Туре	Format	Description
LM_MAHv	LM_MAHv	Тад	Instance of the Add-on Instruction. Access instruction status parameters.
Axis	tstLM_Axis	Тад	LinMot axis reference.
VirtualAxis	AXIS_VIRTUAL	Тад	Virtual axis reference

LM_MAHv Structure Descriptions

Enumerations	Description
EN (Enable)	It is set when the rung makes a false-to-true transition and remains set until the servo message transaction is completed and the rung goes false.
DN (Done)	It is set when axis home has been successfully completed or is aborted.
ER (Error)	It is set to indicate that the instruction detected an error.
IP (In Process)	It is set on positive rung transition and cleared after the Motion Home Axis is complete, or terminated by a stop command, shutdown, or a servo fault.
PC (Process Compete)	It is set when axis home is successfully completed (real and virtual axis).



Note:

The homing sequence is configured using LinMot-Talk. The simplest method is to configure homing through the LinMot-Talk motor wizard.



5.6.2 CIP Sync Command Position (LM_ADV_CmdPosition)

This instruction is the main part of this solution as it couples the virtual motion axis and the physical axis. It encapsulates the read and write instructions of chapter 5.4 and the PVA Streaming instruction of chapter 5.6.3 to simplify the code. The encapsulated instructions will be visible in the controller organizer.

This instruction is used in the demo project > check chapter 4.2.1



Attention:

When this instruction is used do not use the following instructions anywhere else in the program! *LM_LMDriveEDS_Read_78_64, LM_LMDriveEDS_Write_78_64 & LM_ADV_PVATime*

	LM_ADV_CmdPositi	on
_	Encapsulation of the basic	instructio
	LM_ADV_CmdPosition	?(DN)-
	AxisComIn	?
	AxisComOut	? -(ER)-
	Axis	?
	MotionGroup	? . (P)—
	VirtualAxis	?
	EnableStreaming	?
		??

Operand	Туре	Format	Description
LM_ADV_CmdPosition	LM_ADV_CmdPosition	Tag	Instance of the Add-on Instruction. Access instruction status parameters.
AxisComIn	_024D:LMDrive_A3FF6A28:I:0	Tag	LinMot axis input assembly
AxisComOut	_024D:LMDrive_AD451A70:O:0	Tag	LinMot axis output assembly
Axis	tstLM_Axis	Tag	LinMot axis reference.
MotionGroup	MOTION_GROUP	Tag	Motion Group reference.
VirtualAxis	VIRTUAL_AXIS	Tag	Virtual axis reference.
EnableStreaming	Bool	Tag	Couples virtual and physical axis

LM_ADV_CmdPosition Structure Descriptions

Enumerations	Description
DN (Done)	The streaming was successfully initiated.
ER (Error)	An error occurred.
IP (In Process)	The LinMot axis is coupled with the virtual axis and command values are transmitted.



Attention:

The LM_ADV_CmdPosition instruction must be **always enabled!** The coupling between physical and virtual axis can be enabled and disabled using the *EnableStreaming* tag. The IOT instruction is important to immediately write the drive data to the outputs!



Attention:

Rockwell Automation controller revision must be V30 or later

LinMot drive firmware must be 6.8 Build 20190315 or later



5.6.3 CIP Sync PVA Streaming (LM_ADV_PVATime)

This instruction couples the LinMot drive with a virtual axis. As soon as IP is set the command values (position, velocity & acceleration) of the virtual axis are transmitted to the LinMot drive. This includes a time stamp to guarantee a synchronized move together with CIP Motion axes.

LM_ADV_PVATi	me treaming In	L
LM_ADV_PVATime	?	-(EN)-
Axis	?	-(DN)-
MotionGroup	?	-(ER)-
VirtualAxis	?	-(IP)

Operand	Туре	Format	Description
LM_ADV_PVATime	LM_ADV_PVATime	Тад	Instance of the Add-on Instruction. Access instruction status parameters.
Axis	tstLM_Axis	Tag	LinMot axis reference.
MotionGroup	MOTION_GROUP	Тад	Motion Group reference.
VirtualAxis	VIRTUAL_AXIS	Тад	Virtual axis reference.

LM_ADV_PVATime Structure Descriptions

Enumerations	Description
EN (Enable) A false-to-true transition caused the instruction to execute. The EN bi until the process is complete and the rung goes false.	
DN (Done)	The streaming was successfully initiated.
ER (Error)	An error occurred.
IP (In Process)	The LinMot axis is coupled with the virtual axis and command values are transmitted.

1 Note:

If **DN =True**, **ER = False and IP = False** then the drive is waiting to have its clock synchronized with the master clock (check variable UPID 23A0h = 1 when logged in as "Service").

	🛄 📰 🖬 🔻 🗃 🕾 🖛 🖽	0 R W	/ @ @	<u>11</u>
Control Panel	Name	Value	RawData	UPID
> 🕒 Parameters	Is Synchronized			23A0h
🗸 🕰 Variables	System Time Low (ns)			23A1h
	System Time High (ns)			23A2h
EtherNet/IP	System Time Read Tricore Timestamp			23A3h
EtherNet/IP:Configuration Assembly	Offset from Master Low (ns)			23A4h
EtherNet/IP:PTP	Offset from Master High (ns)			23A5h
EtherNet/IP:LIP Sync	Mean Path Delay to Master Low (ns)			23A6h

Check that the Controller / Ethernet card the LinMot is connected to has "Time Synchronization" enabled.



Attention:

If the LM_ADV_CmdPosition instruction (chapter 5.6.2) is used (as it is in the demo project) do not use this instruction. It is already part of LM_ADV_CmdPosition.



Attention:

- Rockwell Automation controller revision must be V30 or later
- LinMot drive firmware must be 6.8 Build 20190315 or later



5.6.4 Motion Axis Redefine Position (LM_MRPv)

Motion Axis Redefine Position (LinMot)

Use this instruction to change the command and actual position of both the virtual and real (LinMot) axis.



Attention:

This instruction is thought for special use cases only!

The type is always absolute and performs on both command and actual position.

The instruction must only be used when the axis is not in coupled mode (tstLM_Axis.PVAStatus = FALSE)!

LM_MR	Pv	
LM_MRPv Axis	? ?	-(EN) -(DN)
Position	? ??	-(er)-
VirtualAxis	?	

Operand	Туре	Format	Description
LM_MRPv	LM_MRPv	Tag	Instance of the Addon Instruction. Access instruction status parameters.
Axis	tstLM_Axis	Tag	Axis to perform the action on.
Position	REAL	Immediate Tag	The value to use to change the axis position to
VirtualAxis	VIRTUAL_AXIS	Тад	Virtual axis reference.

LM_MRPv Structure Descriptions

Enumerations	Description
EN (Enable)	A false-to-true transition caused the instruction to execute. The EN bit remains set until the process is complete and the rung goes false.
DN (Done)	Is set when the axis position has been successfully redefined.
ER (Error)	An error occurred.



Note:

There is also a version for the physical axis only available > LM_MRP

5.7 LinMot Parameter Instructions

5.7.1 Read Parameter (LM_ParameterRead)

Use this instruction to read a parameter (RAM or ROM) of the LinMot drive.



Operand	Туре	Format	Description
LM_ParameterRead	LM_ParameterRead	Тад	Instance of the Addon Instruction. Access instruction status parameters.
Axis	tstLM_Axis	Тад	LinMot Axis reference.
Mode	INT	Immediate Tag	Set access mode: 0 = ROM 1 = RAM
UPID	INT	Immediate Tag	Unique Parameter ID. Parameter to be read.
Value	DINT	Immediate Tag	Parameter value read. Valid if PC bit set.
ErrorID	INT	Immediate Tag	Error ID if error is detected.

LM_ParameterRead Structure Descriptions

Enumerations	Description
EN (Enable)	A false-to-true transition caused the instruction to execute. The EN bit stays set until the process is complete and the rung goes false.
DN (Done)	The drive has accepted command.
ER (Error)	An error occurred.
IP (In Process)	Drive is reading the parameter.
PC (Process Complete)	Parameter read complete.



Note: Be aware of the parameter scale



5.7.2 Write Parameter (LM_ParameterWrite)

Use this instruction to write a parameter (RAM, ROM or RAM&ROM) of the LinMot drive.

LM_ParameterWrite			
LM_ParameterWrite	?	 -(EN)	
Axis	?	 (DN)	
Mode	?	-(ER)	
	??	-(P)-	
UPID	?	-(PC)	
	??		
Value	?		
	??		
ErrorID	??		

Operand	Туре	Format	Description
LM_ParameterWrite	LM_ParameterWrite	Тад	Instance of the Addon Instruction. Access instruction status parameters.
Axis	tstLM_Axis	Tag	LinMot axis reference
Mode	INT	Immediate Tag	Set access mode: 0 = ROM 1 = RAM 2 = RAM & ROM
UPID	INT	Immediate Tag	Unique Parameter ID. Parameter to be written.
Value	DINT	Immediate Tag	Parameter value to be written.
ErrorID	INT	Immediate Tag	Error ID if error is detected.

LM_ParameterWrite Structure Descriptions

Enumerations	Description
EN (Enable)	A false-to-true transition caused the instruction to execute. The EN bit stays set until the process is complete and the rung goes false.
DN (Done)	The drive has accepted command.
ER (Error)	An error occurred.
IP (In Process)	Drive is writing the parameter.
PC (Process Complete)	Parameter writing complete.



Note:

Be aware of the parameter scale



Attention:

Intense use of writing into the ROM memory can reduce the lifetime of the drive memory! More details can be found in the *Drive Configuration Over Fieldbus* (<u>0185-1074</u>) user manual > see chapter Recommended Documentation



5.7.3 LinMot Drive Status (LM_DriveStatus)

Use this instruction to get LinMot specific drive status information.

	LM_DriveStatus-		1
_	Read LinMot Drive Statu	s Infor	
	LM_DriveStatus	?	-(EN)
	Axis	?	-(SW_OperationEnabled)
	StateVar	??	-(SW_SwitchOnActive)-
	WarnWord	??	-(SW_EnableOperation)-
	StatusWord	??	-(SW_Error)-
	DriveMainState	??	(SW_VoltageEnable)-
	CommandPosition	??	(SW_nQuickStop)
	ActualPosition	??	-(SW_SwitchOnLocked)
	PositionError	??	-(SW_Warning)
	ActualVelocity	??	(SW_EventHandlerActive)
	CurrentFeedback	??	-(SW_SpecialMotionActive)-
	ErrorCode	??	-(SW InTargetPosition)-
			-(SW Homed)-
			-(SW FatalError)-
			(SW MotionActive)
			(SW RangeIndicator1)-
			(SW RangeIndicator2)

Operand	Туре	Format	Description
LM_DriveStatus	LM_DriveStatus	Тад	Instance of the Addon Instruction. Access instruction status parameters
Axis	tstLM_Axis	Тад	Axis to perform the action on



Note:

For a detailed description of the status information refer to the Motion Control Software manual -> see chapter Recommended Documentation



5.8 LinMot Config Instructions

5.8.1 Config Assembly Init (LM_CFG_CAInit)

Use this instruction to setup and activate the configuration assembly of the LinMot drive.





Note: Setup the connected MESSAGE as shown in chapter 4.1.2



Attention: It is very important that the configuration assembly is setup correctly!



Operand	Туре	Format	Description
LM_CFG_CAInit	LM_CFG_CAInit	Тад	Instance of the Addon Instruction. Access instruction status parameters.
Axis	tstLM_Axis	Тад	LinMot Axis reference
ConfigAssembly	_024D:LMDrive_A8562DE1:C:0	Immediate Tag	LinMot Config Assembly
MotionGroup	MOTION_GROUP	Immediate Tag	Motion Group
Message	MESSAGE	Immediate Tag	Message
PositionScalingNumerator	DINT	Immediate Tag	Increments per Motor Revolution > see chapters 4.3.1 & 4.3.2
PositionScalingDenominator	DINT	Immediate Tag	Units per Motor Revolution > see chapters 4.3.1 & 4.3.2
MaximalCurrentPositiveActive	BOOL	Immediate Tag	Activate Force/Torque Limit Positive
MaximalCurrentNegativeActive	BOOL	Immediate Tag	Activate Force/Torque Limit Negative
TorqueLimitPositive	REAL	Immediate Tag	Force/Torque Limit Positive [0100%]
TorqueLimitNegative	REAL	Immediate Tag	Force/Torque Limit Negative [0100%]
ParameterChannel0UPID	INT	Immediate Tag	UPID to be written in Parameter Channel 0
ParameterChannel1UPID	INT	Immediate Tag	UPID to be written in Parameter Channel 1
ParameterChannel2UPID	INT	Immediate Tag	UPID to be written in Parameter Channel 2
ParameterChannel3UPID	INT	Immediate Tag	UPID to be written in Parameter Channel 3
MonitoringChannel0UPID	INT	Immediate Tag	UPID to be read in Monitoring Channel 0
MonitoringChannel1UPID	INT	Immediate Tag	UPID to be read in Monitoring Channel 1
MonitoringChannel2UPID	INT	Immediate Tag	UPID to be read in Monitoring Channel 2
MonitoringChannel3UPID	INT	Immediate Tag	UPID to be read in Monitoring Channel 3
ParMonChannelConfigID	DINT	Immediate Tag	Configuration ID to use
MonChannelConfigID	DINT	Immediate Tag	Actual Active Configuration ID (Monitoring)

LM_CFG_CAInit Structure Descriptions

Enumerations	Description
EN (Enable)	A false-to-true transition caused the instruction to execute. The EN bit stays set until the process is complete and the rung goes false.
DN (Done)	The drive has accepted command.
ER (Error)	An error occurred. Check ERR to get the error ID of the internal MESSAGE instruction.



5.8.2 Get Error Text (LM_CFG_GetErrorText)

This instruction returns a STRING containing the LinMot drive Error Text. Input the ErrorCode to receive the corresponding ErrorText.

The actual error code of the drive can be found either in the axis data structure (tstLM_axis.ErrorID) or as ErrorCode output of the LM_DriveStatus instruction.

LM_CFG_GetErro	rText	
Get LinMot Drive Error 1	ext as String	
LM_CFG_GetErrorText	?	-(EN)
Axis	?	-(DN)
ErrorCode	?	-(ER)
	??	-(P)
ErrorText	?	-(PC)
ErrorID	??	

Operand	Туре	Format	Description
LM_CFG_GetErrorText	LM_CFG_GetErrorText	Tag	Instance of the Addon Instruction. Access instruction status parameters.
Axis	tstLM_Axis	Tag	Axis to perform the action on.
ErrorCode	SINT	Immediate Tag	ErrorCode of the LinMot drive from which the error text should be read
ErrorText	STRING	Tag	Error text returned.
ErrorID	INT	Immediate Tag	Error ID if error is detected.

LM_CFG_GetErrorText Structure Descriptions

Enumerations	Description
EN (Enable)	A false-to-true transition caused the instruction to execute. The EN bit stays set until the process is complete and the rung goes false.
DN (Done)	The drive has accepted command.
ER (Error)	An error occurred.
IP (In Process)	Drive is processing the command.
PC (Process Complete)	Process complete.



5.8.3 Get String by UPID (LM_CFG_GetStringByUPID)

This instruction returns a STRING containing the text of a string parameter/variable of the LinMot drive. Input the UPID to receive the corresponding text.

	LM_CFG_GetStringByUPID)	1	
-	Get a LinMot String by its UPID			
	LM_CFG_GetStringByUP	?	 -(EN)-	
	Axis	?	-(DN)-	
	UPID	?	-(ER)-	
		??	<u>-(</u> ₽)	
	UPIDText	?	-(PC)-	
	ErrorID	??		

Operand	Туре	Format	Description
LM_CFG_GetStringByUPID	LM_CFG_GetStringByUPID	Tag	Instance of the Addon Instruction. Access instruction status parameters.
Axis	tstLM_Axis	Tag	Axis to perform the action on.
UPID	SINT	Immediate Tag	UPID of the LinMot drive from which the text should be read
UPIDText	STRING	Tag	Error text returned.
ErrorID	INT	Immediate Tag	Error ID if error is detected.

LM_CFG_GetStringByUPID Structure Descriptions

Enumerations	Description
EN (Enable)	A false-to-true transition caused the instruction to execute. The EN bit stays set until the process is complete and the rung goes false.
DN (Done)	The drive has accepted command.
ER (Error)	An error occurred.
IP (In Process)	Drive is processing the command.
PC (Process Complete)	Process complete.



5.8.4 Get Modified UPID List (LM_CFG_GetModUPIDList)

This instruction reads a list of drive parameters and their values that have been modified (compared to factory defaults) and stores them in the array. Can be used to save the configuration of a drive in the controller.



Operand	Туре	Format	Description
LM_CFG_GetModUPIDList	LM_CFG_GetModUPIDList	Tag	Instance of the Addon Instruction. Access instruction status parameters.
Axis	tstLM_Axis	Тад	Axis to perform the action on.
NrOfEntries	INT	Immediate Tag	Number of parameters to be read at maximum. Recommended: 200
UPIDList	tstLM_CfgUPIDListEntry[200]	Тад	Array where the parameters are stored.
ErrorID	INT	Immediate Tag	Error ID if error is detected.

LM_CFG_GetModUPIDList Structure Descriptions

Enumerations	Description
EN (Enable)	A false-to-true transition caused the instruction to execute. The EN bit stays set until the process is complete and the rung goes false.
DN (Done)	The drive has accepted command.
ER (Error)	An error occurred.
IP (In Process)	Drive is processing the command.
PC (Process Complete)	Process complete.



5.8.5 Write UPID List (LM_CFG_WriteUPIDList)

This instruction writes a list of drive parameters (UPID & Value) stored in an array to the drive.

LM_CFG_WriteUPIDI	_ist	1		
 Write Parameters (UPIDs) 1 	Write Parameters (UPIDs) to LinMot D			
LM_CFG_WriteUPIDList	?	(EN)		
Axis	?	-(DN)-		
NrOfEntries	?	-(ER)		
	??	-(P)		
UPIDList	?	(PC)-		
ErrorID	??			

Operand	Туре	Format	Description
LM_CFG_WriteUPIDList	LM_CFG_WriteUPIDList	Тад	Instance of the Addon Instruction. Access instruction status parameters.
Axis	tstLM_Axis	Tag	Axis to perform the action on.
NrOfEntries	INT	Immediate Tag	Number of parameters to be written at maximum. Recommended: 200
UPIDList	tstLM_CfgUPIDListEntry[200]	Тад	Array where the parameters are stored.
ErrorID	INT	Immediate Tag	Error ID if error is detected.

LM_CFG_WriteUPIDList Structure Descriptions

Enumerations	Description
EN (Enable)	A false-to-true transition caused the instruction to execute. The EN bit stays set until the process is complete and the rung goes false.
DN (Done)	The drive has accepted command.
ER (Error)	An error occurred.
IP (In Process)	Drive is processing the command.
PC (Process Complete)	Process complete.



Attention:

The instruction stops writing as soon as it finds an entry with UPID = 0 in the array. Therefore, the last parameter entry in the array must be followed by an entry with UPID = 0. **Or** as soon as the number at "NrOfEntries" has been reached.



5.8.6 Stop Start Default (LM_CFG_StopStartDefault)

This instruction provides the functionality to restart the drive, stop and start single firmware layers, or set the parameters of each firmware layer to factory defaults.



Operand	Туре	Format	Description
LM_CFG_StopStartDefault	LM_CFG_StopStartDefault	Тад	Instance of the Addon Instruction. Access instruction status parameters.
Axis	tstLM_Axis	Tag	Axis to perform the action on.
Mode	INT	Immediate Tag	Set access mode: 0 = Restart Drive 1 = Set parameter ROM values to default (OS SW) 2 = Set parameter ROM values to default (MC SW) 3 = Set parameter ROM values to default (Interface SW) 4 = Set parameter ROM values to default (Application SW) 5 = Stop MC and Application Software (for Flash Access) 6 = Start MC and Application Software
ErrorID	INT	Immediate Tag	Error ID if error is detected.

LM_CFG_StopStartDefault Structure Descriptions

Enumerations	Description
EN (Enable)	A false-to-true transition caused the instruction to execute. The EN bit stays set until the process is complete and the rung goes false.
DN (Done)	The drive has accepted command.
ER (Error)	An error occurred.
IP (In Process)	Drive is processing the requested mode.
PC (Process Complete)	Process complete.



Attention:

When mode 0 (Restart Drive) is executed then the EtherNet/IP connection of the drive is interrupted (same as power cycling the drive).



5.8.7 Command Table Access (LM_CFG_CTAccess)

This instruction provides access to the command table of a LinMot drive. Read and write entries, delete entries, delete the complete command table, save the command table from RAM to flash memory.

	LM_CFG_CTAc	cess	
_	manage command tab	le entries in t	
	LM_CFG_CTAccess	?	-(EN)-
	Axis	?	-(DN)-
	Mode	?	-(ER)-
		??	-(IP)
	CTID	?	-(PC)-
		??	
	CTEntry	?	
	PresenceList	?	

Operand	Туре	Format	Description
LM_CFG_CTAccess	LM_CFG_CTAccess	Тад	Instance of the Addon Instruction. Access instruction status parameters.
Axis	tstLM_Axis	Тад	Axis to perform the action on.
Mode	INT	Immediate Tag	Set access mode: 0 = Save to Flash: Saves the Command Table to the flash memory (MC_SW must be stopped!) 1 = Delete all Entries (RAM) 2 = Delete Entry (RAM) 3 = Write Entry (RAM) 4 = Get Entry (is stored in CTEntry) 5 = Read presence list from drive
CTID	INT	Immediate Tag	Command Table ID (line number). Range: 1255
CTEntry	tstLM_CfgCTEntry	Тад	Command Table Entry. Data type that contains all data for one command table line.
PresenceList	DINT[8]	Тад	Bit addressed array of DINT that shows if a command table ID is defined. 0 = Line defined 1 = Line empty
ErrorID	INT	Immediate Tag	Error ID if error is detected.

LM_CFG_CTAccess Structure Descriptions

Enumerations	Description
EN (Enable)	A false-to-true transition caused the instruction to execute. The EN bit stays set until the process is complete and the rung goes false.
DN (Done)	The drive has accepted command.
ER (Error)	An error occurred.
IP (In Process)	Drive is processing the requested mode.
PC (Process Complete)	Process complete.



Attention:

Before executing mode 0 the MC_SW of the drive must be stopped. Use LM_CFG_StartStopDefault Mode 5 to do so.



5.8.8 Curve Access (LM_CFG_CurveAccess)

This instruction provides access to motion profiles (curves) on the LinMot drive. It is possible to read, write, modify and delete curves as well as saving all curves from the RAM to the flash memory.

LM_CFG_CurveAccess		1	
manage curves in the drive			
LM_CFG_CurveAccess	?	 H(EN)-	_
Axis	?	-(DN)	
Mode	?	-(ER)-	
	??	-(₽)-	_
CurvelD	?	-(PC)-	
	??		
CurveArray	?		
-			

.

Operand	Туре	Format	Description
LM_CFG_CurveAccess	LM_CFG_CurveAccess	Тад	Instance of the Addon Instruction. Access instruction status parameters.
Axis	tstLM_Axis	Tag	Axis to perform the action on.
Mode	INT	Immediate Tag	Set access mode: 0 = Save all curves from RAM to Flash. (MC_SW must be stopped!) 1 = Delete all Curves (RAM) 2 = Add Curve (RAM) 3 = Modify Curve (RAM) 4 = Get curve (-> stored in CurveArray)
CurveID	INT	Immediate Tag	Curve ID (number). Range: 1255
CurveArray	DINT[1019]	Tag	Curve data. Contains all important curve data.
ErrorID	INT	Immediate Tag	Error ID if error is detected.

LM_CFG_CurveAccess Structure Descriptions

Enumerations	Description
EN (Enable)	A false-to-true transition caused the instruction to execute. The EN bit stays set until the process is complete and the rung goes false.
DN (Done)	The drive has accepted command.
ER (Error)	An error occurred.
IP (In Process)	Drive is processing the requested mode.
PC (Process Complete)	Process complete.



Attention:

Before executing mode 0 the MC_SW of the drive must be stopped. Use LM_CFG_StartStopDefault Mode 5 to do so.



Attention:

The curve stored on the LinMot drive must not exceed 1001 set-points!

5.9 Optional Instructions: Force / Torque Control

This chapter lists instructions for closed loop force/torque control.

These instructions can only be used when the virtual axis is not coupled with the physical axis! Use *tstLM_Axis.PVAStatus* to check if the axis is in streaming mode.

The input tag *TFScale* of the instructions shown in this chapter must be set to the correct scaling factor depending on the motor that is used.

Motor Type	Encoder Settings	TFScale
PS01	For linear motor it is always 1 mm	0.1 (N)
PR01 & PR02	360'000 ticks per motor revolution	0.00057295779513082 (Nm)
EC02	524'288	0.000834430268037632 (Nm)

The required scale can also be found within LinMot-Talk:

Project		ect	n in the second s					1	× (8 × 1		
~	📲 C	CM_Test_Linear_Axis, IP: 192.168.1.2 (DEV						•			1	
	- N	😵 Control Panel	Name	Value	Raw	Value	UPID	Туре	Scale	Of	Min	Max
	v - E	Parameters	OV/-10V Force	0 N	0000h	0 N	1501h	SInt16	0.1 N	ΟN	-3276.8 N	3276.1
	3	> • 🚍 OS	10V Force	100 N	03E8h	100 N	1502h	SInt16	0.1 N	ΟN	-3276.8 N	3276.7
	· ·	🖌 🖃 Motion Control SW	Speed Filter Time	1000 us	03E8h	1000 us	150Ah	UInt16	1 us	Ous	Ous	65535
		> 😑 Drive Configuration	Acceleration Filter Time	1000 us	03E.8h	1000 us	150Dh	UInt16	1 us	0 us	0 us	65535
		> 😑 Motor Configuration										
		> 😑 State Machine Setup										
		> 😑 Motion Interface										
		> 😑 Position Controller										
		> 😑 Errors & Warnings										
		🗸 🖃 Protected Technology Function										
		🗙 🖃 Analog Force Feedback Co										
	-											
		📃 主 Analog Force Feedback										
		Force Control Paramete										
		> E Wizard Parameters										
		> 😑 Motor Info Block										



Attention:

The closed loop force / torque control technology function must be ordered separately: *Technology Function: Closed Loop FC (Part Nr. 0150-2503)*



Note:

Additional information about the commands used in this chapter can be found in the Motion Control Software user manual > See Recommended Documentation





Attention: Check if the Target Force is reached

If the Target Force is reached must be approved in the application itself as the force/torque control instructions set the DN output TRUE when the drive has switched from position to closed loop force/torque control.

Either you can use a Monitoring Channel (CM / MI drives only) to have the measured force transmitted from the drive to the controller in the bus cycle time, and implement your compare logic,

or you can set the Range Indicator 1 accordingly and check Bit 14 of the StatusWord to become TRUE.

Project	-5		🗌 🗸 🗶 🤅	8 I
Control Panel	Name	Value	Raw Data	UPID
🗸 🔚 Parameters	Range Indicator 1 Minuend UPID	1EA0h (Target Force)	1EA0h	1488h
> 🖅 OS	Range Indicator 1 Subtrahend UPID	1EA1h (Measured Force)	1EA1h	1489h
Y 🖃 Motion Control SW	^L Range Indicator 1 Low Limit Raw Data	-5 (= -0.5 N)	FFFFFFBh	1478h
> 🚖 Drive Configuration	^L Range Indicator 1 High Limit Raw Data	5 (= 0.5 N)	00000005h	1479h
> 🚖 Motor Configuration			1	
🗸 🖃 State Machine Setup				
> E Control Word				
>				
> E Heady I o Uperate				
> E Phase Search				
> Terris Special Mode				
StatusWord				
Range Indicator I				
E Range Indicator 2				

Check the Bit in the axis UDT to become TRUE:

> tstLMAxis.StatusWord.14

1: Switch On Active 2: Enable Operation	1 1
3: Error	0
4: Voltage Enable	1
5: /Quick Stop	1
6: Switch On Locked	0
7: Warning	0
8: Event Handler Active	0
9: Special Motion Active	e0
10: In Target Position	1
11: Homed	1
12: Fatal Error	0
13: Motion Active	
14: Range Indicator 1	1
15: Range Indicator 2	0
Status Word:	4C37h

The Range Indicator 1 Low/High Limits can be modified using the LM_ParameterWrite instruction by accessing UPID 1478h or 1479h.



5.9.1 Force / Torque Control Change Target Force (LM_FC_FCCTF)

Use this instruction to change the target force / torque if the drive is in force / torque control mode.



Operand	Туре	Format	Description
LM_FC_FCCTF	LM_FC_FCCTF	Тад	Instance of the Addon Instruction. Access instruction status parameters.
Axis	tstLM_Axis	Tag	Axis to perform the action on.
TargetForce	REAL	Immediate Tag	Target force [N] / torque [Nm].
TFScale	REAL	Immediate Tag	Force [N] / Torque [Nm] scale

LM_FC_FCCTF Structure Descriptions

Enumerations	Description
EN (Enable)	A false-to-true transition caused the instruction to execute. The EN bit stays set until the process is complete and the rung goes false.
DN (Done)	The command was successfully initiated.
ER (Error)	An error occurred.
IP (In Process)	Drive is setting new target force / torque.
PC (Process Complete)	Drive has set new target force / torque.



Note:

- This instruction implements the LinMot motion command: "Force Ctrl Change Target Force (382xh)"



5.9.2 Force / Torque Control Standstill Tara (LM_FC_FCST)

Use this instruction to tara the differential analogue input -10V..10V.

This command captures the Measured Force/Torque (UPID 0x1EA1) over the parametrized Capture Time and stores its average as 0V Raw Data Offset (UPID 0x1798).



Operand	Туре	Format	Description
LM_FC_FCST	LM_FC_FCST	Тад	Instance of the Addon Instruction. Access instruction status parameters.
Axis	tstLM_Axis	Tag	Axis to perform the action on.
CaptureTime	INT	Immediate Tag	Capture time in milliseconds [ms]

LM_FC_FCST Structure Descriptions

Enumerations	Description
EN (Enable)	A false-to-true transition caused the instruction to execute. The EN bit stays set until the process is complete and the rung goes false.
DN (Done)	The command was successfully initiated.
ER (Error)	An error occurred.
IP (In Process)	Drive is capturing and calculating the average.
PC (Process Complete)	Drive has completed capturing and calculating the average



Note:

- This instruction implements the LinMot motion command: "Standstill Tara Diff Analog In -10V..10V (38Bxh)"



Attention:

This command is available on C1250 series drives and from firmware 6.10 and higher only.



5.9.3 Go To Position Tara Diff Analog In -10..10V (LM_FC_GTPT)

Use this instruction to tara the differential analogue input -10V..10V.

This command sets a new target position and defines the maximal speed, acceleration, and deceleration rate for the movement. The command execution starts immediately when the command has been sent.

This command additionally captures the Measured Force (UPID 0x1EA1) while the Demand Velocity is in maximal velocity state and stores its average as 0V Raw Data Offset (UPID 0x1798).

The measurement of the Measured Force can be delayed by the parameter Time Delay and is captured during the time Capture Time. More information about the command is found in the manual.

	LM FC G	ГРТ	
_	Go To Position Ta	ara Diff An	
	LM_FC_GTPT	?	-(EN)-
	Axis	?	
	Position	?	-(DN)-
		??	
	Speed	?	-(ER)
		??	
	AccelRate	?	-(₽)
		??	
	DecelRate	?	-(PC)-
		??	
	TimeDelay	?	
		??	
	CaptureTime	?	
		??	

Signature ID: B03E7239

Operand	Туре	Format	Description
LM_FC_FCST	LM_FC_FCST	Тад	Instance of the Addon Instruction. Access instruction status parameters.
Axis	tstLM_Axis	Tag	Axis to perform the action on.
Position	REAL	Immediate Tag	Absolute position to move to
Speed	REAL	Immediate Tag	Speed to move the axis in [Units/s]
AccelRate	REAL	Immediate Tag	Acceleration rate of the axis in [Units/s ²]
DecelRate	REAL	Immediate Tag	Deceleration rate of the axis in [Units/s ²]
TimeDelay	REAL	Immediate Tag	Time delay in milliseconds [ms]
CaptureTime	REAL	Immediate Tag	Capture time in milliseconds [ms]

LM_FC_FCGTPT Structure Descriptions

Enumerations	Description
EN (Enable)	A false-to-true transition caused the instruction to execute. The EN bit stays set until the process is complete and the rung goes false.
DN (Done)	The command was successfully initiated.
ER (Error)	An error occurred.
IP (In Process)	Drive is moving, capturing, and calculating the average.
PC (Process Complete)	Drive has reached the position and completed capturing and calculating the average.





Note:

This instruction implements the LinMot motion command: "Go To Position Tara Diff Analog In -10..10V (38Axh)"



Attention:

This command **only supports linear axis** at this point and is available on C1250 series drives from firmware **6.10** and higher.



5.9.4 Go To Position Force / Torque Control High Limit (LM_FC_GTPFCHL)

With this AOI the motor starts moving towards the target position (*Position*). If the measured force / torque **exceeds** the *ForceLimit* the drive switches to force / torque control mode with target force / torque = *TargetForce*.

<u>Hint</u>: If the target position is reached without switching to force / torque control mode an error is generated (ErrorID = 07h).

	LM_FC_GTPFC	HL	
-	Go To Pos With Highe	er Force/To	
	LM_FC_GTPFCHL	?	-(EN)
	Axis	?	
	MoveType	?	-(DN)-
		??	
	Position	?	-(ER)
		??	
	Speed	?	-(P)
		??	
	AccelRate	?	-(PC)
		??	
	ForceLimit	?	
		??	
	TargetForce	?	
	-	??	
	TFScale	?	
		??	

Operand	Туре	Format	Description
LM_FC_GTPFCHL	LM_FC_GTPFCHL	Тад	Instance of the Addon Instruction. Access instruction status parameters.
Axis	tstLM_Axis	Тад	Axis to perform the action on.
МоvеТуре	DINT	Tag Immediate	Absolute (0), Incremental (1)
Position	REAL	Immediate Tag	Target position / distance. Should not be reached but defines the maximum the motor moves if no force is detected. [Units]
Speed	REAL	Immediate Tag	Speed for the force search movement. [Units/s]
Acceleration	REAL	Immediate Tag	Acceleration for the force search movement. [Units/s ²]
ForceLimit	REAL	Immediate Tag	Force / torque limit that must be exceeded to switch to force / torque control mode in [N] / [Nm].
TargetForce	REAL	Immediate Tag	Target force [N] / [Nm].
TFScale	REAL	Immediate Tag	Force [N] / Torque [Nm] scale.

LM_FC_GTPFCHL Structure Descriptions

Enumerations	Description
EN (Enable)	A false-to-true transition caused the instruction to execute. The EN bit stays set until the process is complete and the rung goes false.
DN (Done)	The command was successfully initiated.
ER (Error)	An error occurred.
IP (In Process)	Motor is moving to detect the Force Limit.
PC (Process Complete)	Force / Torque Limit reached, and drive is operating in force / torque control mode.



5.9.5 Go To Position Force / Torque Control Low Limit (LM_FC_GTPFCLL)

With this AOI the motor starts moving towards the target position (*Position*). If the measured force / torque **undercuts** the *ForceLimit* the drive switches to force / torque control mode with target force / torque = *TargetForce*.

<u>Hint</u>: If the target position is reached without switching to force / torque control mode an error is generated (ErrorID = 07h).

	LM_FC_GTPFC	LL	1
-	Go To Pos With Lowe	er Force/T	
	LM_FC_GTPFCLL	?	-(EN)-
	Axis	?	
	MoveType	?	CDN)-
		??	
	Position	?	-(ER)
		??	
	Speed	?	-(P)
		??	
	AccelRate	?	-(PC)-
		??	
	ForceLimit	?	
		??	
	TargetForce	?	
	-	??	
	TFScale	?	
		??	

Operand	Туре	Format	Description
LM_FC_GTPFCHL	LM_FC_GTPFCHL	Тад	Instance of the Addon Instruction. Access instruction status parameters.
Axis	tstLM_Axis	Тад	Axis to perform the action on.
МоvеТуре	DINT	Tag Immediate	Absolute (0), Incremental (1) Mode 1 requires firmware 6.9 and higher!
Position	REAL	Immediate Tag	Target position / distance. Should not be reached but defines the maximum the motor moves if no force is detected. [Units]
Speed	REAL	Immediate Tag	Speed for the force search movement. [Units/s]
Acceleration	REAL	Immediate Tag	Acceleration for the force search movement. [Units/s ²]
ForceLimit	REAL	Immediate Tag	Force / torque limit that must be undercut to switch to force / torque control mode in [N] / [Nm].
TargetForce	REAL	Immediate Tag	Target force [N] / [Nm].
TFScale	REAL	Immediate Tag	Force [N] / Torque [Nm] scale.

LM_FC_GTPFCLL Structure Descriptions

Enumerations	Description
EN (Enable)	A false-to-true transition caused the instruction to execute. The EN bit stays set until the process is complete and the rung goes false.
DN (Done)	The command was successfully initiated.
ER (Error)	An error occurred.
IP (In Process)	Motor is moving to detect the Force Limit.
PC (Process Complete)	Force / Torque Limit reached, and drive is operating in force / torque control mode.



5.9.6 Go To Position Reset Force Control (LM_FC_GTPRFC)

With this AOI the drive can be set back to position control loop and moved from its actual position to the position defined with *Position, Speed, Acceleration* and *Deceleration*.

	LM_FC_GTPR	FC	
_	Go To Pos From Act	Pos And	
	LM_FC_GTPRFC	?	-(EN)
	Axis	?	
	MoveType	?	-(DN)
		??	
	Position	?	-(ER)
		??	
	Speed	?	-(P)
		??	
	AccelRate	?	-(PC)
		??	
	DecelRate	?	
		??	

Operand	Туре	Format	Description
LM_FC_GTPRFC	LM_FC_GTPRFC	Тад	Instance of the Addon Instruction. Access instruction status parameters.
Axis	tstLM_Axis	Tag	Axis to perform the action on.
МоvеТуре	DINT	Tag Immediate	Absolute (0), Incremental (1)
Position	REAL	Immediate Tag	Target position / distance in [Units].
Speed	REAL	Immediate Tag	Speed in [Units/s].
Acceleration	REAL	Immediate Tag	Acceleration in [Units/s ²].
Deceleration	REAL	Immediate Tag	Deceleration in [Units/s ²].

LM_FC_GTPRFC Structure Descriptions

Enumerations	Description
EN (Enable)	A false-to-true transition caused the instruction to execute. The EN bit stays set until the process is complete and the rung goes false.
DN (Done)	The command was successfully initiated.
ER (Error)	An error occurred.
IP (In Process)	Motor is moving to position.
PC (Process Complete)	Axis position controlled and in target position.



Note:

- This instruction implements the LinMot motion commands: MoveType 0 (Absolute): "VAI Go To Pos From Act Pos And Reset Force Control Set I (386xh)" MoveType 1 (Incremental): "VAI Increment Act Pos And Reset Force Control Set I (387xh)"



5.10 Optional Instructions: Motion Move Instructions known from LinMot -IP Drives

This chapter lists a couple of motion instructions that directly control the physical axis. They can be used if no coordinated motion is required or if you do not want to use the physical axis in a motion group.

These instructions can only be used when the virtual axis is not coupled with the physical axis! Use *tstLM_Axis.PVAStatus* to check if the axis is in streaming mode.

5.10.1 Motion Axis Stop (LM_MAS)

The LM_MAS instruction is the equivalent for the Rockwell Automation MAS instruction. Use this instruction to stop a specific motion process on an axis or to stop the axis completely.

LM_MA	S Axis Stop	1
LM_MAS Axis DecelRate	? ? ? ??	-(EN)- -(DN)- -(ER)- -(IP)- -(IP)-

Operand	Туре	Format	Description
LM_MAS	LM_MAS	Тад	Instance of the Add-on Instruction. Access instruction status parameters.
Axis	tstLM_Axis	Tag	Axis to perform the action on.
DecelRate	REAL	Immediate Tag	Deceleration rate of the axis in [Units/s ²] Important : The axis could overshoot its target position if you reduce the deceleration while a move is in process.

LM_MAS Structure Descriptions

Enumerations	Description
EN (Enable)	The EN bit stays set until the process is complete and the rung goes false. A false-to-true transition caused the instruction to execute.
DN (Done)	The stop was successfully initiated.
ER (Error)	An error occurred.
IP (In Process)	The axis is stopping.
PC (Process Compete)	The axis stopped. The PC bit stays set until the rung makes a false-to-true transition.

i

Note:

- Stop Type is always All (0)
- DecelRate is in position units per second squared [Units/s²]
- DecelRate is 10'000 Units/s² by default
- A trapezoidal profile is always used for LM_MAS
- This instruction implements the LinMot motion command "VAI Stop (017xh)"



5.10.2 Motion Axis Home (LM_MAH)

The LM_MAS instruction is the equivalent for the Rockwell Automation MAH instruction. Use this instruction to home an axis.

The homing sequence can be selected during axis configuration (LinMot-Talk Motor Wizard). It's an active homing.



Operand	Туре	Format	Description
LM_MAH	LM_MAH	Тад	Instance of the Add-on Instruction. Access instruction status parameters.
Axis	tstLM_Axis	Тад	Axis to perform the action on.

LM_MAH Structure Descriptions

Enumerations	Description
EN (Enable)	It is set when the rung makes a false-to-true transition and remains set until the servo message transaction is completed and the rung goes false.
DN (Done)	It is set when axis home has been successfully completed or is aborted.
ER (Error)	It is set to indicate that the instruction detected an error.
IP (In Process)	It is set on positive rung transition and cleared after the Motion Home Axis is complete, or terminated by a stop command, shutdown, or a servo fault.
PC (Process Compete)	It is set when axis home is successfully completed.



Note:

Note:

The homing sequence can be set-up using LinMot-Talk. The easiest way is to use the Motor Wizard.

i

If a master gantry system is used (E1250-IP or E1450-IP drives) a special instruction is available for homing (LM_MAH_MG) which guarantees a proper homing of all involved axes.



5.10.3 Motion Axis Jog (LM_MAJ)

The LM_MAJ instruction is the equivalent for the Rockwell Automation MAJ instruction. Use this instruction to move an axis at a constant speed until you tell it to stop using the LM_MAS instruction above.

LM_M	IAJ	
 LinMot Motion	n Axis Jog	
LM_MAJ	?	-(EN)
Axis	?	-(DN)
Direction	?	-(ER)
	??	-(P)
Speed	?	
	??	
AccelRate	?	
	??	

Operand	Туре	Format	Description
LM_MAJ	LM_MAJ	Тад	Instance of the Add-on Instruction. Access instruction status parameters.
Axis	tstLM_Axis	Tag	Axis to perform the action on.
Direction	DINT	Immediate Tag	Forward = 0 Reverse = 1
Speed	REAL	Immediate Tag	Speed to move the axis in [Units/s]
AccelRate	REAL	Immediate Tag	Acceleration rate of the axis in [Units/s ²]

LM_MAJ Structure Descriptions

Enumerations	Description
EN (Enable)	A false-to-true transition caused the instruction to execute. The EN bit stays set until the process is complete and the rung goes false.
DN (Done)	The jog was successfully initiated.
ER (Error)	An error occurred.
IP (In Process)	The axis is jogging.



Note: - Profile is always trapezoidal

- Default Speed = 10 Units/s, Default AccelRate = 10 Units/s²

- This instruction implements the LinMot motion commands: VAI Dec=Acc VAI Infinite Motion Positive Direction (0CExh) and VAI Dec=Acc VAI Infinite Motion Negative Direction (0CFxh)



5.10.4 Motion Axis Move (LM_MAM)

The LM_MAM instruction is the equivalent for the Rockwell Automation MAM instruction. Use this instruction to move an axis to a specified position.

LM MAM-				
 LinMot Motion	Axis Move			
LM_MAM	?	-(EN)-		
Axis	?			
MoveType	?	-(DN)-		
	??			
Position	?	-(ER)		
	??			
Speed	?	-<"₽)		
	??			
AccelRate	?	-(PC)-		
	??			
DecelRate	?			
	??			
Profile	?			
	??			
JerkRate	?			
	??			

Operand	Туре	Format	Description		
LM_MAM	LM_MAM	Тад	Instance of the Add-on Instruction. Access instruction status parameters.		
Axis	tstLM_Axis	Тад	Axis to perform the action	on on.	
MoveType	DINT	Immediate	Absolute	0	
		Tag	Incremental	1	
			Rotary Shortest Path	2 profile 0 only	
			Rotary Positive	3 profile 0 only	
			Rotary Negative	4 profile 0 only	
Position	REAL	Immediate	Absolute position or incr	emental distance for the move.	
		Tag	For this Move Type	Enter this Position value in [Units]	
			Absolute	Position to move to	
			Incremental	Distance to move	
Speed	REAL	Immediate Tag	Speed to move the axis in [Units/s].		
AccelRate	REAL	Immediate Tag	Acceleration rate of the axis in [Units/s ²].		
DecelRate	REAL	Immediate Tag	Deceleration rate of the axis in [Units/s ²] Only used with Trapezoidal (0) and S-Curve (2) profile.		
Profile	DINT	Immediate Tag	Select the profile to run for the move. 0 = Trapezoidal 1 = Bestehorn 2 = S-Curve 3 = Sine		
JerkRate	REAL	Immediate Tag	Jerk rate of the axis in [Units/s ³] The instruction only uses the JerkRate operand if the Profile is Bestehorn (1) or S-Curve (2). Setting a LM_MAM to Bestehorn with 0 as JerkRate value will not produce a Trapezoidal profile.		



LM_MAM Structure Descriptions

Enumerations	Description	
EN (Enable)	A false-to-true transition caused the instruction to execute. The EN bit stays set until the process is complete and the rung goes false.	
DN (Done)	The move was successfully initiated.	
ER (Error)	An error occurred.	
IP (In Process)	The axis is moving. Any of these actions stop this move and clear the IP bit: • The axis gets to the end Position • Another MAM instruction supersedes this MAM instruction • MAS instruction • Shutdown command • Fault Action	
PC (Process Compete)	 The PC bit stays set until the rung makes a false-to-true transition. The PC bit stays cleared if some other action stops the move before the axis gets to the end Position. 	



Note: If an input tag is 0 (zero) the following default values are taken

Default Speed = 10 Units/s, Default AccelRate & DecelRate = 10 Units/s², Default JerkRate = 10 Units/s³

i

Note:

The MAM instruction implements the following LinMot motion commands:

- Profile 0 Trapezoidal:
- Absolute: VAI Go To Pos (010xh)
- Incremental: VAI Increment Dem Pos (011xh)
- Rotary Shortest Path : VAI Modulo Go To Pos Shortest Way (3C2xh)
- Rotary Positive: VAI Modulo Go To Pos Positive Direction (3C0xh)
- Rotary Negative: VAI Modulo Go To Pos Negative Direction (3C1xh)

Profile 1 Bestehorn:

- Absolute: Bestehorn VAJ Go To Pos (0F0xh)
- Incremental: Bestehorn VAJ Increment Demand Pos (0F1xh)

Profile 2 S-Curve:

- Absolute: VAJI Go To Pos (3A0xh)
- Incremental: VAJI Increment Dem Pos (3A1xh)

Profile 3 Sine:

- Absolute: Sin VA Go To Pos (0E0xh)
- Incremental: Sin VA Increment Demand Pos (0E1xh)



Attention: Risk of Velocity and/or End Position Overshoot

If you change move parameters dynamically by any method, for example by starting a new instruction before the last one has completed, be aware of the risk of velocity and/or end position overshoot.

A Trapezoidal profile can overshoot if maximum deceleration is decreased while the move is decelerating or is close to the deceleration point.

A Bestehorn profile can overshoot if a Bestehorn move is overwritten by another Bestehorn move.



Attention:

The Bestehorn profile has same acceleration and deceleration rate. So only AccelRate has influence.



5.10.5 Motion Axis Increment Actual Position (LM_MAIAP_I0)

Use the LM_MAIAP_I0 instruction to increment the actual position and reset the I part of the position controller of a LinMot motor.

The most common use case is to reset the position lag after pressing on an object.

1	LM_MAIAP	_10	1
-	Increment Act Po	s Starting	
	LM_MAIAP_I0	?	-(EN)
	Axis	?	-(DN)-
	Distance	?	-(ER)
		??	-(P)
	Speed	?	-(PC)-
		??	
	AccelRate	?	
		??	
	DecelRate	?	
		??	

Operand	Туре	Format	Description
LM_MAIAP	LM_MAIAP	Тад	Instance of the Add-on Instruction. Access instruction status parameters.
Axis	tstLM_Axis	Тад	Axis to perform the action on.
Distance	REAL	Immediate Tag	Distance to move
Speed	REAL	Immediate Tag	Speed to move the axis in [Units/s]
AccelRate	REAL	Immediate Tag	Acceleration rate of the axis in [Units/s ²]
DecelRate	REAL	Immediate Tag	Deceleration rate of the axis in [Units/s ²]

LM_MAIAP_I0 Structure Descriptions

Enumerations	Description
EN (Enable)	A false-to-true transition caused the instruction to execute. The EN bit stays set until the process is complete and the rung goes false.
DN (Done)	The move was successfully initiated.
ER (Error)	An error occurred.
IP (In Process)	The axis is moving.
PC (Process Complete)	The move was successfully completed.



Note:

- Profile is always trapezoidal

- Default Speed = Units/s, Default AccelRate & DecelRate = 10 Units/s²

- The instruction LM_MAIAP_I0 implements the LinMot motion command: VAI Increment Act Pos Starting with Dem Vel = 0 Reset I-Contr (0D9xh)



5.10.6 Motion Axis Time Curve (LM_MATC)

Use this instruction to start a curve (motion profile) stored on the LinMot drive.

	LM_MAT	ю	1
_	Time Curve With A	Adjustable O	
	LM_MATC	?	-(EN)
	Axis	?	-(DN)-
	CurvelD	?	-(ER)
		??	-(P)
	CurveOffset	?	-(PC)
		??	
	TimeScale	?	
		??	
	AmplitudeScale	?	
		??	

Operand	Туре	Format	Description
LM_MATC	LM_MATC	Тад	Instance of the Addon Instruction. Access instruction status parameters.
Axis	tstLM_Axis	Тад	Axis to perform the action on.
CurvelD	DINT	Immediate Tag	Curve ID to start. Range: 1255
CurveOffset	REAL	Immediate Tag	Curve Offset in [Units].
TimeScale	REAL	Immediate Tag	Time scaling in [%]. Range: 0.1 to 200.0%
AmplitudeScale	REAL	Immediate Tag	Amplitude scaling in [%]. Range: -2000.0 to +2000.0%

LM_MATC Structure Descriptions

Enumerations	Description	
EN (Enable)	A false-to-true transition caused the instruction to execute. The EN bit stays set until the process is complete and the rung goes false.	
DN (Done)	The move was successfully initiated.	
ER (Error)	An error occurred.	
IP (In Process)	The axis is running the curve.	
PC (Process Complete)	The axis finished the curve.	



Note:

- This instruction implements the LinMot motion command: "Time Curve With Adjustable Offset, Time Scale & Amplitude Scale (044xh)"



5.10.7 Motion Axis Start Command Table (LM_MASC)

Use this instruction to start an entry of the Command Table stored on the LinMot drive.

LM_MA Start Comman	SC	
LM_MASC Axis CTEntryID	? ? ?? ??	-(EN) -(DN) -(ER)

Operand	Туре	Format	Description
LM_MATC	LM_MATC	Тад	Instance of the Addon Instruction. Access instruction status parameters.
Axis	tstLM_Axis	Tag	Axis to perform the action on.
CTEntryID	DINT	Immediate Tag	Command Table entry ID to start. Range: 1255

LM_MASC Structure Descriptions

Enumerations	Description
EN (Enable)	A false-to-true transition caused the instruction to execute. The EN bit stays set until the process is complete and the rung goes false.
DN (Done)	The drive has accepted command and is executing the Command Table entry.
ER (Error)	An error occurred.



Note:

If the Command Table Entry started is linked to other entries, they will be executed as well!

- This instruction implements the LinMot motion command: "Start Command Table Command (200xh)"


5.10.8 Clear Event Evaluation (LM_ADV_CEE)

Use this instruction to clear the event evaluation inside the LinMot drive. E.g., to stop a running command table.



Operand	Туре	Format	Description
LM_ADV_CEE	LM_ADV_CEE	Тад	Instance of the Addon Instruction. Access instruction status parameters.
Axis	tstLM_Axis	Tag	Axis to perform the action on.

LM_ADV_CEE Structure Descriptions

Enumerations	Description
EN (Enable)	A false-to-true transition caused the instruction to execute. The EN bit stays set until the process is complete and the rung goes false.
DN (Done)	The command was successfully initiated.
ER (Error)	An error occurred.
IP (In Process)	Drive is clearing event evaluation.
PC (Process Complete)	Event evaluation cleared.



Note:

- This instruction implements the LinMot motion command: "Clear Event Evaluation (008xh)"

LinMot®

6 Error Descriptions

6.1 Motion Instructions Errors

ERR	Corrective Action or Cause	Notes
1	Home axis with LM_MAH	Axis Not Homed
5	Close the servo loop before you execute this instruction. E.g., Use LM_MSO	Servo Off State Error
7	Target position reached (FC instructions only)	LM_FC_GTPFC only > see chapter 5.9
13	An operand is outside its range	
16	Wait until the homing process is done.	Home In Process Error
20	The axis is in the faulted state.	Axis In Faulted State
>=4096	Internal instruction has an error > Err = 1000h + Error ID see 6.2	

6.2 Configuration Instructions Errors

If the ER output is set the following Error IDs are possible

Error ID	Error Text	Description
00h	Instruction aborted	The instruction was aborted by another instruction.
01h	TimeOut (No response from drive)	Drive is not responding within the requested time. Check fieldbus connection
02h	ConfigChannel already busy	Configuration channel is already busy. Check if another configuration instance is in process.
03h	Invalid Mode selected	Invalid mode selected. Please check Mode input
06h	Array size to small	Connected Array is too small
C0h	UPID error	Unknown UPID selected, check UPID input
C1h	Parameter Type Error	
C2h	Range Error	The value to be written is outside the parameters range
C3h	Address Usage Error	There is an attempt to write a read only parameter
C5h	Error: Command 21h	
D0h	Odd Address	
D1h	Size Error (Curve Service)	
D4h	Curve already defined / Curve not present (Curve Service)	
D7h	MC Software is still running, should be stopped	To store the Command Table / Curves into the Flash memory of the drive the MC_SW must be stopped (LM_CFG_StopStartDefault, Mode 5)
other		Contact LinMot technical support



7 Optional Example Programs

7.1 Functionality Beside Synchronized Motion

Beside the demo project (CIPSync_Demo_...) the package also contains some exported programs in the folder *Exports**Optional*.

Optional_1_Parameters...L5X shows the use of the parameter and configuration instructions in a very basic manner.

Optional_2_ForceTorqueControl...L5X shows the use of the force / torque control instructions in a very basic manner.

Both program exports can be imported into a, preferably new, project to look at the implementation. After importing do not forget to set a valid alias for the tstLM_Axis type, e.g.:

S	cope: 📮 Optional_2_Forci 🗸 Sho	w: All Tags			
	Name 📰 🛆	Usage	Alias For	Base Tag	Data Type
	bLMAxis_ChangeTargetForce	Local			BOOL
	bLMAxis_GoToPosForceContro	Local			BOOL
	bLMAxis_GoToPosForceContro	Local			BOOL
	bLMAxis_GoToPosResetForce	Local			BOOL
	+-LMAxis	Local	LMAxis1(C)	LMAxis1(C)	tstLM_Axis
		Local Local	LMAxis1(C)	LMAxis1(C)	tstLM_Axis LM_FC_FCCTF
		Local Local Local	LMAxis1(C)	LMAxis1(C)	tstLM_Axis LM_FC_FCCTF LM_FC_GTPFCHL
		Local Local Local Local	LMAxis1(C)	LMAxis1(C)	tstLM_Axis LM_FC_FCCTF LM_FC_GTPFCHL LM_FC_GTPFCLL
		Local Local Local Local Local	LMAxis1(C)	LMAxis1(C)	tstLM_Axis LM_FC_FCCTF LM_FC_GTPFCHL LM_FC_GTPFCLL LM_FC_GTPRFC

7.2 Example Projects for Non-Synchronized Motion

In the folder *Misc* of this package two demo projects can be found that show how the physical axis can be controlled without a virtual motion axis.

7.2.1 CM Drive (C1250-CM-..., C1250-MI-..., C1251-MI-...)

A demo project is available called:

• ...\Misc\CM_EDS_NoMotion_Demo_L320ERM_Vxx_xxxxxxx

7.2.2 IP Drive (C1250-IP-..., E1250-IP-...) as AOP

With some limitations also C1250-IP and E1250-IP drives can use the version 2 instructions. To read and write the drive communication two instructions are available in the folder \AOI:

- LM_LMDriveAOP_Read_IP.L5X
- LM_LMDriveAOP_Write_IP.L5X

The demo project showing this integration can be found in the folder \Misc.

...\Misc\IP_AOP_NoMotion_Demo_L320ERM_Vxx_xxxxxxx

7.2.3 IP Drive (C1450-IP-..., E1450-IP-...) as EDS

With some limitations also all other LinMot -IP drives can use the version 2 instructions. To read and write the drive communication two instructions are available in the folder \AOI:

- LM_LMDriveEDS_Read_IP.L5X
- LM_LMDriveEDS_Write_IP.L5X

The demo project showing this integration can be found in the folder \Misc.

...\Misc\IP_EDS_NoMotion_Demo_L320ERM_Vxx_xxxxxxx

8 Principle of Upgrading a Project from IP to CM Drives

The following steps illustrate a possible way to upgrade an existing project from the IP to CM drives. There are a variety of implementation philosophies and there may be other steps required. Please contact our technical support if you have any problems.



Note:

.inMot®

It is not foreseen that both -IP and -CM/MI type drives are used in the same project! V2 instructions are not compatible with IP drives.

 In an empty or test project create a program where you add all new V2 instructions in the tags that you used in the old (IP) project.

⊢		a		٠
ᄂ	•	ч	٠	•
		-		

Controller Organizer 🗸 🕂 🗙	Sc	ope: 📮	MaxExportDC 2 V Sho	w: All Tags				
□ Gontroller v30_CIPSync_Dev	11-6	Name		Usage	Alias For	Base Tag	Data Type	Description
		+-LM_A	ADV_PVATime	Local			LM_ADV_PVATime	LinMot CIPSync S
Controller Fault Handler		⊕-LM_C	CFG_StopStartDefault	Local			LM_CFG_StopStartDefault	Control Firmware
Power-Up Handler		+-LM_D	DriveStatus	Local			LM_DriveStatus	Read LinMot Driv
E			MDriveEDS_Read_78_64	Local			LM_LMDriveEDS_Read_78_64	Read LinMot Driv
		+-LM_L	MDriveEDS_Write_78_64	Local			LM_LMDriveEDS_Write_78_64	Write LinMot Driv
z_MotionGroupUpdate		+-LM_N	MAFR	Local			LM_MAFR	LinMot Motion Axi
			ИАН	Local			LM_MAH	
		+-LM_N	MAIAP_10	Local			LM_MAIAP_I0	
Parameters and Local Tags		+-LM_N	4AJ	Local			LM_MAJ	
A lesting Axis]		+-LM_N	MAM	Local			LM_MAM	LinMot Motion Axi
Motion Groups		+-LM_N	MAS	Local			LM_MAS	LinMot Motion Axi
MotionGroup		⊞-LM_N	MASC	Local			LM_MASC	
Master			MATC	Local			LM_MATC	
- VLMAxis1_Lin		±-LM_Ν	MSF .	Local			LM_MSF	LinMot Motion Ser
vLMAxis2_Rot		+-LM_N	4SO	Local	~		LM_MSO	LinMot Motion Ser
Ungrouped Axes		+-LM_P	ParameterRead	Local			LM_ParameterRead	LinMot Parameter
🚊 😂 Add-On Instructions			ParameterWrite	Local			LM_ParameterWrite	LinMot Parameter
i 🕼 LM_ADV_CmdPosition								

- 2. Export this program.
- 3. Install the EDS file of the CM/MI drive you want to use.
- 4. Add CM/MI drive(s) to your existing project replacing the existing IP drive(s).
- 5. Import the exported program from above into your existing project.





6. Attention: In the import configuration set all Add-On Instructions and Data Types to Overwrite!

Find:		- 🎽 🐴 🛛	Find/Rep	lace						
Import Content:										
Programs	Confi	gure Data Typ	e Refere	ences						
MaxExportDC_210		Import Name	Opera	tion 🕞	Final N	ame A	P Desc	riptio	n	
Parameters and Local Ta	igs 📉 t	stLM Axis	Overv	write 🗸 🗼	tstLM	Axis		mpero		
Routines		 UDT_GrandMast	e	• 🗋	UDT_C	GrandMaste	•••			
References Tags Add-On Instructions Connections Errors/Warnings			/							
Import Configuration - MaxExperiment Find: Find Within: Final Name	ortDC_21	0.L5X	₿ Fi r	nd/Replace.						
Import Configuration - MaxExpension Find: Find Within: Final Name	ortDC_21	0.L5X	Fir	nd/Replace.						
Import Configuration - MaxExperience Find: Find Within: Final Name Import Content: Find Programs	ortDC_21	0.L5X	-On Inst	nd/Replace.		ices				
Import Configuration - MaxExperiment Find: Find: Find Within: Final Name Find	ortDC_21	0.L5X	-On Inst	nd/Replace.		nces			Dentet	
Import Configuration - MaxExperiment Find: Find Within: Final Name Import Content: Programs MaxExportDC_210 Parameters and Local	ortDC_21	0.L5X		truction R	 eferei	nces			Revisi	Revision
Import Configuration - MaxExperiment Find: Find Within: Final Name Find Withi	ortDC_21	0.L5X	-On Inst	truction R Operation Create		Final Name	e 🛆 PVATime		Revisi v2.1	Revision
Import Configuration - MaxExperimental Systems Find:	ortDC_21	0.L5X	-On Inst e VATime itop Sta.	truction R Operation Create Overwrite		Final Name	e ∆ °VATime StopSta…		Revisi v2.1 v2.0	Revision
 Import Configuration - MaxExperiment Find: Find Within: Final Name Import Content: Programs MaxExportDC_210 Parameters and Loca Routines Programs References References 	ortDC_21	0.L5X	-On Inst e VATime top Sta.	truction R Operation Create Overwrite Overwrite	eferei	Final Name LM_ADV_1 LM_CFG_9 LM_DriveS	e A PVATime Stop Sta tatus		Revisi v2.1 v2.0 v2.0	Revision Initial V2 Initial V2
 Import Configuration - MaxExperiment Find: Find Within: Final Name Import Content: Programs MaxExportDC_210 Parameters and Local Routines Routines References Tags Add-On Instruction 	ortDC_21	0.L5X	-On Inst -On Inst ite VATime itop Sta eEDS	truction R Operation Create Overwrite Overwrite Create	eferer	Final Name LM_ADV_I LM_CFG_S LM_DriveS LM_LMDriv	e PVATime Stop Sta tatus reEDS		Revisi v2.1 v2.0 v2.0 v2.0	Revision Initial V2 Initial V2 Initial V2
 Import Configuration - MaxExperiment Find: Find: Find Within: Final Name Import Content: Programs MaxExportDC_210 Parameters and Local Routines Programs References References Tags Add-On Instruction Data Types 	ortDC_21	O.L5X	-On Inst e PVATime top Sta tatus reEDS reEDS	truction R Operation Create Overwrite Overwrite Create Create	eferei	Final Name LM_ADV_I LM_CFG_S LM_DriveS LM_LMDriv LM_LMDriv	e A PVATime StopSta reEDS reEDS		Revisi v2.1 v2.0 v2.0 v2.0 v2.0 v2.0	Revision Initial V2 Initial V2 Initial V2 Initial V2
 Import Configuration - MaxExperiment Find: Find Within: Final Name Import Content: Programs MaxExportDC_210 Parameters and Local Routines Programs References References Tags Add-On Instructor Data Types 	ortDC_21	0.L5X	-On Insl ee VATime top Sta eeEDS eeEDS	truction R Operation Create Overwrite Overwrite Create Create Overwrite	eferei	Final Name LM_ADV_I LM_CFG_S LM_DriveS LM_LMDriv LM_LMDriv LM_LMDriv	e A PVATime StopSta tatus reEDS reEDS		Revisi v2.1 v2.0 v2.0 v2.0 v2.0 v2.0 v2.0	Revision Initial V2 Initial V2 Initial V2 Initial V2 Initial V2
 Import Configuration - MaxExperiment Find: Find Within: Final Name Import Content: Programs MaxExportDC_210 Parameters and Loca Routines Programs References References Add-On Instruction Connections Errors/Warnings 	ortDC_21	0.L5X	-On Inst ee VVATime topSta tatus eEDS	truction R Operation Create Overwrite Overwrite Create Overwrite Overwrite Overwrite	eferer	Final Name LM_ADV_I LM_CFG_S LM_DriveS LM_LMDriv LM_LMDriv LM_LMDriv LM_MAFR	e A PVATime StopSta tatus reEDS reEDS		Revisi v2.1 v2.0 v2.0 v2.0 v2.0 v2.0 v2.0 v2.0	Revision Initial V2 Initial V2 Initial V2 Initial V2 Initial V2
 Import Configuration - MaxExperiment Find: Find Within: Final Name Import Content: Programs MaxExportDC_210 Parameters and Location Routines Programs References References Add-On Instruction Connections Errors/Warnings 	ortDC_21	0.L5X	-On Inst itop Sta itop Sta iteEDS iteEDS	truction R Operation Create Overwrite Create Create Overwrite Overwrite Overwrite Overwrite	eferer	Final Name LM_ADV_f LM_CFG_S LM_DriveS LM_LMDriv LM_LMDriv LM_MAFR LM_MAH	PVATime StopSta reEDS reEDS 2_10		Revisi v2.1 v2.0 v2.0 v2.0 v2.0 v2.0 v2.0 v2.0 v2.0	Revision Initial V2 Initial V2 Initial V2 Initial V2 Initial V2 Initial V2 Initial V2
 Import Configuration - MaxExperiment Find: Find: Find Within: Final Name Import Content: Programs MaxExportDC_210 Parameters and Local Routines Programs References References Tags Add-On Instructor Connections Errors/Warnings 	ortDC_21	0.L5X	• Fir • On Inst • e VATime top Sta • eEDS • eEDS • eEDS	truction R Operation Create Overwrite Overwrite Create Overwrite Overwrite Overwrite Overwrite Overwrite		Final Name LM_ADV_I LM_CFG_S LM_DriveS LM_LMDriv LM_LMDriv LM_MAFR LM_MAFR LM_MAH	e A PVATime StopSta reEDS reEDS 2_10		Revisi v2.1 v2.0 v2.0 v2.0 v2.0 v2.0 v2.0 v2.0 v2.0	Revision Initial V2 Initial V2 Initial V2 Initial V2 Initial V2 Initial V2 Initial V2 Initial V2
 Import Configuration - MaxExperiment Find: Find Within: Final Name Import Content: Programs MaxExportDC_210 Parameters and Loca Routines Programs References References Add-On Instruction Connections Errors/Warnings 	ortDC_21	0.L5X	-On Inst e VATime topSta. tatus eEDS eEDS 10	truction R Operation Create Overwrite Overwrite Overwrite Overwrite Overwrite Overwrite Overwrite Overwrite		Final Name LM_ADV_I LM_CFG_S LM_DriveS LM_LMDriv LM_LMDriv LM_MAFR LM_MAH LM_MAIAF LM_MAIAF	e <u>A</u> PVATime Stop Sta tatus reEDS reEDS P_10		Revisi v2.1 v2.0 v2.0 v2.0 v2.0 v2.0 v2.0 v2.0 v2.0	Revision Initial V2 Initial V2 Initial V2 Initial V2 Initial V2 Initial V2 Initial V2 Initial V2
 Import Configuration - MaxExperiment of the second s	ortDC_21	0.L5X	-On Inst ite VATime itopSta eEDS 10	truction R Operation Create Overwrite Overwrite Create Overwrite Overwrite Overwrite Overwrite Overwrite Overwrite Overwrite		Final Name LM_ADV_f LM_CFG_S LM_DriveS LM_LMDriv LM_LMDriv LM_MAFR LM_MAH LM_MAIAF LM_MAJ LM_MAJ LM_MAS	→ △ PVATime Stop Sta tatus reEDS P_10		Revisi v2.1 v2.0 v2.0 v2.0 v2.0 v2.0 v2.0 v2.0 v2.0	Revision Initial V2 Initial V2 Initial V2 Initial V2 Initial V2 Initial V2 Initial V2 Initial V2 Initial V2



AB:Embedded DiscreteIO:O:0

BOOL

BOOL

7. Replace the old read and write instructions in the project (and then delete them from the project).



8. In this example it would make sense to rename the LM_ADV_PVA instruction to LM_ADV_PVATime first, so that it is overwritten during import.

If not then replace the instructions LM_ADV_PVA > LM_ADV_PVATime in both the routine and tags. Then correct the tags at the instruction.

+ Local:1:0

Macro_0

Macro_1

🖂 🖨 Cantrallas DC 210		
Controller Tags	Scope: DC_210 V Show: All Tags	
Controller Fault Handler	Name <u>=</u> ≣ ∆ Alias For Base Tag	Data Type Description
Power-Up Handler		REAL[10]
🚊 🔄 Tasks	HMI_MAM_Pos	REAL[10]
🖨 💭 Coms_Task	+-HMI_MAM_Prof	DINT[10]
🖨 🖼 Coms_Program	HMI_MAM_Vel	REAL[10]
Parameters and Local Tags	HMI_TempOut	REAL
Communication_Routine	±-LM_ADV_PVA	LM_ADV_PVATime LnMot CIPS
- Main lask	.LM_CFG_SSD	LM_CFG_StopStartDefault Control Firm
		LM_DriveStatus Read LinMo
MaxExportDC 210		LM_MAFR Lin Mot Motio

🔁 MainTask 🗄 🕞 MainProgram

🔄 Unscheduled



- 9. Build the controller and check for errors like ActualCurrent <> CurrentFeedback, invalid input and output tags, and so on.
- 10. Delete the imported program.



in MG



11. To have the PVA CIP Sync running you must add the *LM_CFG_CAInit* instruction (copy paste or import), add an init program, add a message tag in the controller tags and set it up as shown in chapters 4.1.2 & 5.8.1.

Set the aliases to the corre	ect tag	s.									
Controller Organizer	→ ‡	×	Scope:	DemoCase_Dr	ive 🗸 🛛 Sho	w: All Tags					
E Controller DC_210		^	Nam	e	-== 4	Usage	Alias For		Base Tag	Data Type	
Controller Tags			F	S_Done		Local				BOOL	
Controller Fault Handler			l Ir	nit_Done		Local				BOOL	
Power-Up Handler			- +L	MAxis		Local	DemoCaseAxis1(C)		DemoCaseAxis1(C)	tstLM Axis	
📋 🔄 Tasks				MAxis CAlnit		Local				LM CFG CAIr	nit
🖻 🤝 Coms_Task				 MAxisConfig		Local	DemoCase Drive:C(C)		DemoCase Drive:	024D:LMDriv	/e_A85620
🖻 🖼 Coms_Program				MAxisReconf		Local	DemosCase CA Reconf(C)		DemosCase CA	MESSAGE	
Parameters and Local Tags						2000	Democodo _ or (_ricconi(o)				
Communication_Routine											
🖨 🧔 MainTask											
🖶 🕞 MainProgram											
DemoCase_Drive_Init											
Parameters and Local Tags											
- Binit											
Unscheduled											
Controller Organizer 🗸 📮 🗙	MH ES ES	1 62 60	abed ab	ah 🔻 (ah)							
Controller DC 210	(H) 20 70		2 00 00								
- Ontroller Tags		***	*****	*****	*****			******	*******	***************	***
Controller Fault Handler							nit Linmot axis parameter				
Power-Up Handler					Enable the ins	struction as soc	on as the connection to the LinMot driv	e is esta	blished		
		LM	Axis.DriveC	onnectionFaulted							
Gons Program		<democ< td=""><td>aseAxis1.D</td><td>iveConnectionFaulted></td><td></td><td></td><td></td><td></td><td>LM_CFG_CAInit-</td><td></td><td></td></democ<>	aseAxis1.D	iveConnectionFaulted>					LM_CFG_CAInit-		
😑 👼 Main Task	۰ ۱			/				LM	_CFG_CAInit LMA	xis_CAlnit	(EN)-
🖶 🚑 MainProgram								Ax	is	LMAxis	-
☐ ☐ ☐ ☐								Co	nfigAssembly LMA	AxisConfig	
Parameters and Local Tags								Мо	<democas< td=""><td>e_Drive:C></td><td>(ER)—</td></democas<>	e_Drive:C>	(ER)—
								Me	ssage LMA	xisReconf	_
🖃 📇 Motion Groups								Por	<demoscase_c <br="">sitionScalingNumerator</demoscase_c>	A_Reconf> 10000	
🖨 🚭 Motion_Group									Skonoodalinghamorator		
								Pos	sitionScalingDenominator	1	
Virtual_Master								Ma	ximalCurrentPositiveActive	1	
Add-On Instructions								Ма	ximalCurrentNegativeActive	1	
🖥 🧰 Data Types											
Trends								TO	rqueLimitPositive	100.0	
Logical Model								To	rqueLimitNegative	-100.0	
E- Configuration								Pa	rameterChannel0UPID	0	
100 1769-1 16FR-BB1B DC 210											
Embedded I/O								Pa	rameterChannelTUPID	U	
								Pa	rameterChannel2UPID	0	

12. Now the project should be ready.



9 Appendix I: LinMot-Talk Configuration over EtherNet/IP

9.1 Login with static IP address



9.1.1 Settings on the LinMot Drive

The default setting of the EtherNet/IP port address is manual IP Configuration using hex switches. With the standard settings, the IP address will be in the following range 192.168.001.xxx. The last number can be set with the hex switches S1 and S2.

Identification	Description	Example
S1 – S2	S1: (58) Bit 5 is LSB Bit 8 is MSB S2: (14) Bit 1 is LSB Bit 4 is MSB	IP address with the settings below: S1 = binary 0000, dec 0, hex 0 S2 = binary 0011, dec 3, hex 3 (Bits 1 and 2 are switched to on) Address = 192.168.001.003
X17 – X18		
	X17 RT ETH In X18 RT ETH Out	Connect network cable on X17: X17 RT ETH In

Note: Changes on S1 and S2 require a power up cycle to refresh the values in the drive.



9.1.2 Settings on the PC

The computer needs to be in the same IP subnet as the servo drive. Set the network settings in the PC to an IP address with 192.168.1.xxx. The IP address needs to be different from the IP address of the drive.

Internetprotokoll, Version 4 (TCP/IPv4) Properties				
General				
You can get IP settings assigned auton this capability. Otherwise, you need to for the appropriate IP settings.	natically if your network supports ask your network administrator			
Obtain an IP address automatical	ly			
• Use the following IP address:				
IP address:	192.168.1.250			
Subnet mask:	255.255.255.0			
Default gateway:				
Obtain DNS server address autom	natically			
• Use the following DNS server add	resses:			
Preferred DNS server:				
Alternate DNS server:	· · ·			
Validate settings upon exit	Advanced			
	OK Cancel			



9.1.3 Login with LinMot-Talk

Open the LinMot-Talk Software and start the Scanning (via Ethernet) in the menu tab: *File -> Scanning (via Ethernet)*.



Select the network card of the laptop. Make sure that the IP address of the Laptop is in the following sub net (192.168.1.xxx).

The following table will show all connected LinMot drives in the network.

🔀 Logir	1	The Incide St	-	Transa States States	Annual Contra	
State	IP Address	MACID	Group	Drive Name	Device Type	Release Info
🔽 🏯	192.168.1.3	00:1A:4E:01:02:6D	0	Unnamed	C1250IPXC1S/V1RF	6.5 Build 20160622
•						۱.
Scan Again Blink Selected Show Help Login All Login Selected						

Login to the drive to adjust drive settings.



Note: When configuring the IP address of the drive, a new scan is necessary to reconnect the LinMot-Talk communication if the IP address is changed. The IP address of the drive can be configured with LinMot Talk:

Parameter/ Ethernet/IP Intf/ IP Configuration Mode



9.2 Login with dynamic IP address (DHCP)



9.2.1 Settings on the LinMot Drive

If the hex switches are set to S1=0 and S2=0, the servo drive is in the dynamic IP configuration mode. The servo drive doesn't support APIPA (Automatic Private IP Addressing). Connect the servo drive with a DHCP Server to receive a TCP/IP address.

Identification	Description	Example
S1 – S2	S1: (58) Bit 5 is LSB Bit 8 is MSB S2: (14) Bit 1 is LSB Bit 4 is MSB	S1 to OFF / S2 to OFF = All Dip Switches OFF = DHCP.
X17 – X18	X17 RT ETH In X18 RT ETH Out	Connect the network cable to X17: X17 RT ETH In



Note: Changes on S1 and S2 need a power up cycle to refresh the values in the drive.



9.2.2 Setting on PC

Set the Network Configuration IPv4 to "Obtain an IP address automatically".

Internetprotokoll, Versi	on 4 (TCP/IPv4	4) Prop	ertie	s			×
General Alternate Con	figuration						
You can get IP settings this capability. Otherw for the appropriate IP	s assigned auto ise, you need to settings.	matical o ask y	ly if y our ne	our ne etworl	etwork k admi	supports nistrator	
Obtain an IP addr	ess automatica	lly					
O Use the following	IP address: —						
IP address:							
Subnet mask:			÷.,				
Default gateway:			÷.,				
Obtain DNS serve	r address auto	matical	у				
Use the following	DNS server add	dresses	:				
Preferred DNS serve	er:		÷.,				
Alternate DNS serve	er:						
Validate settings	upon exit				Adv	/anced	
				OK		Cance	9



9.2.3 Login with LinMot-Talk

Open the LinMot-Talk software and select "Scanning (via Ethernet)" in the menu tab:





Attention: Use the "Blink Selected" function if you have more than one drive in the network.

×					Login			- 🗆 🗡
State	IP Address	MACID	Group	Drive Name	Device Type	Release Info	User ID	Password
🔽 🌲	10.3.11.86	00:1A:4E:01:02:6D	0	Unnamed	C1250IPXC15/V1RF	6.5 Build 20160622	USER	
	10.3.11.88	00:1A:4E:00:E2:70	0	Unnamed	E1450PNQN0S/2RB	6.5 Build 20160517	USER	
Scan	Again Blir	nk Selected Show H	ielp		Login All Login Selec	cted Abort		

Login to the drive to adjust the drive settings.



Note: When configuring the IP address of the drive, a new scan is necessary to reconnect the LinMot-Talk communication if the IP address is changed. The IP address of the drive can be configured with LinMot Talk:

Parameter/ Ethernet/IP Intf/ IP Configuration Mode



9.3 IP address configuration with BOOTP/ DHCP Server



9.3.1 Settings on the LinMot Drive

If the hex switches are set to S1=0, and S2 =0, the servo drive is in the dynamic IP configuration. The servo drive doesn't support APIPA (Automatic Private IP Addressing). Connect the servo drive with a DHCP Server to receive a TCP/IP address.

Identification	Description	Example
S1 – S2	S1: (58) Bit 5 is LSB Bit 8 is MSB S2: (14) Bit 1 is LSB Bit 4 is MSB	S1 to OFF / S2 to OFF = All Dip Switches OFF = DHCP.
X17 – X18		
	X17 RT ETH In X18 RT ETH Out	The network cable is plugged into X17:



9.3.2 Using the Software BOOTP/ DHCP Server

The following settings are shown with BOOTP/DHCP Server Version 2.3.2.0 from Rockwell Automation. The software shows all the MAC addresses in the Ethernet network. An IP address can be assigned to a LinMot drive with this software. Once the servo drive has an assigned IP address, the LinMot-Talk Software can connect to the drive over the Ethernet real-time port.

9.3.2.1 Search for the LinMot Drive in the Network

The BOOTP Software shows all the slaves in the Network.

BOOTP/DHC	P Server 2	.3			
File Tools H	elp				
- Request History Clear History	Add to	o Relation List			
(hr:min:sec)	Туре	Ethernet Address (MAC)	IP Address	Hostname	
13:37:59 13:37:57 13:37:49 13:37:40 13:37:32 13:37:28 Relation List	DHCP DHCP DHCP DHCP DHCP DHCP	00:1A:4E:01:02:6D 00:08:30:26:60:C4 00:1A:4E:01:02:6D 00:08:30:26:60:C4 00:08:30:26:60:C4 00:08:30:26:60:C4		-1	
Ethernet Addr	ess (MAC)	Type IP Addres	s Hostname	Description	
Status		quest from 00:14-4E-01-02-	50		Entries

Compare the MAC-Address in the list with the MAC on the Servo Drive label.

Linl	
Туре:	C1250-IP-XC-1S-000
Part No.:	0150-2346
Serial No.:	2346.6GC.092
Hardware:	Ver. 1 Rev. F - P22
Signal Sup.:	24 VDC
Power Sup.:	24-85 VDC
MAC-IDs: 00:1	A:4E:01:02:6C/6D



Select the correct MAC and assign the IP address to the drive.

(hr:min:sec) (4:03:33 (4:03:22 (4:03:12	Type Etherne DHCP 00:1A:4	Address (MAC)	IP Address		
14:03:12 📻	UHUP 00:1A:4	E:01:02:6D E:01:02:6D		Hostname	
Et	- hernet Address (MAC IP Addres Hostnam): 00:1A:4E:01 : 192 . 168	:02:6D . 1 . 70		
New L	Descriptio	ηΟΚ	Cancel	Description	

Add the IP address in the Relation List and press "Enable DHCP". Normally a Communication Error is displayed, but the message can be ignored. Press OK.

Clear Communication Error Ihrmin: Failed to complete the requested operation. 14:11:0 See status bar for further information then press OK when ready to continue. 14:10:4 OK Idelation List OK New Delete Enable BOOTP Ethernet Address (MAC) Type IP Address DHCP 192.168.1.70	equest Hi	jetonu	1
(hr:min: 14:11:0 14:11:0 14:10:4 Failed to complete the requested operation. See status bar for further information then press OK when ready to continue. 0K elation List New Delete Enable BOOTP Enable DHCP Disable BOOTP/DHCP Ethernet Address (MAC) Type IP Address Hostname Description 00:1A:4E:01:02:6D DHCP	Clear	Communication Error	
elation List New Delete Enable BOOTP Enable DHCP Disable BOOTP/DHCP Ethernet Address (MAC) Type IP Address Hostname Description 00:1A:4E:01:02:6D DHCP 192.168.1.70	(hr:min: 14:11:0 14:11:0 14:10:5 14:10:4	Failed to complete the requested operation. See status bar for further information then press OK when ready to continue.	
Ethernet Address (MAC) Type IP Address Hostname Description 00:1A:4E:01:02:6D DHCP 192.168.1.70	elation Li:	st Delete Enable BOOTP Enable DHCP Disable BOOTP/DHCP	
00:1A:4E:01:02:6D DHCP 192.168.1.70	New		
	Ethernet	Address (MAC) Type IP Address Hostname Description	

Note: After the IP address assignment, the BOOTP/DHCP Server Software must be closed. After that, restart the LinMot-Talk Software to login in the drive.



9.3.3 Login with LinMot-Talk

In the LinMot-Talk Software File -> Login/Open Offline and enter the IP address of the Servo Drive.





Use the Scan function if the IP address is unknown.

📉 Login						- • ×
State	IP Address	MACID	Group	Drive Name	Device Type	Release Info
🔽 🕌	192.168.1.70	00:1A:4E:01:02:6D	0	Unnamed	C1250IPXC1S/V1RF	6.5 Build 20160622
•						•
Scan	Again Bl	ink Selected Show	Help		Login All Login Selected	d Abort



9.3.3.1 Change the IP settings in the LinMot-Talk Software

Go to *Parameters/ Ethernet/IP Intf/ Ethernet Configuration/ IP Configuration Mode* and set the mode to "Static by IP Configuration".



Change the settings of the IP address if the IP Configuration Mode is Static by IP Configuration. *Parameters/ Ethernet/IP Intf/ Ethernet Configuration/ IP Configuration*

File Search Drive Services Options Wir	ndow Tools Manuals Help	
"L + ⊐ ⊕ ⊡ 🛩 🖬 🖷 🚑 🥵 🤅	Unnamed, IP: 192.168.1.70 (USER) 💌	🖫 😫 🕨 🗖
 Project Unnamed, IP: 192.168.1.90 (USER) Unnamed, IP: 192.168.1.70 (USER) Control Panel Parameters S 	ID Name IP address 1st Byte IP address 2nd Byte IP address 3rd Byte	Value 192 168 1
 Motion Control SW Ethernet/IP Intf Dis-/Enable Ethernet Configuration IP Configuration Mode IP Configuration Variables Oscilloscopes Messages Errors 	IP address 4th Byte Netmask 1st Byte Netmask 2nd Byte Netmask 3rd Byte Netmask 4th Byte Default Gateway 1st Byte Default Gateway 2nd Byte Default Gateway 3rd Byte Default Gateway 4th Byte	15 255 255 255 0 192 168 1 1

Attention: Modifications to the IP address will be activated only after a restart of the firmware. Logging back into the drive with the new IP address will be necessary to reestablish the LinMot-Talk connection.

10 Appendix II: Master / Gantry System

In some applications like a portal system often a master gantry setup is required where a slave axis follows a master axis.

This can be achieved with the Motion Axis Gear (MAG) instruction.



There are some conditions that must be fulfilled:

- The axes must not be rigidly coupled mechanically as they are both position-controlled. They must have some mechanical play, or they will otherwise heat up.
- The Going to Initial position move must be setup slower than the reference (home) search move.

10.1 Drive Settings

.inMot®

10.1.1 Decrease Go to Initial Position Speed and Acceleration

Make sure that the *Max. Speed* and *Acceleration* values are lower than in the *Homing Position Config*: K LinMot-Talk 6.8

Datei Suche Drive Services Einstellungen Fenster Tools Handbücher Hilfe





10.2 Controller Logic

10.2.1 Homing

The homing of both axes must be initiated at the same time. Using the LM_MAHv instruction the homing routine defined in the LinMot drive is initiated. After the homing is done, the physical axes are coupled to the virtual axes.

а

E.g.:						
	- Afte	Motion Axis Home (LinMot) an - Homes the LinMot rwards the LinMot physical axis is coupled with the Virtu	d Motion Axis Home (Virtual Axis and the Virtual Axis Jal Axis in the routineCmd	Axis) Position in task z_MotionGro	upUpdate	
LMAxis_Home.1	LinMot Motion Axis Home & Virtual LinMot Motion Axis Home & Virtual Axis LinAxis Mathy[1] Axis LinAxis1> VirtualAxis1> VirtualAxis1> Signature D: B45F6928	UMAxis1_Lin_CmdPos1MAxis_EnableStreaming	MLLMAxisMAHv[1].PC	MLLMAxisMAHv[2].PC	U.MAxis1_Lin_CmdPos.LMAxis_EnableStreaming U.MAxis2_Lin_CmdPos.LMAxis_EnableStreaming	LMAxis_Home.1
	LimMot Motion Axis Home & Virtual LimMot Motion Axis Home & Virtual Axis LimAxisD2 (CR) VirtualAxis2 (CR) VirtualAxis VirtualAxis2 (CR) Signature ID: 845F6928	ULMAxis2_Lin_CmdPos.LMAxis_EnableStreaming	J			

10.2.2 Gear

The slave axis is coupled to the master axis using the Motion Axis Gear (MAG) instruction.

E.g.:

N	IAG				
Motion Axis Ge	ar	(EN)			
Slave Axis	vLMAxis2_Lin				
Master Axis	vLMAxis1_Lin	(DN)			
Motion Control	MI_MAG				
Direction	0	(ER)			
Ratio	1				
Slave Counts	0				
Master Counts	0				
Master Beference, Command					
Ratio Format	Real				
Clutch	Enabled				
Accel Rate	500				
Accel Units	Units per sec2				
	*				



Notes



Contact & Support

Europe / Asia Headquarters	NTI AG - LinMot & MagSpring Bodenaeckerstrasse 2 CH-8957 Spreitenbach Switzerland			
	Sales / Administration:	+41 56 419 91 91 office@linmot.com		
	Tech. Support:	+41 56 544 71 00 support@linmot.com		
		+49 201 858940 10 support@linmot.de		
	Web:	https://www.linmot.com		
North / South America Headquarters	LinMot USA Inc. N1922 State Road 120, Unit 1 Lake Geneva, WI 53147 USA			
	Sales / Administration:	262.743.2555 usasales@linmot.com		
	Tech. Support:	262.743.2555 usasupport@linmot.com		
	Web:	https://www.linmot-usa.com		

Visit <u>https://www.linmot.com/contact</u> to find a distributor next to you.

