LinMot®

EtherNet/IP Interface User Manual

Manual

EtherNet/IP™

for
C1250-CM-XC-0S
C1250-CM-XC-1S

April 2019

Doc.: 0185-1165-E_5V1_MA_EtherNet-IP-CIP-Sync

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

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1 System overview

The LinMot Ethernet/IP drives have the following functionalities:

Device Property	Value / Remark
Minimal EtherNet/IP cycle time	1 ms
Minimal CIP Sync based streaming period	2 ms
DHCP	Supported
EDS	Supported
IEEE1588 (CIP-Sync)	with Rockwell PLC
DLR Support (Device Level Ring Protocol)	Yes

EtherNet/IP is a real time Ethernet protocol based on the standard Ethernet protocols TCP/IP and UDP/IP.

For further information on EtherNet/IP please visit: http://www.odva.org

1.1 References

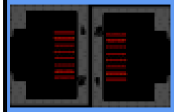
All user manuals are distributed with the LinMot-Talk configuration software. The newest version can also be downloaded from the LinMot homepage in the download section.

Ref	Title	Source
1	0185-1093-E_XXX_MA_MotionCtrlSW-SG5-SG7	www.linmot.com
2	0185-1074-E_XXX_MA_Drive-Configuration-Over-Fieldbus-SG5-SG7	www.linmot.com

2 Connection to the EtherNet/IP Network

2.1 Pin Assignment of the Connectors X17-X18

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

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

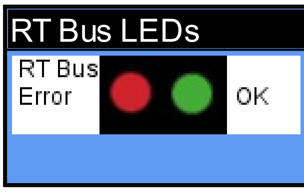
2.2 Default IP Address Settings

The default IP address is 192.168.1.xxx, where the last byte xxx is defined via the two hex switches S1 and S2. S1 sets the high and S2 the low digit.

S1, S2	IP Selectors	
	S1	Bus ID High (0h...Fh)
	S2	Bus ID Low (0h...Fh)

The switch value S1 = S2 = 0 (factory default setting) is a special configuration which acquires the IP address via DHCP.

2.3 RT Bus LEDs

RT Bus LEDs	Function
	The RT Bus LEDs have no function. They are always turned off.

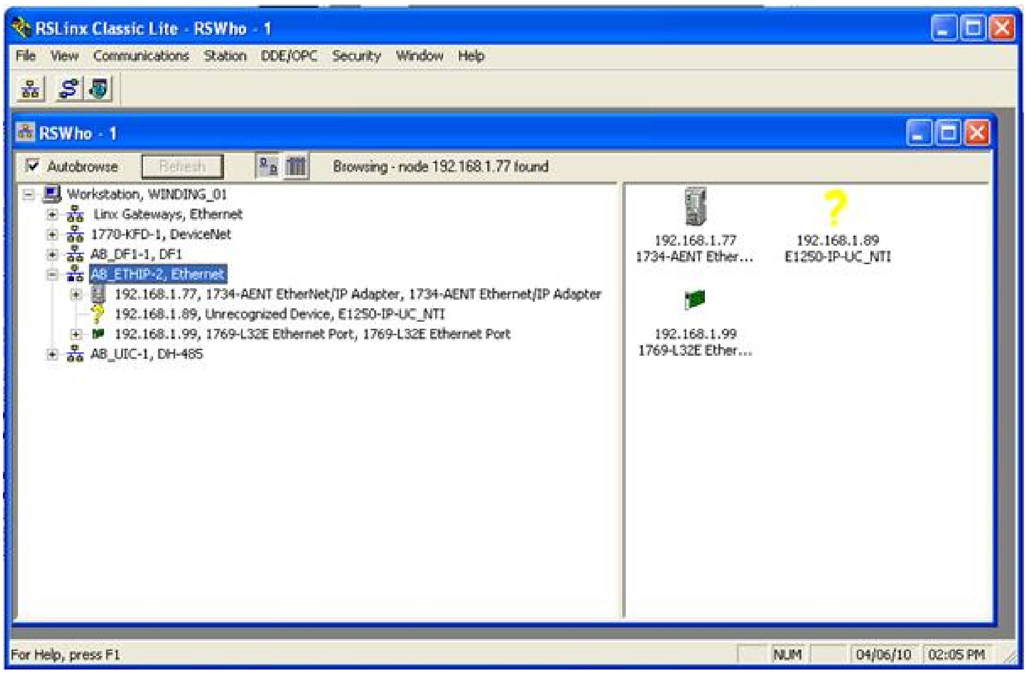
3 Setup in the PLC

Use only AB PLC firmware 18.0 or higher!

The following steps describe the integration of a LinMot Ethehernet/IP drive in the PLC. In the example an Allen Bradley master PLC is used. RSLinx tool can only be used to see if the device is on the network and under which IP-address it can be accessed. The whole configuration is done in the PLC, which is described in chapter 3.2.

3.1 RSLinx Classic

In the RSLinx the LinMot device should occur under the defined IP address as "Unrecognized Device"



☑ Autobrowse

Browsing - node 192.168.1.77 found

- Workstation, WINDING_01
  - Linx Gateways, Ethernet
  - 1770-KFD-1, DeviceNet
  - AB_DF1-1, DF1
  - AB_ETHIP-2, Ethernet
    - 192.168.1.77, 1734-AENT EtherNet/IP Adapter, 1734-AENT Ethernet/IP Adapter
    - 192.168.1.89, Unrecognized Device, E1250-IP-UC_NTI
    - 192.168.1.99, 1769-L32E Ethernet Port, 1769-L32E Ethernet Port
  - AB_UIC-1, DH-485

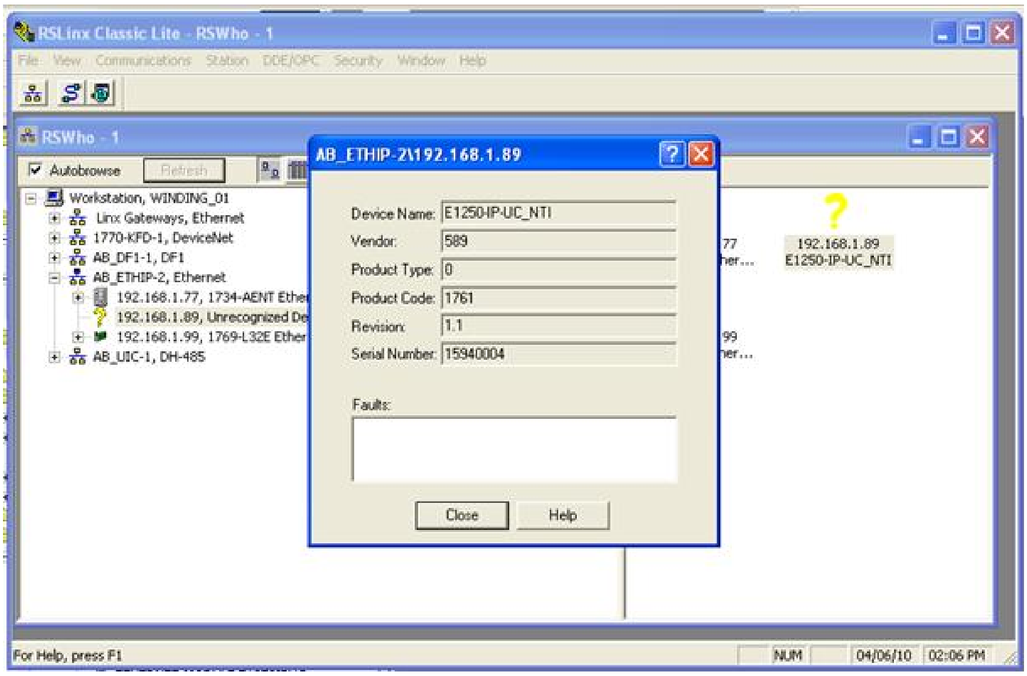
192.168.1.77
1734-AENT Ether...

192.168.1.89
E1250-IP-UC_NTI

192.168.1.99
1769-L32E Ether...

For Help, press F1 | NUM | 04/06/10 | 02:05 PM

LinMot Device with the IP address 192.168.1.89. in the RSLinx tool.



AB_ETHIP-2\192.168.1.89

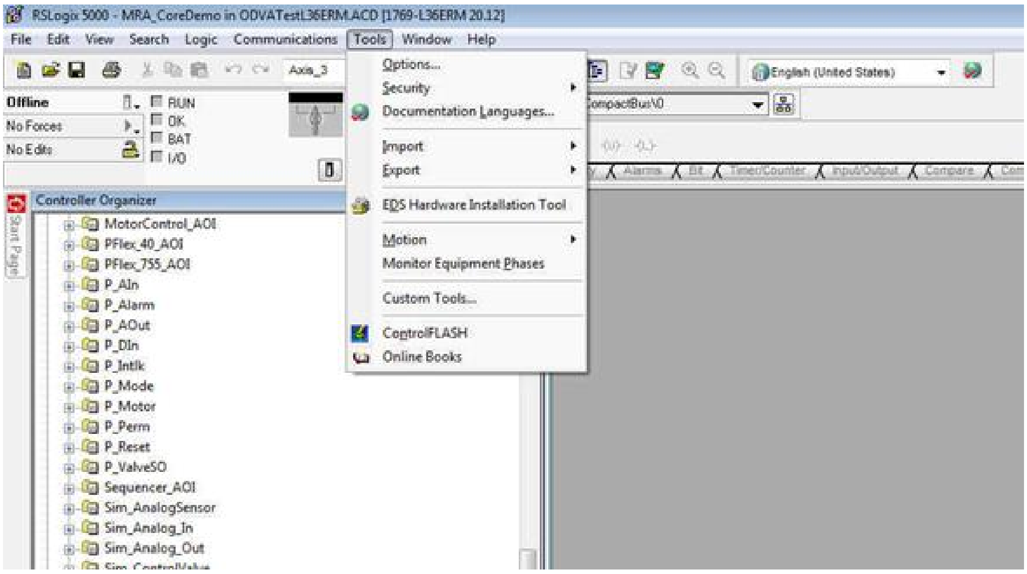
Device Name: E1250-IP-UC_NTI
Vendor: 589
Product Type: 0
Product Code: 1761
Revision: 1.1
Serial Number: 15940004
Faults:

LinMot device properties

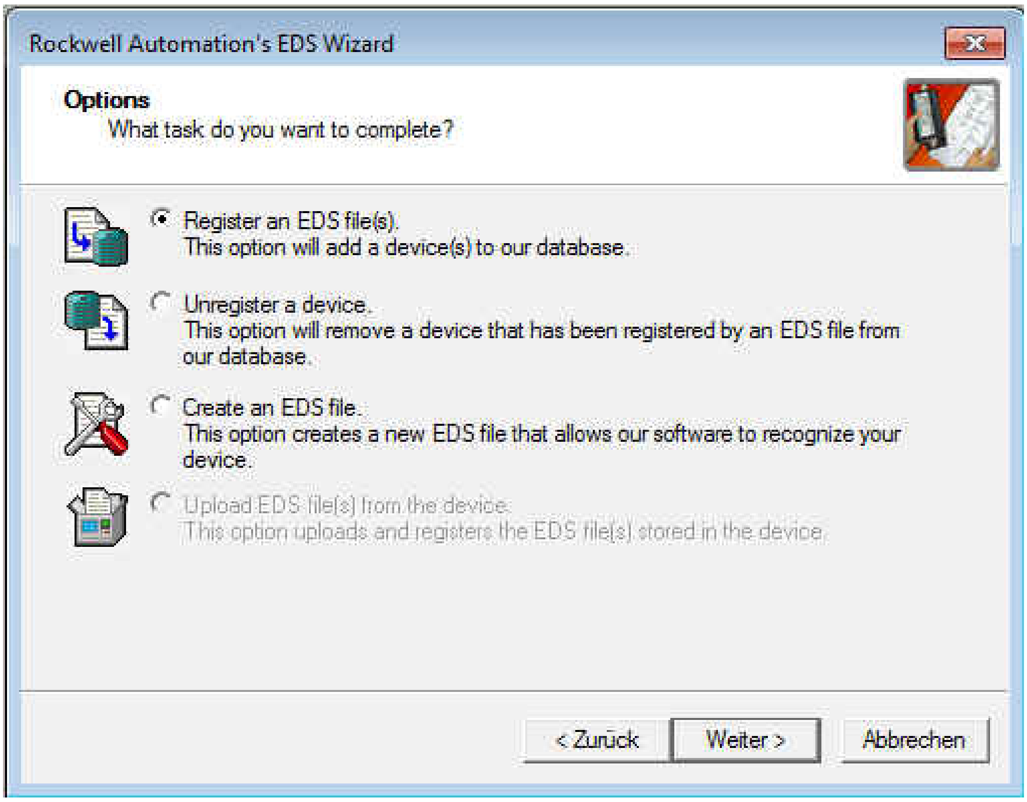
3.2 LinMot Configuration in the PLC

The LinMot Drive must be configured in the PLC using an EDS-File.

To configure the LinMot with the EDS File, the EDS-File must be downloaded into the configuration software of the PLC. In the RSLogix 5000 there is the EDS Hardware Installation Tool, which is used for the installation. It can be found in the menu under "Tools".



Then you can click next until the "Options" window is shown. In this window "Register an EDS file(s)" has to be selected.



Rockwell Automation's EDS Wizard

Options

What task do you want to complete?

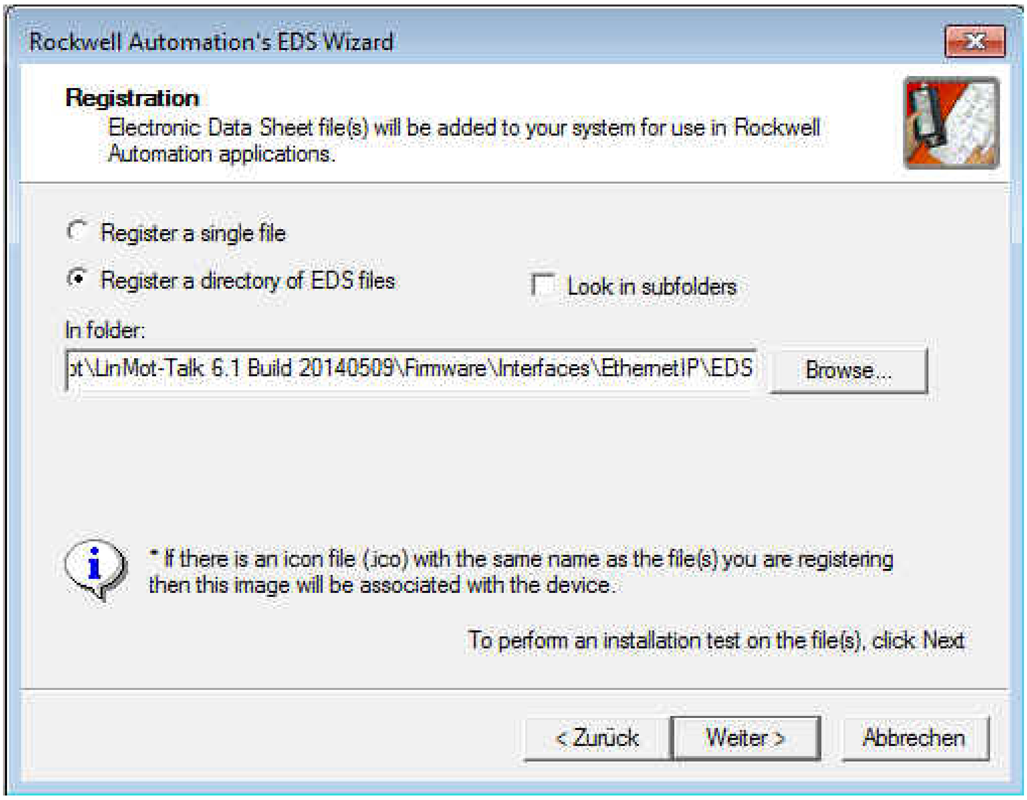
● Register an EDS file(s).
This option will add a device(s) to our database.

○ Unregister a device.
This option will remove a device that has been registered by an EDS file from our database.

○ Create an EDS file.
This option creates a new EDS file that allows our software to recognize your device.

○ Upload EDS file(s) from the device.
This option uploads and registers the EDS file(s) stored in the device.

In the "Registration" window, “Register a directory of EDS files” has to be selected. The path of the directory is ../LinMot-TalkX.X BuildX/Firmware/Interfaces/EtherNetIP_netX/EDS. After this selection you can click next and finish the EDS Hardware Installation.



Rockwell Automation's EDS Wizard

Registration

Electronic Data Sheet file(s) will be added to your system for use in Rockwell Automation applications.

○ Register a single file

● Register a directory of EDS files

□ Look in subfolders

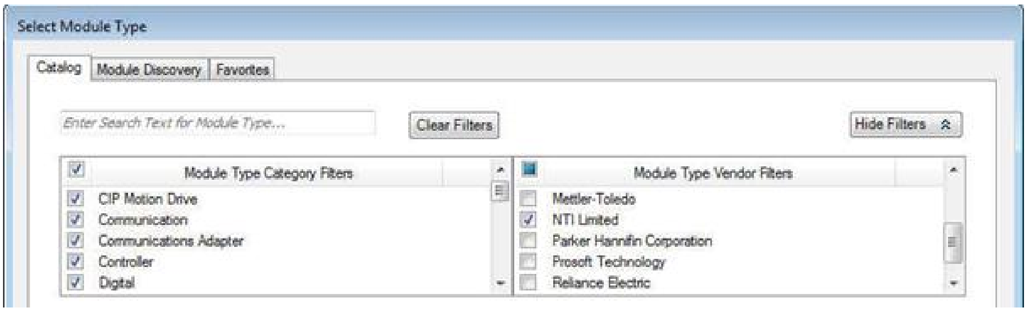
In folder:

ɔt\LinMot-Talk 6.1 Build 20140509\Firmware\Interfaces\EthernetIP\EDS

* If there is an icon file (.ico) with the same name as the file(s) you are registering then this image will be associated with the device.

To perform an installation test on the file(s), click Next

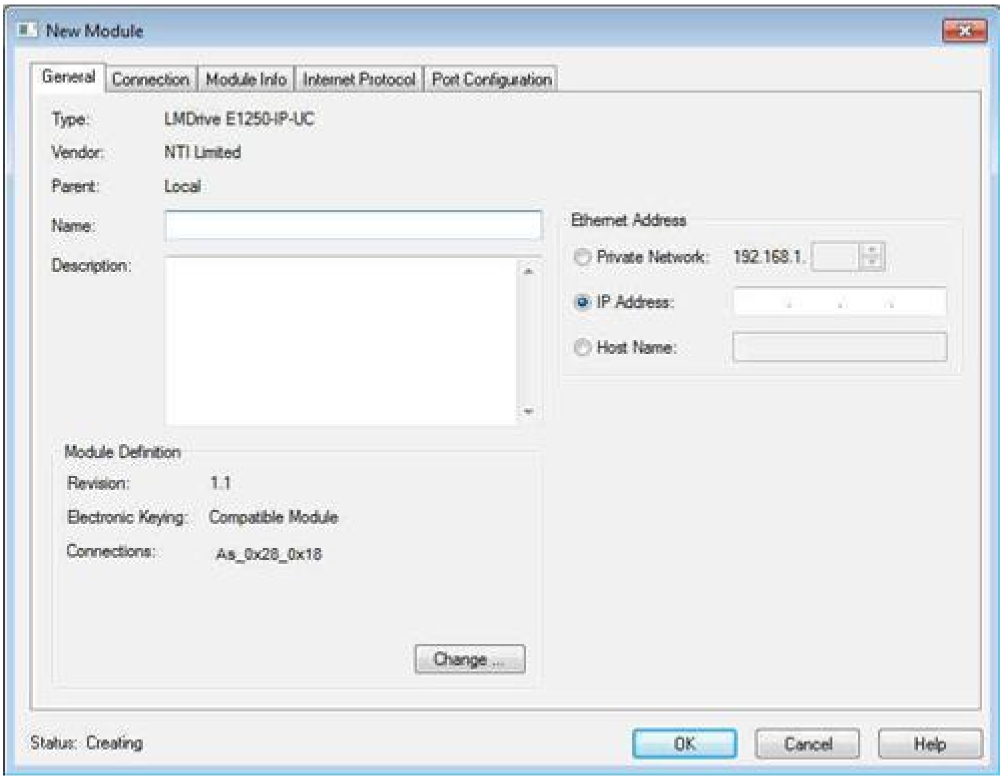
When the EDS-Files are downloaded in the PLC configuration software, the LinMot can be configured in the I/O configuration section, in the Ethernet section as a new module. In the section “Module Type Vendor Filters” there is the Vendor “NTI Limited”, where the drive can be selected.



☑ Module Type Category Filters	Module Type Vendor Filters
☑ CIP Motion Drive	☐ Mettler-Toledo
☑ Communication	☑ NTI Limited
☑ Communications Adapter	☐ Parker Hannifin Corporation
☑ Controller	☐ Prosoft Technology
☑ Digital	☐ Reliance Electric

After creating a new module, on the Tab "General", under "Module Definition" using the button "Change ...", two communication types can be chosen.

- Exclusive Owner, CIPSync, 0x78/0x64: Realtime IO with configuration module and CIP Sync Timestamp (Default)
- Legacy: Exclusive Owner, As_0x28_0x18: Realtime IO with configuration module, only for retrofit without CIP Sync functionality, no streaming supported

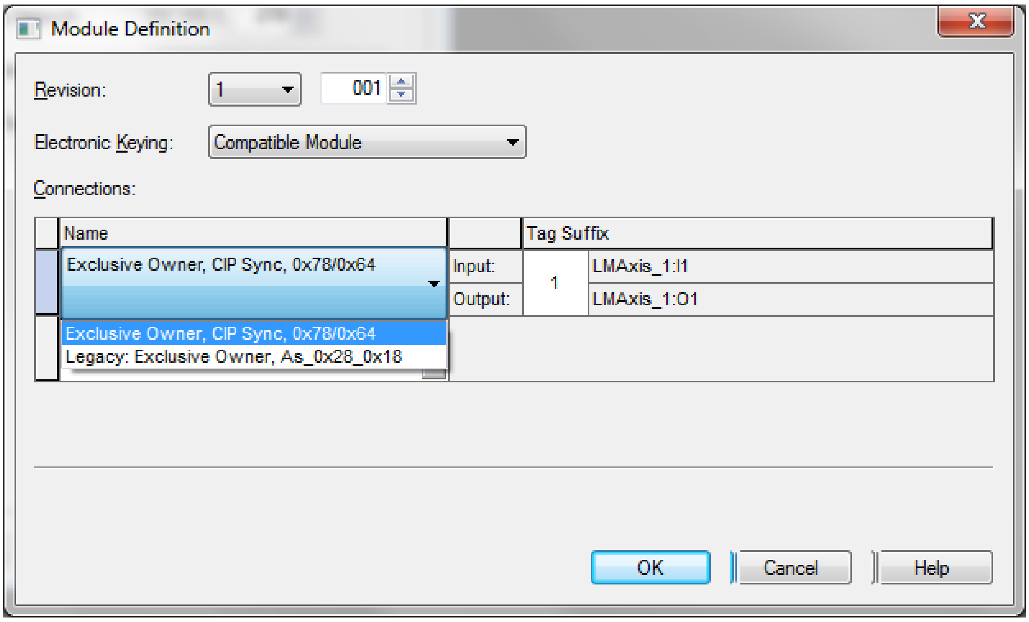


Type: LMDrive E1250-IP-UC
Vendor: NTI Limited
Parent: Local
Name:
Description:

Ethernet Address
○ Private Network: 192.168.1.
● IP Address:
○ Host Name:

Module Definition
Revision: 1.1
Electronic Keying: Compatible Module
Connections: As_0x28_0x18

Status: Creating



Module Definition

Revision: 1 001

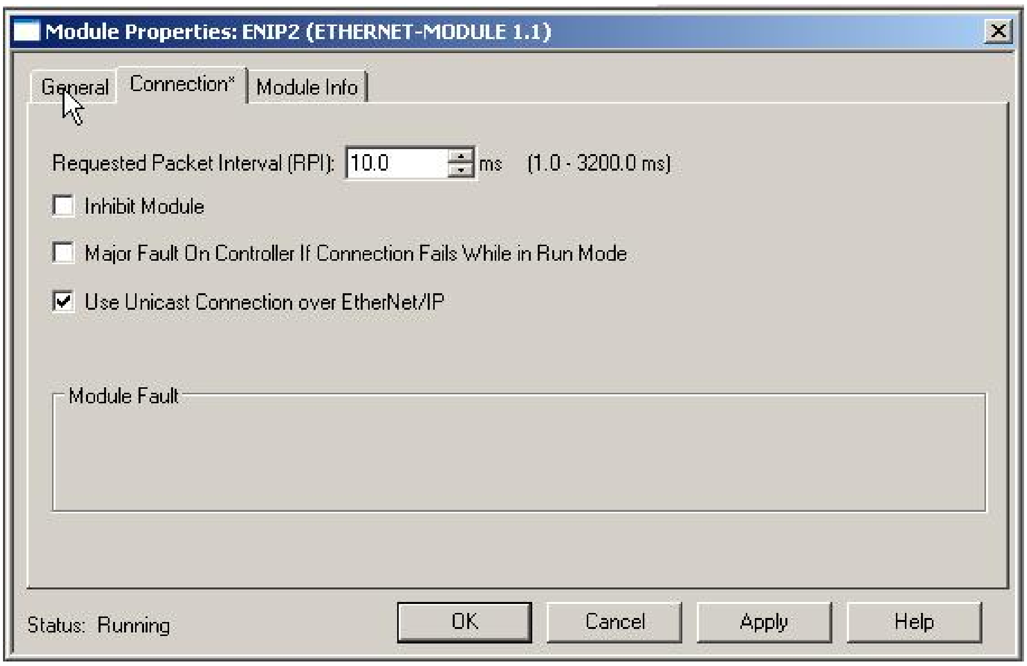
Electronic Keying: Compatible Module

Connections:

Name			Tag Suffix
Exclusive Owner, CIP Sync, 0x78/0x64	Input:	1	LMAxis_1:I1
	Output:		LMAxis_1:O1

Exclusive Owner, CIP Sync, 0x78/0x64
Legacy: Exclusive Owner, As_0x28_0x18

In the Connection tab of the Module Properties the desired cycle time is specified in the range between 1ms and 3200ms.



Module Properties: ENIP2 (ETHERNET-MODULE 1.1)

Requested Packet Interval (RPI): 10.0 ms (1.0 - 3200.0 ms)

☐ Inhibit Module

☐ Major Fault On Controller If Connection Fails While in Run Mode

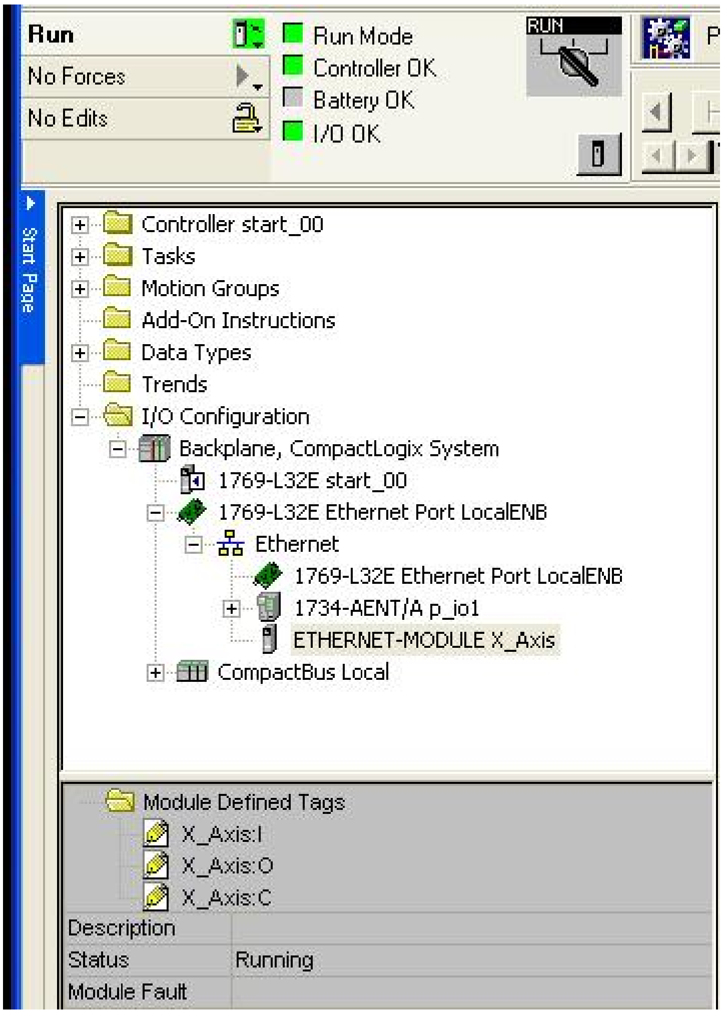
☑ Use Unicast Connection over EtherNet/IP

Module Fault

Status: Running

Only Unicast Connection is supported.

To add more modules the EDS-File registration does not need to be repeated.
If the setup was successful the LinMot module status will be "Running".



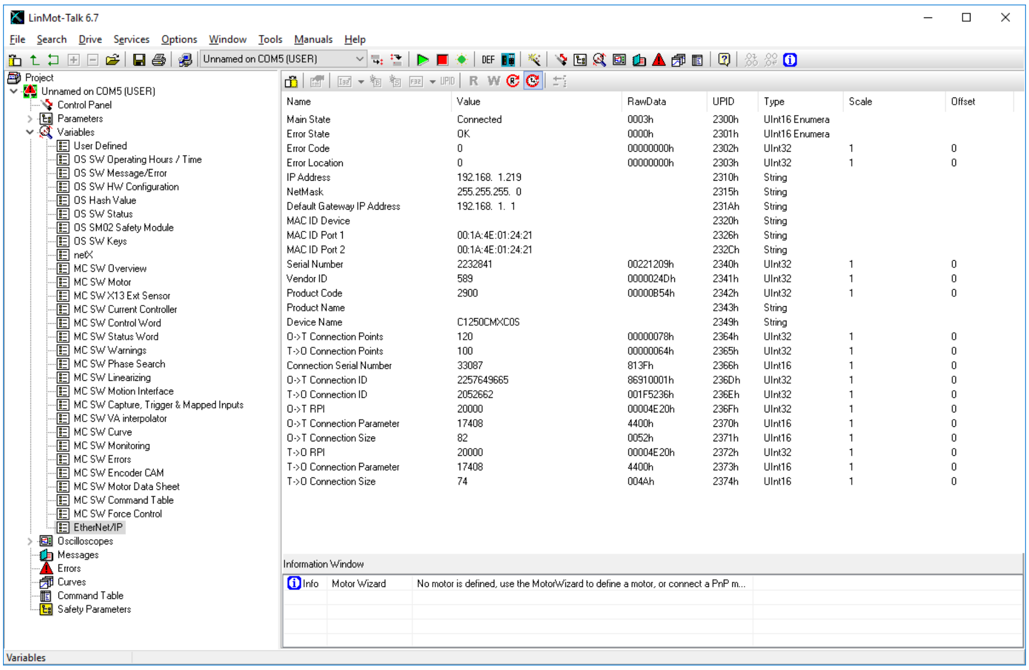
- Controller start_00
- Tasks
- Motion Groups
- Add-On Instructions
- Data Types
- Trends
- I/O Configuration
  - Backplane, CompactLogix System
    - 1769-L32E start_00
    - 1769-L32E Ethernet Port LocalENB
      - Ethernet
        - 1769-L32E Ethernet Port LocalENB
        - 1734-AENT/A p_io1
        - ETHERNET-MODULE X_Axis
    - CompactBus Local

Module Defined Tags
- X_Axis:I
- X_Axis:O
- X_Axis:C

Description	
Status	Running
Module Fault	

The table below shows which EDS-File is for which Drive. If the full EDS folder is loaded in the configuration tool, the names of the Drives are visualized.

File Name	Art.-Number	Drive Type
C1250CMXC0S.eds	0150-2900	C1250CMXC0S
C1250CMXC1S.eds	0150-2901	C1250CMXC1S



Name	Value	RawData	UPID	Type	Scale	Offset
Main State	Connected	0003h	2300h	UInt16 Enumera		
Error State	OK	0000h	2301h	UInt16 Enumera		
Error Code	0	00000000h	2302h	UInt32	1	0
Error Location	0	00000000h	2303h	UInt32	1	0
IP Address	192.168. 1.219		2310h	String		
NetMask	255.255.255. 0		2315h	String		
Default Gateway IP Address	192.168. 1. 1		231Ah	String		
MAC ID Device			2320h	String		
MAC ID Port 1	00:1A:4E:01:24:21		2326h	String		
MAC ID Port 2	00:1A:4E:01:24:21		232Ch	String		
Serial Number	2232841	00221209h	2340h	UInt32	1	0
Vendor ID	589	0000024Dh	2341h	UInt32	1	0
Product Code	2900	00000B54h	2342h	UInt32	1	0
Product Name			2343h	String		
Device Name	C1250CMXC0S		2349h	String		
O->T Connection Points	120	00000078h	2364h	UInt32	1	0
T->O Connection Points	100	00000064h	2365h	UInt32	1	0
Connection Serial Number	33087	813Fh	2366h	UInt16	1	0
O->T Connection ID	2257649665	86910001h	236Dh	UInt32	1	0
T->O Connection ID	2052662	001F5236h	236Eh	UInt32	1	0
O->T RPI	20000	00004E20h	236Fh	UInt32	1	0
O->T Connection Parameter	17408	4400h	2370h	UInt16	1	0
O->T Connection Size	82	0052h	2371h	UInt16	1	0
T->O RPI	20000	00004E20h	2372h	UInt32	1	0
T->O Connection Parameter	17408	4400h	2373h	UInt16	1	0
T->O Connection Size	74	004Ah	2374h	UInt16	1	0

Information Window

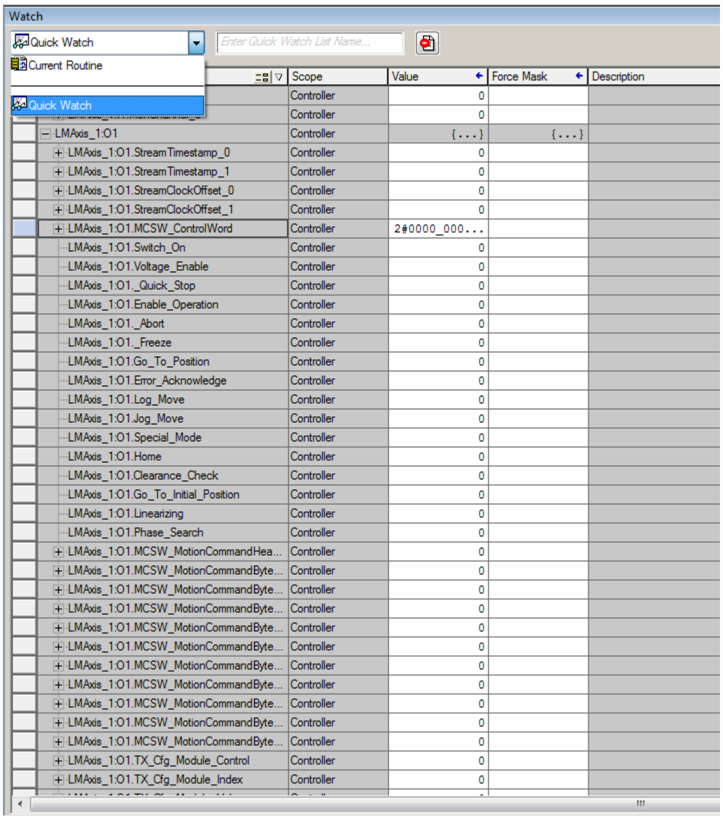
Info	Motor Wizard	No motor is defined, use the MotorWizard to define a motor, or connect a PnP m...

In the LinMot-Talk configuration software the EtherNet/IP connection state is shown in "Variables\EtherNet/IP". If set up correctly, the "Main State" should change to "Connected" after some time when powered on.

3.3 Getting started with the Watch Window

In this section the basics of the LinMot device handling are explained. Instead of programming the LinMot drive, data can be directly set with the watch window. For the next steps, map the modules input data and output data in the quick watch window as shown below.

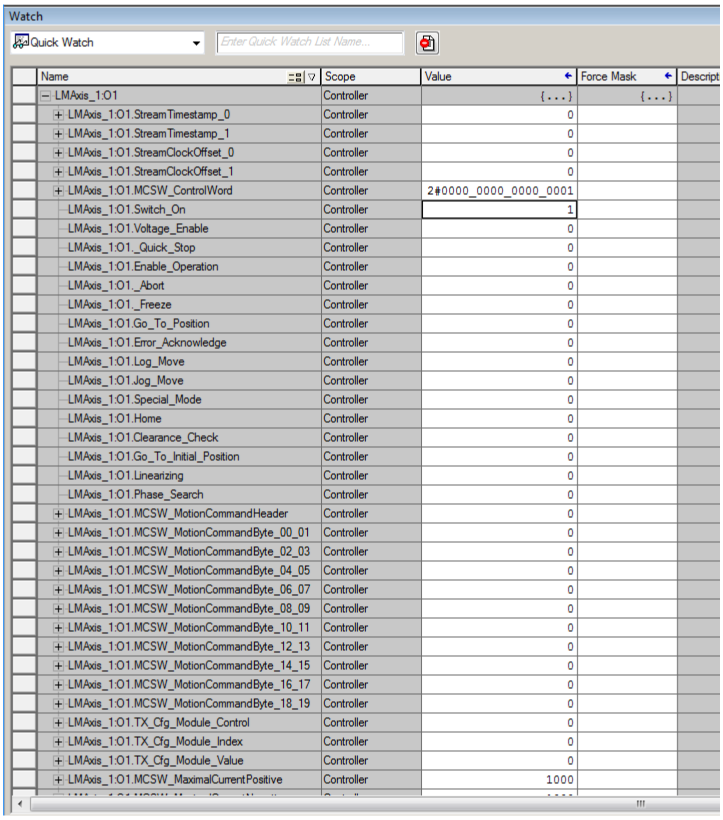
In the following examples it is assumed that a motor has been configured, the power supply is on and the drive is correctly embedded in the Ethernet/IP network.



	Scope	Value	Force Mask	Description
	Controller	0		
	Controller	0		
LMAxis_1:O1	Controller	{...}	{...}	
LMAxis_1:O1.StreamTimestamp_0	Controller	0		
LMAxis_1:O1.StreamTimestamp_1	Controller	0		
LMAxis_1:O1.StreamClockOffset_0	Controller	0		
LMAxis_1:O1.StreamClockOffset_1	Controller	0		
LMAxis_1:O1.MCSW_ControlWord	Controller	2#0000_000...		
LMAxis_1:O1.Switch_On	Controller	0		
LMAxis_1:O1.Voltage_Enable	Controller	0		
LMAxis_1:O1._Quick_Stop	Controller	0		
LMAxis_1:O1.Enable_Operation	Controller	0		
LMAxis_1:O1._Abort	Controller	0		
LMAxis_1:O1._Freeze	Controller	0		
LMAxis_1:O1.Go_To_Position	Controller	0		
LMAxis_1:O1.Error_Acknowledge	Controller	0		
LMAxis_1:O1.Log_Move	Controller	0		
LMAxis_1:O1.Jog_Move	Controller	0		
LMAxis_1:O1.Special_Mode	Controller	0		
LMAxis_1:O1.Home	Controller	0		
LMAxis_1:O1.Clearance_Check	Controller	0		
LMAxis_1:O1.Go_To_Initial_Position	Controller	0		
LMAxis_1:O1.Linearizing	Controller	0		
LMAxis_1:O1.Phase_Search	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandHea...	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte...	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte...	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte...	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte...	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte...	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte...	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte...	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte...	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte...	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte...	Controller	0		
LMAxis_1:O1.TX_Cfg_Module_Control	Controller	0		
LMAxis_1:O1.TX_Cfg_Module_Index	Controller	0		

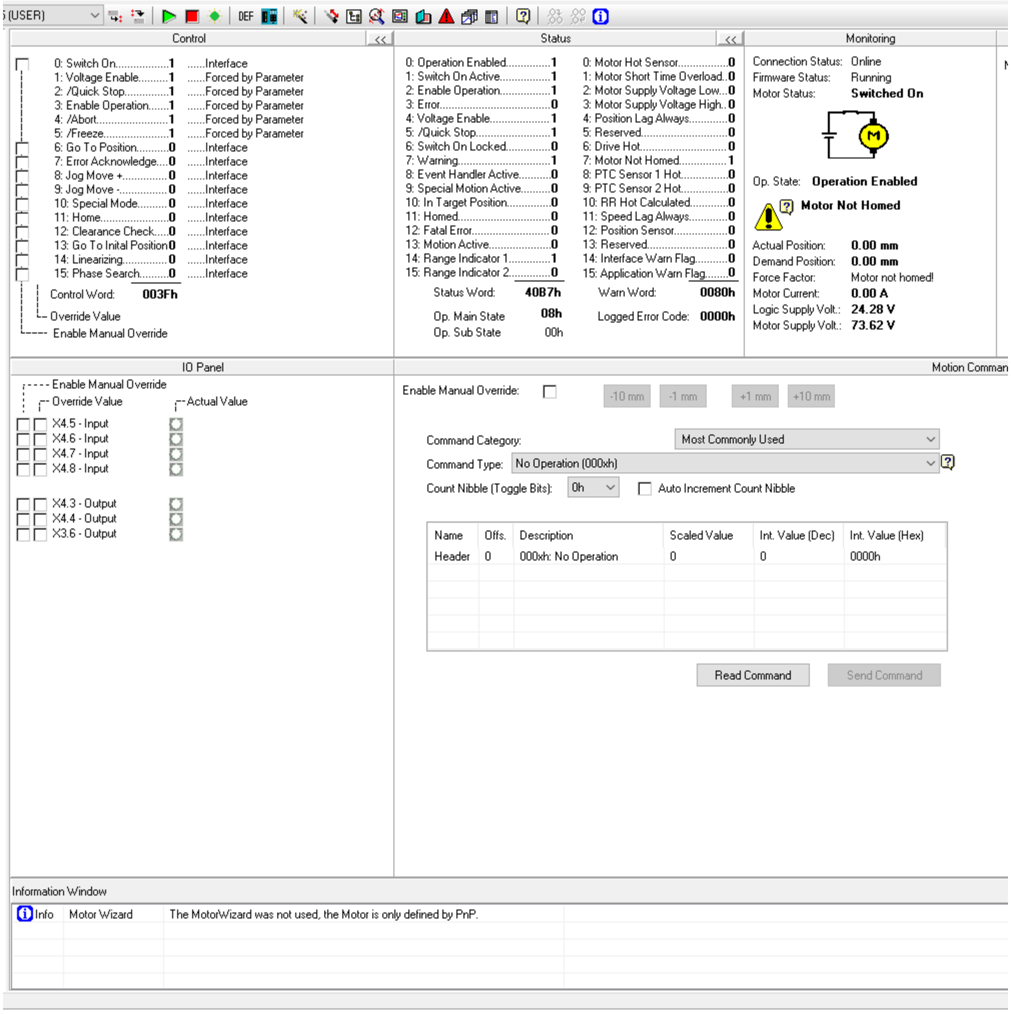
3.3.1 Control Word

The Control Word is mapped to the output data word 4 (byte 16/17). If setting this value to 1 the “Switch On” bit (bit 0) of the Control Word is set.



Name	Scope	Value	Force Mask	Descript
LMAxis_1:O1	Controller	{...}	{...}	
LMAxis_1:O1.StreamTimestamp_0	Controller	0		
LMAxis_1:O1.StreamTimestamp_1	Controller	0		
LMAxis_1:O1.StreamClockOffset_0	Controller	0		
LMAxis_1:O1.StreamClockOffset_1	Controller	0		
LMAxis_1:O1.MCSW_ControlWord	Controller	2#0000_0000_0000_0001		
LMAxis_1:O1.Switch_On	Controller	1		
LMAxis_1:O1.Voltage_Enable	Controller	0		
LMAxis_1:O1._Quick_Stop	Controller	0		
LMAxis_1:O1.Enable_Operation	Controller	0		
LMAxis_1:O1._Abort	Controller	0		
LMAxis_1:O1._Freeze	Controller	0		
LMAxis_1:O1.Go_To_Position	Controller	0		
LMAxis_1:O1.Error_Acknowledge	Controller	0		
LMAxis_1:O1.Log_Move	Controller	0		
LMAxis_1:O1.Jog_Move	Controller	0		
LMAxis_1:O1.Special_Mode	Controller	0		
LMAxis_1:O1.Home	Controller	0		
LMAxis_1:O1.Clearance_Check	Controller	0		
LMAxis_1:O1.Go_To_Initial_Position	Controller	0		
LMAxis_1:O1.Linearizing	Controller	0		
LMAxis_1:O1.Phase_Search	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandHeader	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte_00_01	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte_02_03	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte_04_05	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte_06_07	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte_08_09	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte_10_11	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte_12_13	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte_14_15	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte_16_17	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte_18_19	Controller	0		
LMAxis_1:O1.TX_Cfg_Module_Control	Controller	0		
LMAxis_1:O1.TX_Cfg_Module_Index	Controller	0		
LMAxis_1:O1.TX_Cfg_Module_Value	Controller	0		
LMAxis_1:O1.MCSW_MaximalCurrentPositive	Controller	1000		

This can also be monitored on the Control Panel of the LinMot-Talk software.

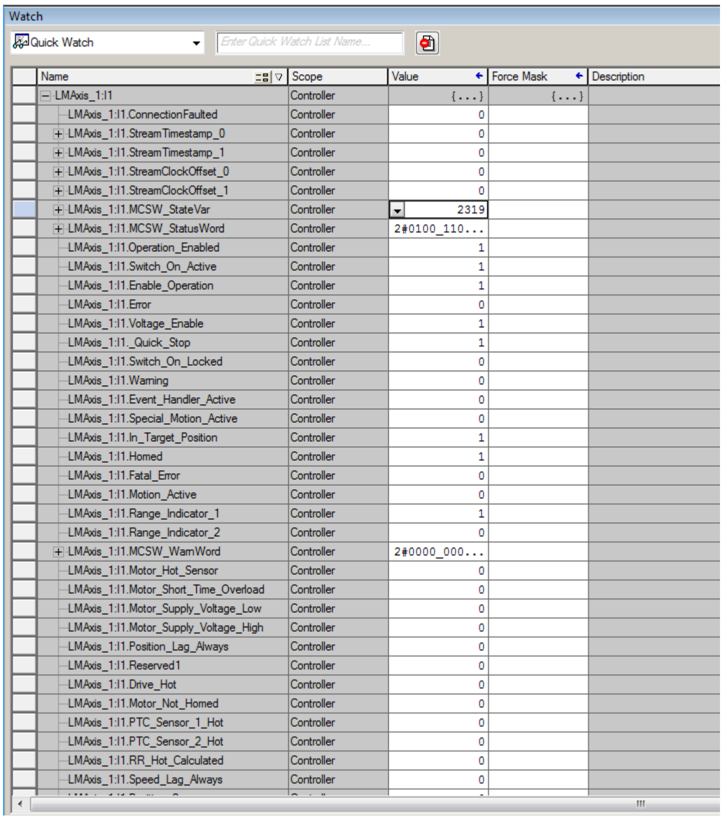


```
5 (USER)   DEF

Control
0: Switch On.................1     ......Interface
1: Voltage Enable..........1     ......Forced by Parameter
2: /Quick Stop..............1     ......Forced by Parameter
3: Enable Operation.......1     ......Forced by Parameter
4: /Abort.......................1     ......Forced by Parameter
5: /Freeze......................1     ......Forced by Parameter
6: Go To Position..........0     ......Interface
7: Error Acknowledge....0     ......Interface
8: Jog Move +..............0     ......Interface
9: Jog Move -...............0     ......Interface
10: Special Mode.........0     ......Interface
11: Home......................0     ......Interface
12: Clearance Check.....0     ......Interface
13: Go To Inital Position0     ......Interface
14: Linearizing..............0     ......Interface
15: Phase Search.........0     ......Interface
  Control Word:      003Fh
  Override Value
  Enable Manual Override

Status
0: Operation Enabled..............1     0: Motor Hot Sensor.................0
1: Switch On Active.................1     1: Motor Short Time Overload..0
2: Enable Operation.................1     2: Motor Supply Voltage Low...0
3: Error.....................................0     3: Motor Supply Voltage High..0
4: Voltage Enable....................1     4: Position Lag Always.............0
5: /Quick Stop..........................1     5: Reserved..............................0
6: Switch On Locked..............0     6: Drive Hot...............................0
7: Warning...............................1     7: Motor Not Homed................1
8: Event Handler Active..........0     8: PTC Sensor 1 Hot...............0
9: Special Motion Active.........0     9: PTC Sensor 2 Hot...............0
10: In Target Position.............0     10: RR Hot Calculated............0
11: Homed.................................0     11: Speed Lag Always............0
12: Fatal Error..........................0     12: Position Sensor.................0
13: Motion Active.....................0     13: Reserved...........................0
14: Range Indicator 1..............1     14: Interface Warn Flag..........0
15: Range Indicator 2..............0     15: Application Warn Flag.......0
    Status Word:       40B7h              Warn Word:            0080h
    Op. Main State     08h                Logged Error Code:    0000h
    Op. Sub State      00h

Monitoring
Connection Status:    Online
Firmware Status:      Running
Motor Status:         Switched On
Op. State:   Operation Enabled
Motor Not Homed
Actual Position:      0.00 mm
Demand Position:      0.00 mm
Force Factor:         Motor not homed!
Motor Current:        0.00 A
Logic Supply Volt.:   24.28 V
Motor Supply Volt.:   73.62 V

IO Panel
Enable Manual Override
  Override Value          Actual Value
□ □ X4.5 - Input          ○
□ □ X4.6 - Input          ○
□ □ X4.7 - Input          ○
□ □ X4.8 - Input          ○

□ □ X4.3 - Output         ○
□ □ X4.4 - Output         ○
□ □ X3.6 - Output         ○

Motion Comman
Enable Manual Override:  □    -10 mm   -1 mm   +1 mm   +10 mm

Command Category:             Most Commonly Used
Command Type:   No Operation (000xh)
Count Nibble (Toggle Bits):  0h     □ Auto Increment Count Nibble
```

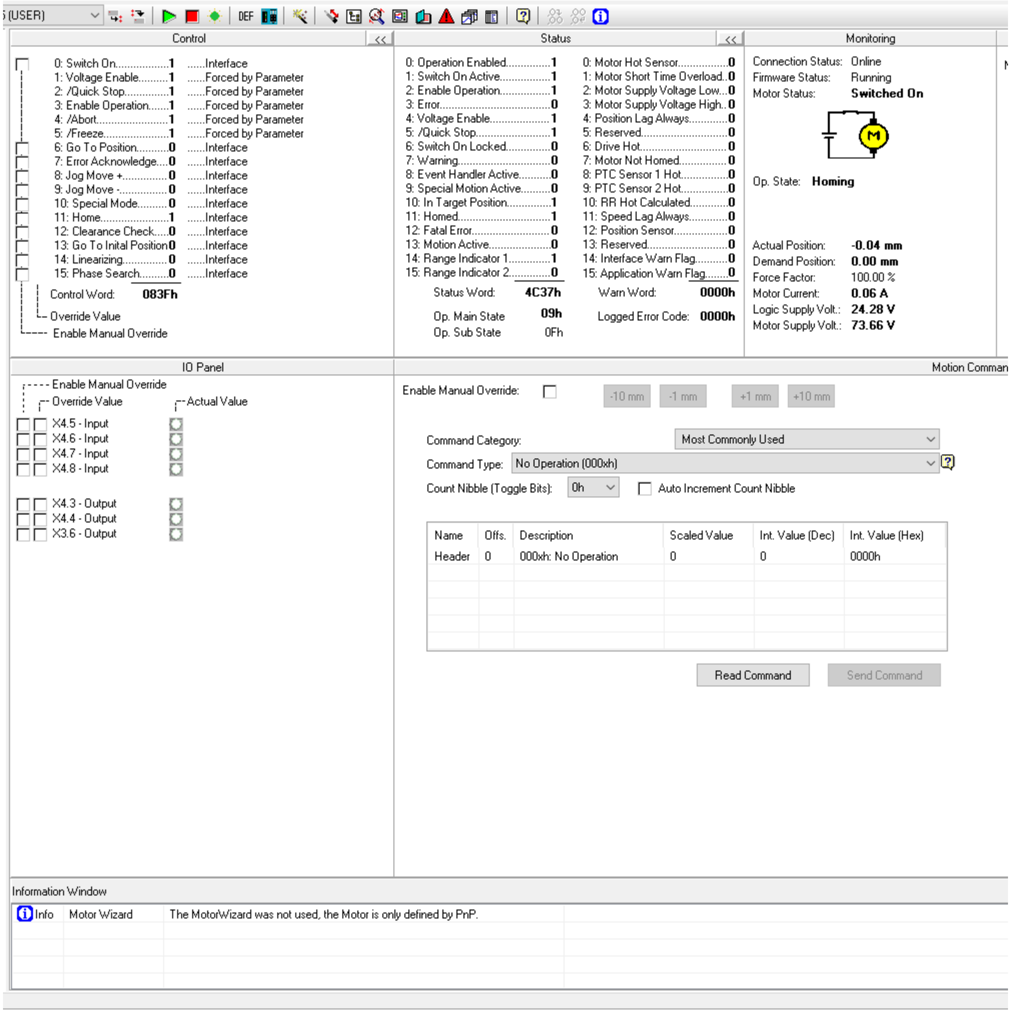
Name	Offs.	Description	Scaled Value	Int. Value (Dec)	Int. Value (Hex)
Header	0	000xh: No Operation	0	0	0000h

```
Read Command    Send Command

Information Window
Info   Motor Wizard   The MotorWizard was not used, the Motor is only defined by PnP.
```

Setting the Control Word to 2049 (0x0801) sets also the “Home” bit (Bit 11) in the Control Word. Wait until the input word 4 “State Var” has the value 2319 (0x090F) Main State 9 (Homing) Sub State 0x0F (Homing finished).



Name	Scope	Value	Force Mask	Description
⊟ LMAxis_1:I1	Controller	{...}	{...}	
LMAxis_1:I1.ConnectionFaulted	Controller	0		
⊞ LMAxis_1:I1.StreamTimestamp_0	Controller	0		
⊞ LMAxis_1:I1.StreamTimestamp_1	Controller	0		
⊞ LMAxis_1:I1.StreamClockOffset_0	Controller	0		
⊞ LMAxis_1:I1.StreamClockOffset_1	Controller	0		
⊞ LMAxis_1:I1.MCSW_StateVar	Controller	2319		
⊞ LMAxis_1:I1.MCSW_StatusWord	Controller	2#0100_110...		
LMAxis_1:I1.Operation_Enabled	Controller	1		
LMAxis_1:I1.Switch_On_Active	Controller	1		
LMAxis_1:I1.Enable_Operation	Controller	1		
LMAxis_1:I1.Error	Controller	0		
LMAxis_1:I1.Voltage_Enable	Controller	1		
LMAxis_1:I1._Quick_Stop	Controller	1		
LMAxis_1:I1.Switch_On_Locked	Controller	0		
LMAxis_1:I1.Warning	Controller	0		
LMAxis_1:I1.Event_Handler_Active	Controller	0		
LMAxis_1:I1.Special_Motion_Active	Controller	0		
LMAxis_1:I1.In_Target_Position	Controller	1		
LMAxis_1:I1.Homed	Controller	1		
LMAxis_1:I1.Fatal_Error	Controller	0		
LMAxis_1:I1.Motion_Active	Controller	0		
LMAxis_1:I1.Range_Indicator_1	Controller	1		
LMAxis_1:I1.Range_Indicator_2	Controller	0		
⊞ LMAxis_1:I1.MCSW_WarnWord	Controller	2#0000_000...		
LMAxis_1:I1.Motor_Hot_Sensor	Controller	0		
LMAxis_1:I1.Motor_Short_Time_Overload	Controller	0		
LMAxis_1:I1.Motor_Supply_Voltage_Low	Controller	0		
LMAxis_1:I1.Motor_Supply_Voltage_High	Controller	0		
LMAxis_1:I1.Position_Lag_Always	Controller	0		
LMAxis_1:I1.Reserved1	Controller	0		
LMAxis_1:I1.Drive_Hot	Controller	0		
LMAxis_1:I1.Motor_Not_Homed	Controller	0		
LMAxis_1:I1.PTC_Sensor_1_Hot	Controller	0		
LMAxis_1:I1.PTC_Sensor_2_Hot	Controller	0		
LMAxis_1:I1.RR_Hot_Calculated	Controller	0		
LMAxis_1:I1.Speed_Lag_Always	Controller	0		



(USER)

DEF

Control

0: Switch On	1	Interface
1: Voltage Enable	1	Forced by Parameter
2: /Quick Stop	1	Forced by Parameter
3: Enable Operation	1	Forced by Parameter
4: /Abort	1	Forced by Parameter
5: /Freeze	1	Forced by Parameter
6: Go To Position	0	Interface
7: Error Acknowledge	0	Interface
8: Jog Move +	0	Interface
9: Jog Move -	0	Interface
10: Special Mode	0	Interface
11: Home	1	Interface
12: Clearance Check	0	Interface
13: Go To Inital Position	0	Interface
14: Linearizing	0	Interface
15: Phase Search	0	Interface

Control Word: **083Fh**

Override Value

Enable Manual Override

Status

0: Operation Enabled	1	0: Motor Hot Sensor	0
1: Switch On Active	1	1: Motor Short Time Overload	0
2: Enable Operation	1	2: Motor Supply Voltage Low	0
3: Error	0	3: Motor Supply Voltage High	0
4: Voltage Enable	1	4: Position Lag Always	0
5: /Quick Stop	1	5: Reserved	0
6: Switch On Locked	0	6: Drive Hot	0
7: Warning	0	7: Motor Not Homed	0
8: Event Handler Active	0	8: PTC Sensor 1 Hot	0
9: Special Motion Active	0	9: PTC Sensor 2 Hot	0
10: In Target Position	1	10: RR Hot Calculated	0
11: Homed	1	11: Speed Lag Always	0
12: Fatal Error	0	12: Position Sensor	0
13: Motion Active	0	13: Reserved	0
14: Range Indicator 1	1	14: Interface Warn Flag	0
15: Range Indicator 2	0	15: Application Warn Flag	0

Status Word: **4C37h**
Warn Word: **0000h**
Op. Main State **09h**
Logged Error Code: **0000h**
Op. Sub State 0Fh

Monitoring

Connection Status:	Online
Firmware Status:	Running
Motor Status:	**Switched On**
Op. State:	**Homing**
Actual Position:	**-0.04 mm**
Demand Position:	**0.00 mm**
Force Factor:	100.00 %
Motor Current:	**0.06 A**
Logic Supply Volt.:	**24.28 V**
Motor Supply Volt.:	**73.66 V**

IO Panel

Enable Manual Override
Override Value
Actual Value

□ □ X4.5 - Input ○
□ □ X4.6 - Input ○
□ □ X4.7 - Input ○
□ □ X4.8 - Input ○

□ □ X4.3 - Output ○
□ □ X4.4 - Output ○
□ □ X3.6 - Output ○

Motion Comman

Enable Manual Override: □ -10 mm -1 mm +1 mm +10 mm

Command Category: Most Commonly Used

Command Type: No Operation (000xh)

Count Nibble (Toggle Bits): 0h □ Auto Increment Count Nibble

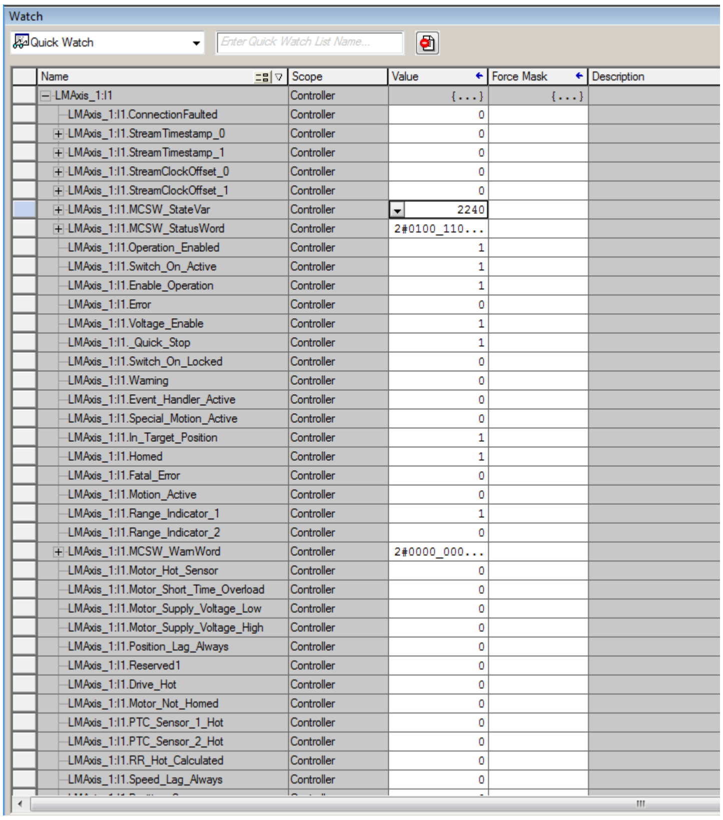
Name	Offs.	Description	Scaled Value	Int. Value (Dec)	Int. Value (Hex)
Header	0	000xh: No Operation	0	0	0000h

Read Command Send Command

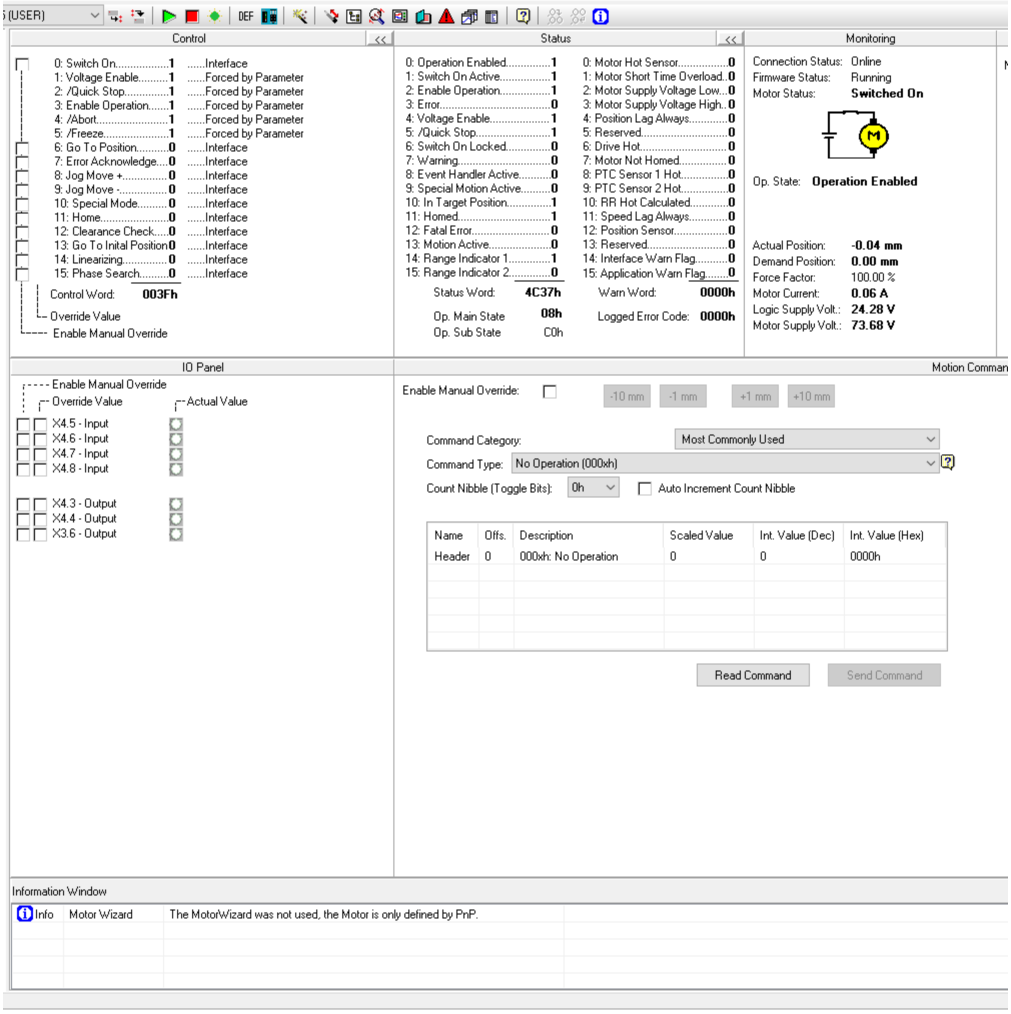
Information Window

Info	Motor Wizard	The MotorWizard was not used, the Motor is only defined by PnP.

The Control Word can then be set to 1 again, the drive will change to Main State 8 (Operation Enabled) Sub State 0xC0 (Homed and In Target Position), the corresponding State Var has the value 2240.



Name	Scope	Value	Force Mask	Description
⊟ LMAxis_1:I1	Controller	{...}	{...}	
LMAxis_1:I1.ConnectionFaulted	Controller	0		
⊞ LMAxis_1:I1.StreamTimestamp_0	Controller	0		
⊞ LMAxis_1:I1.StreamTimestamp_1	Controller	0		
⊞ LMAxis_1:I1.StreamClockOffset_0	Controller	0		
⊞ LMAxis_1:I1.StreamClockOffset_1	Controller	0		
⊞ LMAxis_1:I1.MCSW_StateVar	Controller	2240		
⊞ LMAxis_1:I1.MCSW_StatusWord	Controller	2#0100_110...		
LMAxis_1:I1.Operation_Enabled	Controller	1		
LMAxis_1:I1.Switch_On_Active	Controller	1		
LMAxis_1:I1.Enable_Operation	Controller	1		
LMAxis_1:I1.Error	Controller	0		
LMAxis_1:I1.Voltage_Enable	Controller	1		
LMAxis_1:I1._Quick_Stop	Controller	1		
LMAxis_1:I1.Switch_On_Locked	Controller	0		
LMAxis_1:I1.Waming	Controller	0		
LMAxis_1:I1.Event_Handler_Active	Controller	0		
LMAxis_1:I1.Special_Motion_Active	Controller	0		
LMAxis_1:I1.In_Target_Position	Controller	1		
LMAxis_1:I1.Homed	Controller	1		
LMAxis_1:I1.Fatal_Error	Controller	0		
LMAxis_1:I1.Motion_Active	Controller	0		
LMAxis_1:I1.Range_Indicator_1	Controller	1		
LMAxis_1:I1.Range_Indicator_2	Controller	0		
⊞ LMAxis_1:I1.MCSW_WamWord	Controller	2#0000_000...		
LMAxis_1:I1.Motor_Hot_Sensor	Controller	0		
LMAxis_1:I1.Motor_Short_Time_Overload	Controller	0		
LMAxis_1:I1.Motor_Supply_Voltage_Low	Controller	0		
LMAxis_1:I1.Motor_Supply_Voltage_High	Controller	0		
LMAxis_1:I1.Position_Lag_Always	Controller	0		
LMAxis_1:I1.Reserved1	Controller	0		
LMAxis_1:I1.Drive_Hot	Controller	0		
LMAxis_1:I1.Motor_Not_Homed	Controller	0		
LMAxis_1:I1.PTC_Sensor_1_Hot	Controller	0		
LMAxis_1:I1.PTC_Sensor_2_Hot	Controller	0		
LMAxis_1:I1.RR_Hot_Calculated	Controller	0		
LMAxis_1:I1.Speed_Lag_Always	Controller	0		



5 (USER)

Control

```
□ 0: Switch On.................1     ......Interface
  1: Voltage Enable..........1     ......Forced by Parameter
  2: /Quick Stop..............1     ......Forced by Parameter
  3: Enable Operation.......1     ......Forced by Parameter
  4: /Abort.......................1     ......Forced by Parameter
  5: /Freeze......................1     ......Forced by Parameter
□ 6: Go To Position..........0     ......Interface
□ 7: Error Acknowledge....0     ......Interface
□ 8: Jog Move +..............0     ......Interface
□ 9: Jog Move -...............0     ......Interface
□ 10: Special Mode..........0     ......Interface
□ 11: Home.......................0     ......Interface
□ 12: Clearance Check.....0     ......Interface
□ 13: Go To Inital Position0     ......Interface
□ 14: Linearizing..............0     ......Interface
□ 15: Phase Search.........0     ......Interface
     Control Word:        003Fh
     Override Value
     Enable Manual Override
```

Status

```
0: Operation Enabled..............1     0: Motor Hot Sensor................0
1: Switch On Active................1     1: Motor Short Time Overload..0
2: Enable Operation................1     2: Motor Supply Voltage Low...0
3: Error....................................0     3: Motor Supply Voltage High..0
4: Voltage Enable....................1     4: Position Lag Always............0
5: /Quick Stop.........................1     5: Reserved............................0
6: Switch On Locked..............0     6: Drive Hot.............................0
7: Warning...............................0     7: Motor Not Homed...............0
8: Event Handler Active..........0     8: PTC Sensor 1 Hot...............0
9: Special Motion Active.........0     9: PTC Sensor 2 Hot...............0
10: In Target Position..............1     10: RR Hot Calculated............0
11: Homed...............................1     11: Speed Lag Always............0
12: Fatal Error..........................0     12: Position Sensor.................0
13: Motion Active.....................0     13: Reserved..........................0
14: Range Indicator 1..............1     14: Interface Warn Flag..........0
15: Range Indicator 2..............0     15: Application Warn Flag.......0
     Status Word:       4C37h          Warn Word:              0000h
     Op. Main State      08h          Logged Error Code:      0000h
     Op. Sub State       C0h
```

Monitoring

Connection Status: Online
Firmware Status: Running
Motor Status: **Switched On**

Op. State: **Operation Enabled**

Actual Position: **-0.04 mm**
Demand Position: **0.00 mm**
Force Factor: 100.00 %
Motor Current: **0.06 A**
Logic Supply Volt.: **24.28 V**
Motor Supply Volt.: **73.68 V**

IO Panel

Enable Manual Override
Override Value
Actual Value

□ □ X4.5 - Input ○
□ □ X4.6 - Input ○
□ □ X4.7 - Input ○
□ □ X4.8 - Input ○

□ □ X4.3 - Output ○
□ □ X4.4 - Output ○
□ □ X3.6 - Output ○

Motion Comman

Enable Manual Override: □

Command Category: Most Commonly Used
Command Type: No Operation (000xh)
Count Nibble (Toggle Bits): 0h
□ Auto Increment Count Nibble

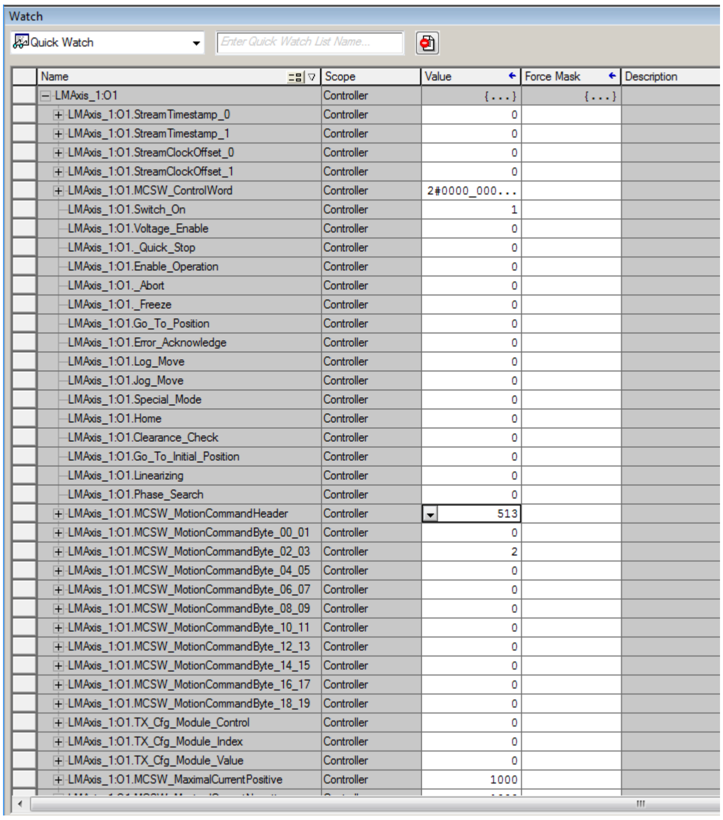
Name	Offs.	Description	Scaled Value	Int. Value (Dec)	Int. Value (Hex)
Header	0	000xh: No Operation	0	0	0000h

Information Window

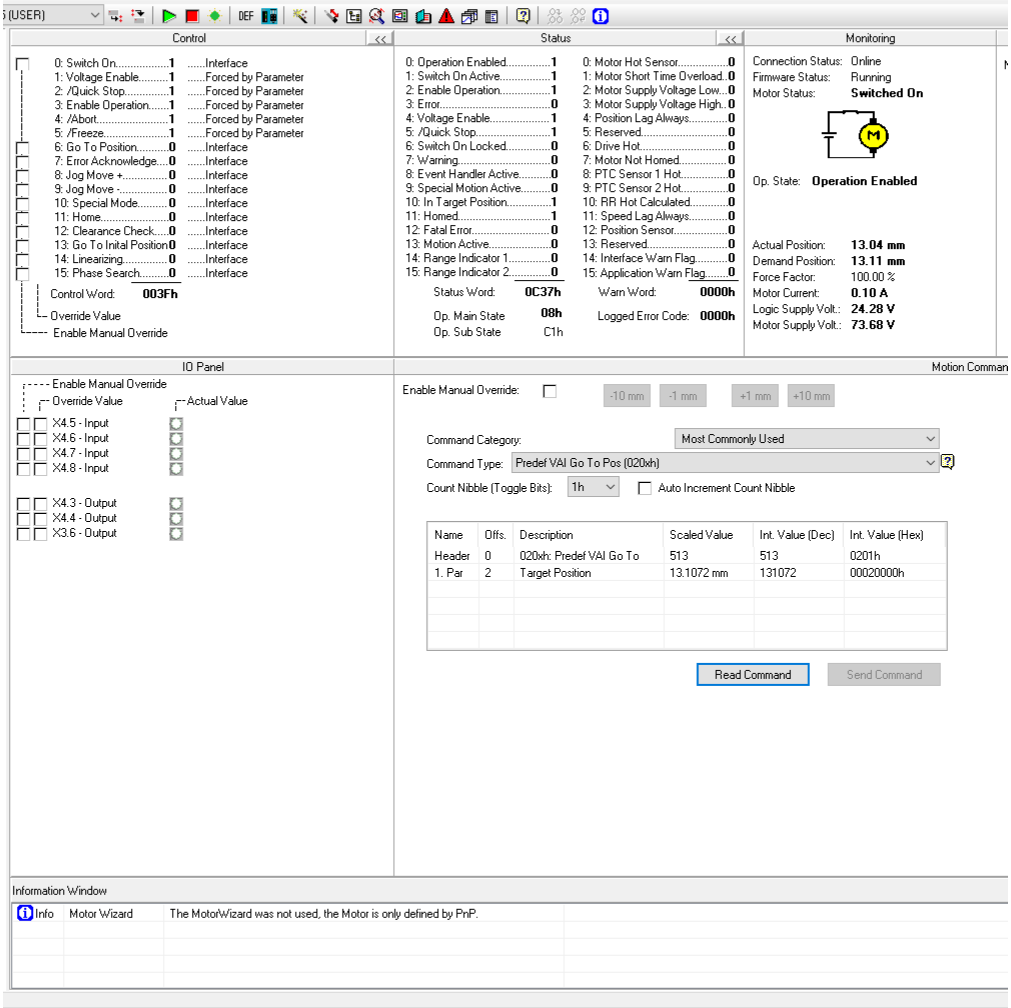
Info	Motor Wizard	The MotorWizard was not used, the Motor is only defined by PnP.

3.3.2 Motion Command Interface

Other output data are mapped to the “Motion Command Interface” (MCSW_MotionCommandHeader and MCSW_MotionCommandByte_0 ... 19). The first word (MCSW_MotionCommandHeader) is the motion command header, the remaining (MCSW_MotionCommandByte 0 ... 19) are the command specific motion parameters. In the next example we will set up a “Predef VAI Go To Pos (020xh)” Motion Command. First we set the target position low word (MCSW_MotionCommandByte_00_01) to 0 then the target position high word (MCSW_MotionCommandByte_02_03) to 2 and the motion command header (MCSW_MotionCommandHeader) to 513 (0x0201).



Name	Scope	Value	Force Mask	Description
LMAxis_1:O1	Controller	{...}	{...}	
LMAxis_1:O1.StreamTimestamp_0	Controller	0		
LMAxis_1:O1.StreamTimestamp_1	Controller	0		
LMAxis_1:O1.StreamClockOffset_0	Controller	0		
LMAxis_1:O1.StreamClockOffset_1	Controller	0		
LMAxis_1:O1.MCSW_ControlWord	Controller	2#0000_000...		
LMAxis_1:O1.Switch_On	Controller	1		
LMAxis_1:O1.Voltage_Enable	Controller	0		
LMAxis_1:O1._Quick_Stop	Controller	0		
LMAxis_1:O1.Enable_Operation	Controller	0		
LMAxis_1:O1._Abort	Controller	0		
LMAxis_1:O1._Freeze	Controller	0		
LMAxis_1:O1.Go_To_Position	Controller	0		
LMAxis_1:O1.Error_Acknowledge	Controller	0		
LMAxis_1:O1.Log_Move	Controller	0		
LMAxis_1:O1.Jog_Move	Controller	0		
LMAxis_1:O1.Special_Mode	Controller	0		
LMAxis_1:O1.Home	Controller	0		
LMAxis_1:O1.Clearance_Check	Controller	0		
LMAxis_1:O1.Go_To_Initial_Position	Controller	0		
LMAxis_1:O1.Linearizing	Controller	0		
LMAxis_1:O1.Phase_Search	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandHeader	Controller	513		
LMAxis_1:O1.MCSW_MotionCommandByte_00_01	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte_02_03	Controller	2		
LMAxis_1:O1.MCSW_MotionCommandByte_04_05	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte_06_07	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte_08_09	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte_10_11	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte_12_13	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte_14_15	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte_16_17	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte_18_19	Controller	0		
LMAxis_1:O1.TX_Cfg_Module_Control	Controller	0		
LMAxis_1:O1.TX_Cfg_Module_Index	Controller	0		
LMAxis_1:O1.TX_Cfg_Module_Value	Controller	0		
LMAxis_1:O1.MCSW_MaximalCurrentPositive	Controller	1000		



Control

```
0: Switch On.................1   ......Interface
1: Voltage Enable..........1   ......Forced by Parameter
2: /Quick Stop..............1   ......Forced by Parameter
3: Enable Operation.......1   ......Forced by Parameter
4: /Abort.......................1   ......Forced by Parameter
5: /Freeze.....................1   ......Forced by Parameter
6: Go To Position..........0   ......Interface
7: Error Acknowledge....0   ......Interface
8: Jog Move +...............0   ......Interface
9: Jog Move -................0   ......Interface
10: Special Mode..........0   ......Interface
11: Home.......................0   ......Interface
12: Clearance Check.....0   ......Interface
13: Go To Inital Position0   ......Interface
14: Linearizing..............0   ......Interface
15: Phase Search.........0   ......Interface
Control Word:        003Fh
Override Value
Enable Manual Override
```

Status

```
0: Operation Enabled..............1     0: Motor Hot Sensor................0
1: Switch On Active.................1     1: Motor Short Time Overload..0
2: Enable Operation.................1     2: Motor Supply Voltage Low....0
3: Error....................................0     3: Motor Supply Voltage High..0
4: Voltage Enable....................1     4: Position Lag Always............0
5: /Quick Stop.........................1     5: Reserved...........................0
6: Switch On Locked.................0     6: Drive Hot............................0
7: Warning...............................0     7: Motor Not Homed................0
8: Event Handler Active...........0     8: PTC Sensor 1 Hot...............0
9: Special Motion Active..........0     9: PTC Sensor 2 Hot...............0
10: In Target Position..............1     10: RR Hot Calculated............0
11: Homed..............................1     11: Speed Lag Always............0
12: Fatal Error..........................0     12: Position Sensor.................0
13: Motion Active.....................0     13: Reserved...........................0
14: Range Indicator 1..............0     14: Interface Warn Flag..........0
15: Range Indicator 2..............0     15: Application Warn Flag.......0
   Status Word:       0C37h          Warn Word:            0000h
   Op. Main State       08h          Logged Error Code:   0000h
   Op. Sub State        C1h
```

Monitoring

```
Connection Status:   Online
Firmware Status:     Running
Motor Status:        Switched On
Op. State:   Operation Enabled
Actual Position:     13.04 mm
Demand Position:     13.11 mm
Force Factor:        100.00 %
Motor Current:       0.10 A
Logic Supply Volt.:  24.28 V
Motor Supply Volt.:  73.68 V
```

IO Panel

```
Enable Manual Override
Override Value        Actual Value
□ □ X4.5 - Input        ○
□ □ X4.6 - Input        ○
□ □ X4.7 - Input        ○
□ □ X4.8 - Input        ○
□ □ X4.3 - Output       ○
□ □ X4.4 - Output       ○
□ □ X3.6 - Output       ○
```

Enable Manual Override: □

Command Category: Most Commonly Used

Command Type: Predef VAI Go To Pos (020xh)

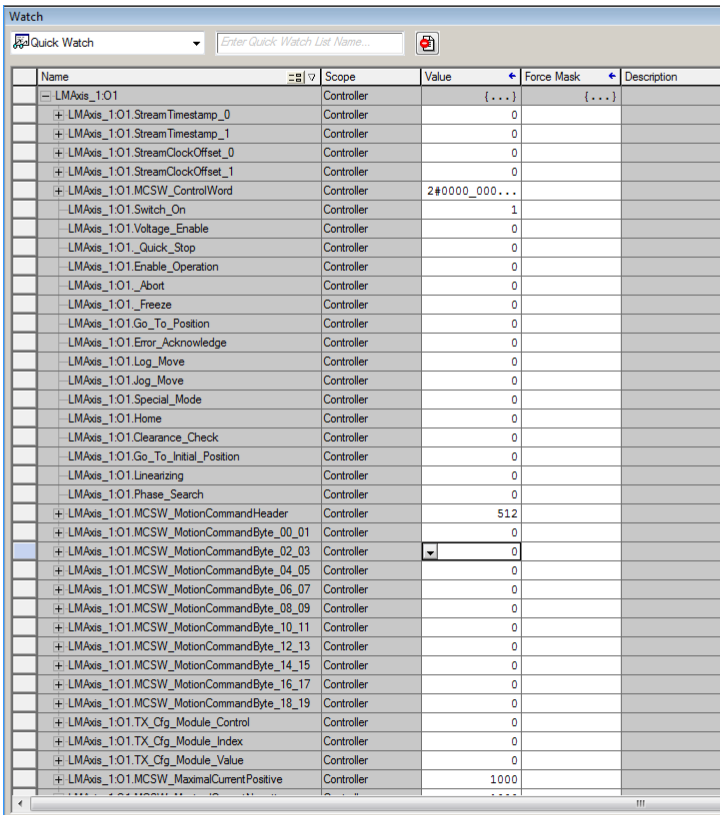
Count Nibble (Toggle Bits): 1h □ Auto Increment Count Nibble

Name	Offs.	Description	Scaled Value	Int. Value (Dec)	Int. Value (Hex)
Header	0	020xh: Predef VAI Go To	513	513	0201h
1. Par	2	Target Position	13.1072 mm	131072	00020000h

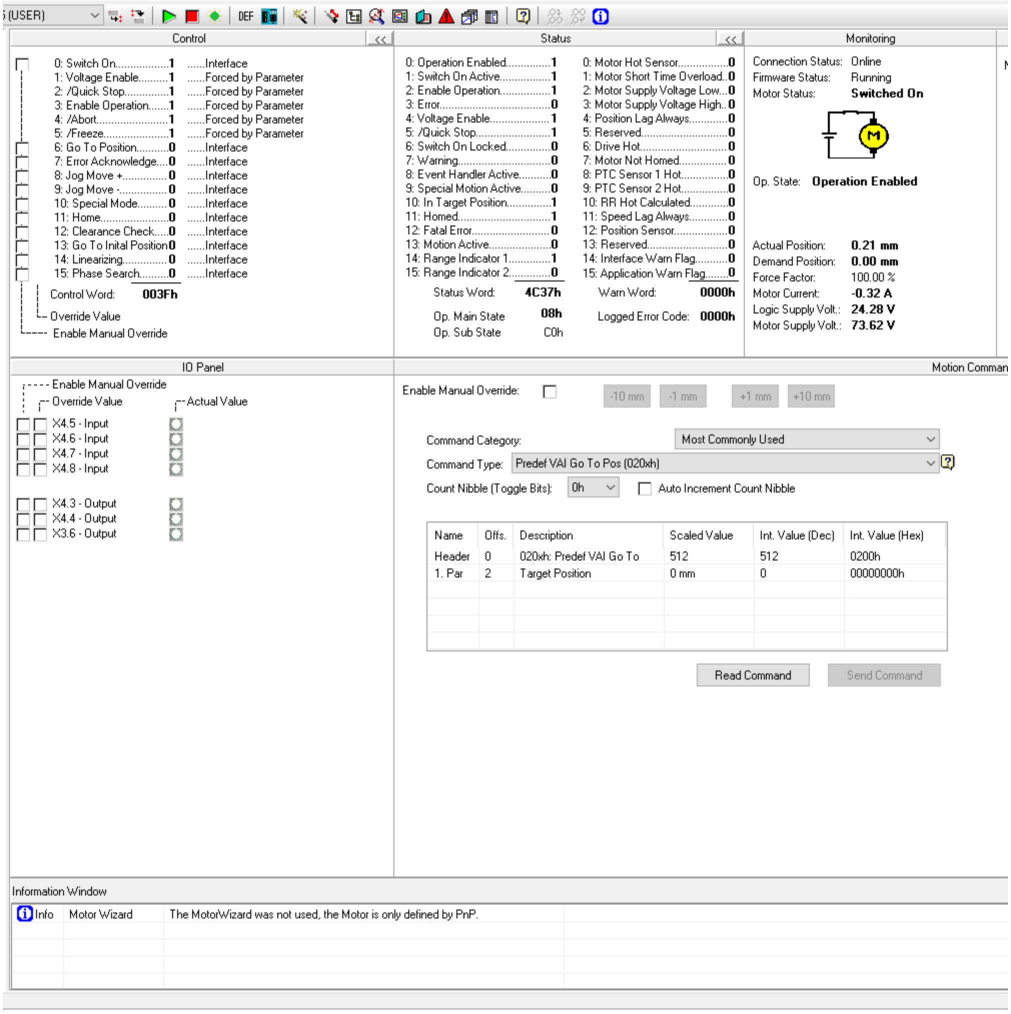
Information Window

Info	Motor Wizard	The MotorWizard was not used, the Motor is only defined by PnP.

Press the “Read Command” button to see the sent command.
We will use the same command to move back to 0mm. Change the target position high word to 0. Then change the count nibble in the motion command header to 0.



Name	Scope	Value	Force Mask	Description
LMAxis_1:O1	Controller	{...}	{...}	
LMAxis_1:O1.StreamTimestamp_0	Controller	0		
LMAxis_1:O1.StreamTimestamp_1	Controller	0		
LMAxis_1:O1.StreamClockOffset_0	Controller	0		
LMAxis_1:O1.StreamClockOffset_1	Controller	0		
LMAxis_1:O1.MCSW_ControlWord	Controller	2#0000_000...		
LMAxis_1:O1.Switch_On	Controller	1		
LMAxis_1:O1.Voltage_Enable	Controller	0		
LMAxis_1:O1._Quick_Stop	Controller	0		
LMAxis_1:O1.Enable_Operation	Controller	0		
LMAxis_1:O1._Abort	Controller	0		
LMAxis_1:O1._Freeze	Controller	0		
LMAxis_1:O1.Go_To_Position	Controller	0		
LMAxis_1:O1.Error_Acknowledge	Controller	0		
LMAxis_1:O1.Log_Move	Controller	0		
LMAxis_1:O1.Jog_Move	Controller	0		
LMAxis_1:O1.Special_Mode	Controller	0		
LMAxis_1:O1.Home	Controller	0		
LMAxis_1:O1.Clearance_Check	Controller	0		
LMAxis_1:O1.Go_To_Initial_Position	Controller	0		
LMAxis_1:O1.Linearizing	Controller	0		
LMAxis_1:O1.Phase_Search	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandHeader	Controller	512		
LMAxis_1:O1.MCSW_MotionCommandByte_00_01	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte_02_03	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte_04_05	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte_06_07	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte_08_09	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte_10_11	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte_12_13	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte_14_15	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte_16_17	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte_18_19	Controller	0		
LMAxis_1:O1.TX_Cfg_Module_Control	Controller	0		
LMAxis_1:O1.TX_Cfg_Module_Index	Controller	0		
LMAxis_1:O1.TX_Cfg_Module_Value	Controller	0		
LMAxis_1:O1.MCSW_MaximalCurrentPositive	Controller	1000		



5 (USER)

Control

0: Switch On.................1 ......Interface
1: Voltage Enable..........1 ......Forced by Parameter
2: /Quick Stop..............1 ......Forced by Parameter
3: Enable Operation.......1 ......Forced by Parameter
4: /Abort.......................1 ......Forced by Parameter
5: /Freeze.....................1 ......Forced by Parameter
6: Go To Position..........0 ......Interface
7: Error Acknowledge....0 ......Interface
8: Jog Move +...............0 ......Interface
9: Jog Move -................0 ......Interface
10: Special Mode..........0 ......Interface
11: Home.......................0 ......Interface
12: Clearance Check.....0 ......Interface
13: Go To Inital Position0 ......Interface
14: Linearizing..............0 ......Interface
15: Phase Search..........0 ......Interface

Control Word: 003Fh

Override Value

Enable Manual Override

Status

0: Operation Enabled..............1
1: Switch On Active.................1
2: Enable Operation.................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..........0
10: In Target Position..............1
11: Homed................................1
12: Fatal Error...........................0
13: Motion Active......................0
14: Range Indicator 1...............1
15: Range Indicator 2...............0

Status Word: 4C37h

Op. Main State 08h
Op. Sub State C0h

0: Motor Hot Sensor.................0
1: Motor Short Time Overload..0
2: Motor Supply Voltage Low...0
3: Motor Supply Voltage High..0
4: Position Lag Always............0
5: Reserved..............................0
6: Drive Hot...............................0
7: Motor Not Homed..................0
8: PTC Sensor 1 Hot................0
9: PTC Sensor 2 Hot................0
10: RR Hot Calculated............0
11: Speed Lag Always.............0
12: Position Sensor.................0
13: Reserved............................0
14: Interface Warn Flag...........0
15: Application Warn Flag........0

Warn Word: 0000h

Logged Error Code: 0000h

Monitoring

Connection Status: Online
Firmware Status: Running
Motor Status: **Switched On**

Op. State: **Operation Enabled**

Actual Position: **0.21 mm**
Demand Position: **0.00 mm**
Force Factor: 100.00 %
Motor Current: **-0.32 A**
Logic Supply Volt.: **24.28 V**
Motor Supply Volt.: **73.62 V**

IO Panel

Enable Manual Override
Override Value
Actual Value

□ □ X4.5 - Input ○
□ □ X4.6 - Input ○
□ □ X4.7 - Input ○
□ □ X4.8 - Input ○

□ □ X4.3 - Output ○
□ □ X4.4 - Output ○
□ □ X3.6 - Output ○

Motion Comman

Enable Manual Override: □

Command Category: Most Commonly Used

Command Type: Predef VAI Go To Pos (020xh)

Count Nibble (Toggle Bits): 0h

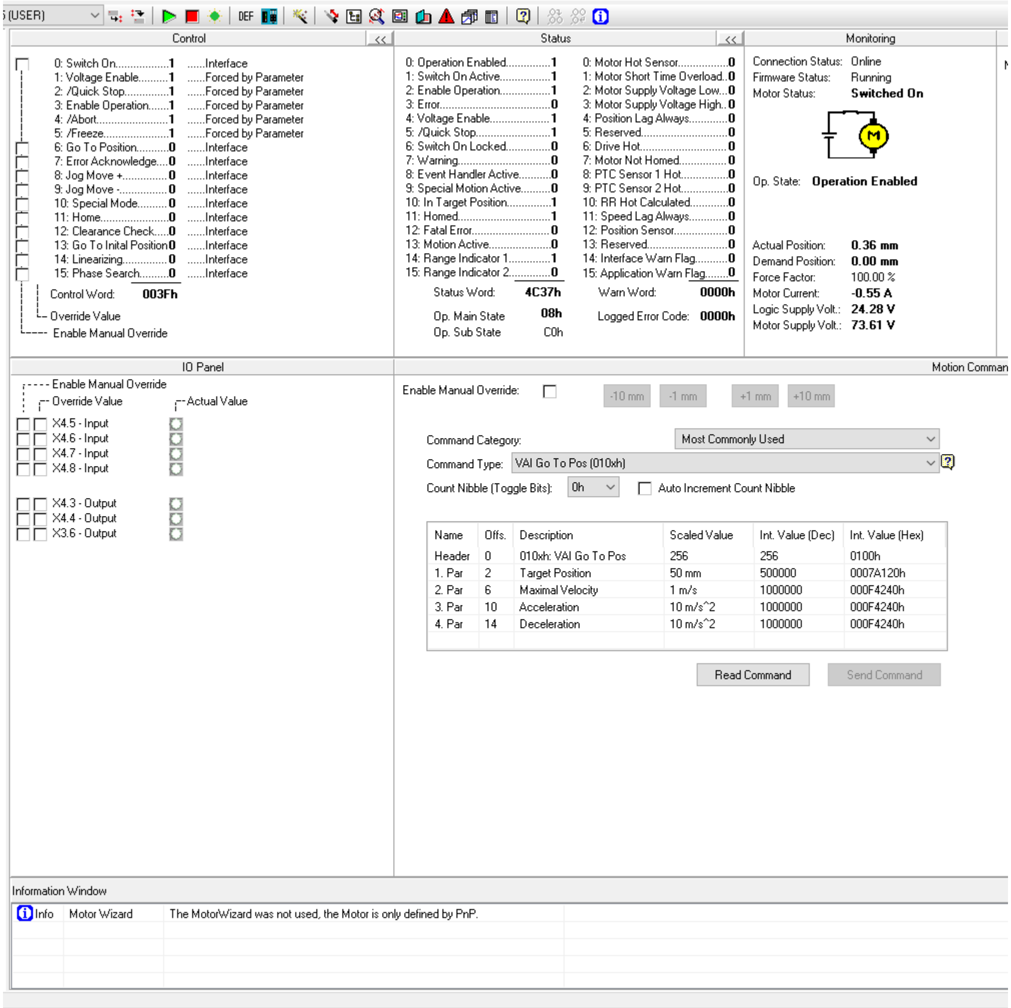
□ Auto Increment Count Nibble

Name	Offs.	Description	Scaled Value	Int. Value (Dec)	Int. Value (Hex)
Header	0	020xh: Predef VAI Go To	512	512	0200h
1. Par	2	Target Position	0 mm	0	00000000h

Information Window

Info	Motor Wizard	The MotorWizard was not used, the Motor is only defined by PnP.

In the next example we are going to use the most common motion command "VAI Go To Pos (010xh)". In this example we define the motion command in the control panel first.



```
5 (USER)

Control
 0: Switch On.................1   ......Interface
 1: Voltage Enable..........1   ......Forced by Parameter
 2: /Quick Stop..............1   ......Forced by Parameter
 3: Enable Operation.......1   ......Forced by Parameter
 4: /Abort.......................1   ......Forced by Parameter
 5: /Freeze.....................1   ......Forced by Parameter
 6: Go To Position..........0   ......Interface
 7: Error Acknowledge....0   ......Interface
 8: Jog Move +...............0   ......Interface
 9: Jog Move -................0   ......Interface
10: Special Mode..........0   ......Interface
11: Home.......................0   ......Interface
12: Clearance Check.....0   ......Interface
13: Go To Inital Position0   ......Interface
14: Linearizing...............0   ......Interface
15: Phase Search..........0   ......Interface
    Control Word:       003Fh
    Override Value
    Enable Manual Override
```

```
Status
 0: Operation Enabled..............1    0: Motor Hot Sensor................0
 1: Switch On Active.................1    1: Motor Short Time Overload..0
 2: Enable Operation.................1    2: Motor Supply Voltage Low....0
 3: Error......................................0    3: Motor Supply Voltage High..0
 4: Voltage Enable....................1    4: Position Lag Always............0
 5: /Quick Stop.........................1    5: Reserved...............................0
 6: Switch On Locked..............0    6: Drive Hot...............................0
 7: Warning...............................0    7: Motor Not Homed...............0
 8: Event Handler Active..........0    8: PTC Sensor 1 Hot...............0
 9: Special Motion Active.........0    9: PTC Sensor 2 Hot...............0
10: In Target Position..............1   10: RR Hot Calculated............0
11: Homed..................................1   11: Speed Lag Always............0
12: Fatal Error............................0   12: Position Sensor.................0
13: Motion Active.......................0   13: Reserved...........................0
14: Range Indicator 1..............1   14: Interface Warn Flag..........0
15: Range Indicator 2..............0   15: Application Warn Flag.......0
    Status Word:       4C37h           Warn Word:          0000h
    Op. Main State      08h            Logged Error Code:  0000h
    Op. Sub State       C0h
```

```
Monitoring
Connection Status:   Online
Firmware Status:     Running
Motor Status:        Switched On

Op. State:   Operation Enabled

Actual Position:      0.36 mm
Demand Position:      0.00 mm
Force Factor:         100.00 %
Motor Current:        -0.55 A
Logic Supply Volt.:   24.28 V
Motor Supply Volt.:   73.61 V
```

```
IO Panel
Enable Manual Override
   Override Value            Actual Value
□ □ X4.5 - Input
□ □ X4.6 - Input
□ □ X4.7 - Input
□ □ X4.8 - Input

□ □ X4.3 - Output
□ □ X4.4 - Output
□ □ X3.6 - Output
```

Motion Comman

Enable Manual Override: □   -10 mm   -1 mm   +1 mm   +10 mm

Command Category: Most Commonly Used

Command Type: VAI Go To Pos (010xh)

Count Nibble (Toggle Bits): 0h   □ Auto Increment Count Nibble

Name	Offs.	Description	Scaled Value	Int. Value (Dec)	Int. Value (Hex)
Header	0	010xh: VAI Go To Pos	256	256	0100h
1. Par	2	Target Position	50 mm	500000	0007A120h
2. Par	6	Maximal Velocity	1 m/s	1000000	000F4240h
3. Par	10	Acceleration	10 m/s^2	1000000	000F4240h
4. Par	14	Deceleration	10 m/s^2	1000000	000F4240h

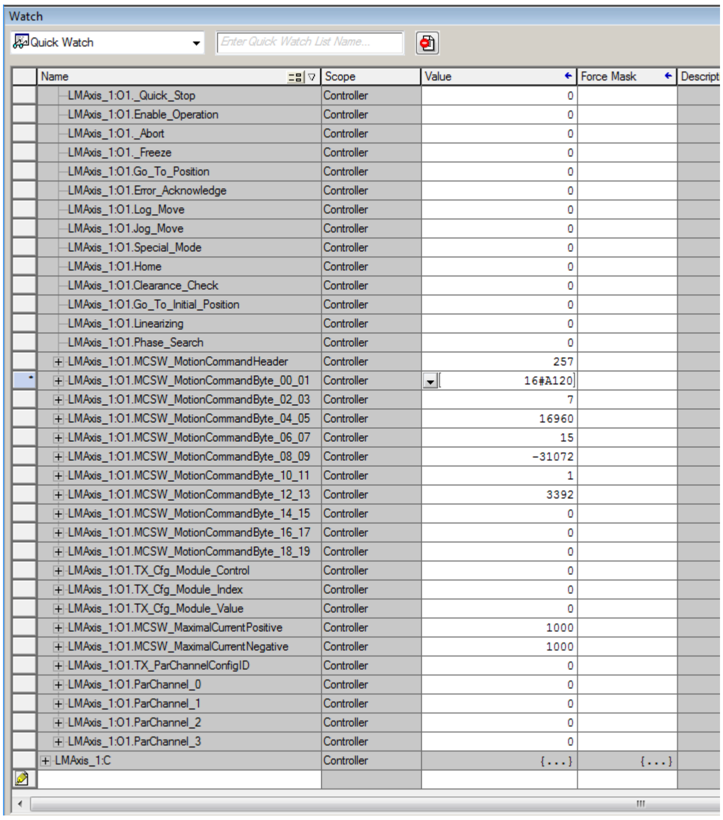
Read Command   Send Command

Information Window

Info	Motor Wizard	The MotorWizard was not used, the Motor is only defined by PnP.

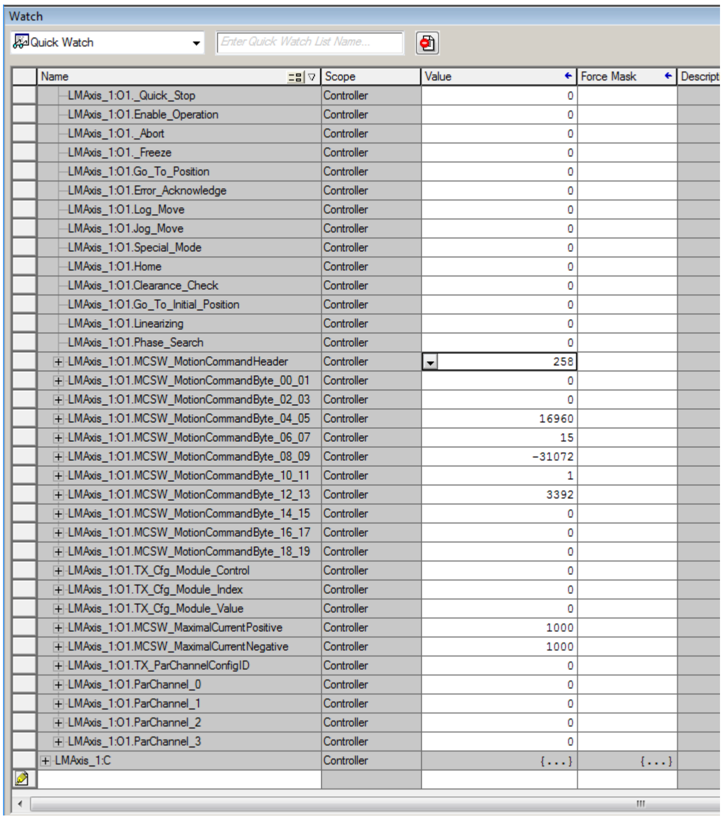
Then, the same hexadecimal values are inserted in the watch window. First the motion parameters - the motion header has to be written last, otherwise the movement starts before data entering is completed.

The data is written from low byte to high byte. (MotionCommandByte_00_01 = 16#A120, MotionCommandByte_02_03 = 16#0007, ...)

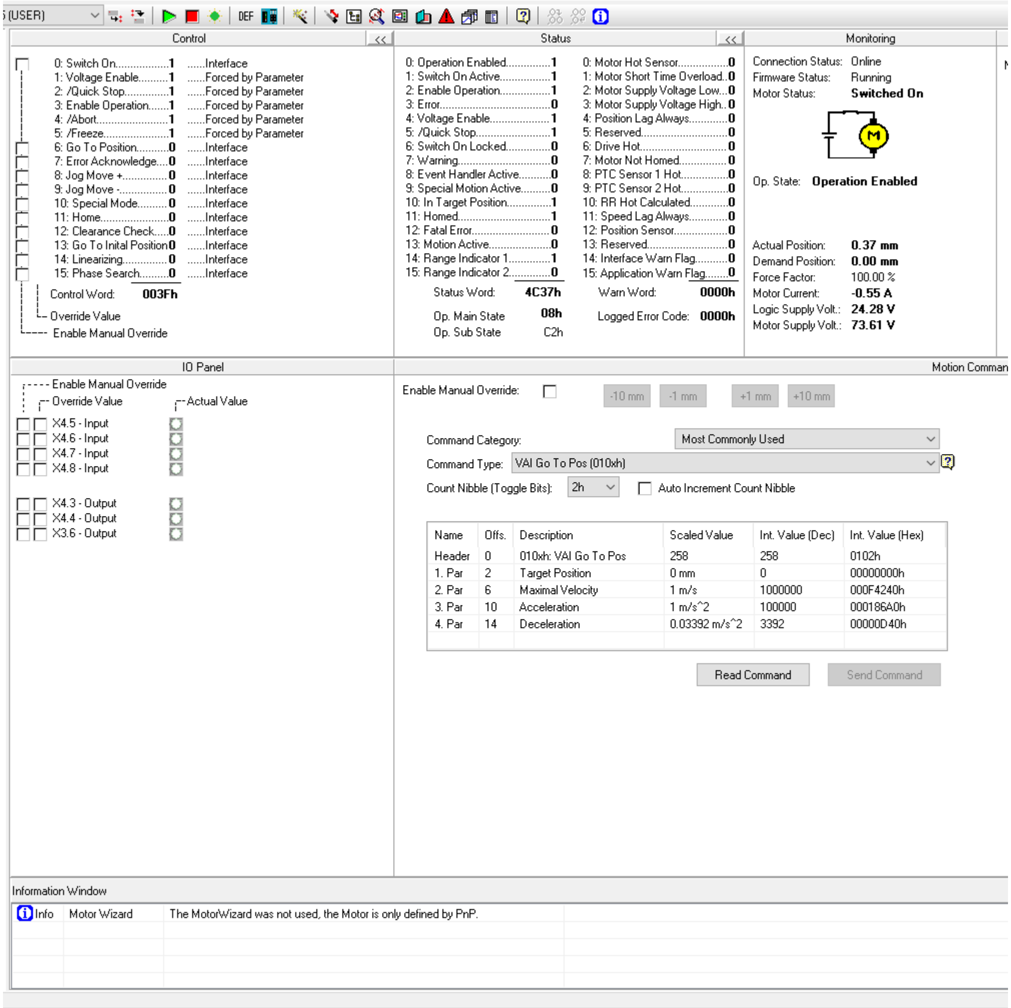


Name	Scope	Value	Force Mask	Descript
LMAxis_1:O1._Quick_Stop	Controller	0		
LMAxis_1:O1.Enable_Operation	Controller	0		
LMAxis_1:O1._Abort	Controller	0		
LMAxis_1:O1._Freeze	Controller	0		
LMAxis_1:O1.Go_To_Position	Controller	0		
LMAxis_1:O1.Error_Acknowledge	Controller	0		
LMAxis_1:O1.Log_Move	Controller	0		
LMAxis_1:O1.Jog_Move	Controller	0		
LMAxis_1:O1.Special_Mode	Controller	0		
LMAxis_1:O1.Home	Controller	0		
LMAxis_1:O1.Clearance_Check	Controller	0		
LMAxis_1:O1.Go_To_Initial_Position	Controller	0		
LMAxis_1:O1.Linearizing	Controller	0		
LMAxis_1:O1.Phase_Search	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandHeader	Controller	257		
LMAxis_1:O1.MCSW_MotionCommandByte_00_01	Controller	16#A120		
LMAxis_1:O1.MCSW_MotionCommandByte_02_03	Controller	7		
LMAxis_1:O1.MCSW_MotionCommandByte_04_05	Controller	16960		
LMAxis_1:O1.MCSW_MotionCommandByte_06_07	Controller	15		
LMAxis_1:O1.MCSW_MotionCommandByte_08_09	Controller	-31072		
LMAxis_1:O1.MCSW_MotionCommandByte_10_11	Controller	1		
LMAxis_1:O1.MCSW_MotionCommandByte_12_13	Controller	3392		
LMAxis_1:O1.MCSW_MotionCommandByte_14_15	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte_16_17	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte_18_19	Controller	0		
LMAxis_1:O1.TX_Cfg_Module_Control	Controller	0		
LMAxis_1:O1.TX_Cfg_Module_Index	Controller	0		
LMAxis_1:O1.TX_Cfg_Module_Value	Controller	0		
LMAxis_1:O1.MCSW_MaximalCurrentPositive	Controller	1000		
LMAxis_1:O1.MCSW_MaximalCurrentNegative	Controller	1000		
LMAxis_1:O1.TX_ParChannelConfigID	Controller	0		
LMAxis_1:O1.ParChannel_0	Controller	0		
LMAxis_1:O1.ParChannel_1	Controller	0		
LMAxis_1:O1.ParChannel_2	Controller	0		
LMAxis_1:O1.ParChannel_3	Controller	0		
LMAxis_1:C	Controller	{...}	{...}	

To move back to 0mm with the same motion command and the same parameters, set the target position to 0 (MotionCommandByte_00 .. 03), then change the count nibble in the motion command header to 2 for example.



Name	Scope	Value	Force Mask	Descript
LMAxis_1:O1._Quick_Stop	Controller	0		
LMAxis_1:O1.Enable_Operation	Controller	0		
LMAxis_1:O1._Abort	Controller	0		
LMAxis_1:O1._Freeze	Controller	0		
LMAxis_1:O1.Go_To_Position	Controller	0		
LMAxis_1:O1.Error_Acknowledge	Controller	0		
LMAxis_1:O1.Log_Move	Controller	0		
LMAxis_1:O1.Jog_Move	Controller	0		
LMAxis_1:O1.Special_Mode	Controller	0		
LMAxis_1:O1.Home	Controller	0		
LMAxis_1:O1.Clearance_Check	Controller	0		
LMAxis_1:O1.Go_To_Initial_Position	Controller	0		
LMAxis_1:O1.Linearizing	Controller	0		
LMAxis_1:O1.Phase_Search	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandHeader	Controller	258		
LMAxis_1:O1.MCSW_MotionCommandByte_00_01	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte_02_03	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte_04_05	Controller	16960		
LMAxis_1:O1.MCSW_MotionCommandByte_06_07	Controller	15		
LMAxis_1:O1.MCSW_MotionCommandByte_08_09	Controller	-31072		
LMAxis_1:O1.MCSW_MotionCommandByte_10_11	Controller	1		
LMAxis_1:O1.MCSW_MotionCommandByte_12_13	Controller	3392		
LMAxis_1:O1.MCSW_MotionCommandByte_14_15	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte_16_17	Controller	0		
LMAxis_1:O1.MCSW_MotionCommandByte_18_19	Controller	0		
LMAxis_1:O1.TX_Cfg_Module_Control	Controller	0		
LMAxis_1:O1.TX_Cfg_Module_Index	Controller	0		
LMAxis_1:O1.TX_Cfg_Module_Value	Controller	0		
LMAxis_1:O1.MCSW_MaximalCurrentPositive	Controller	1000		
LMAxis_1:O1.MCSW_MaximalCurrentNegative	Controller	1000		
LMAxis_1:O1.TX_ParChannelConfigID	Controller	0		
LMAxis_1:O1.ParChannel_0	Controller	0		
LMAxis_1:O1.ParChannel_1	Controller	0		
LMAxis_1:O1.ParChannel_2	Controller	0		
LMAxis_1:O1.ParChannel_3	Controller	0		
LMAxis_1:C	Controller	{...}	{...}	



Control

0: Switch On	1	Interface
1: Voltage Enable	1	Forced by Parameter
2: /Quick Stop	1	Forced by Parameter
3: Enable Operation	1	Forced by Parameter
4: /Abort	1	Forced by Parameter
5: /Freeze	1	Forced by Parameter
6: Go To Position	0	Interface
7: Error Acknowledge	0	Interface
8: Jog Move +	0	Interface
9: Jog Move -	0	Interface
10: Special Mode	0	Interface
11: Home	0	Interface
12: Clearance Check	0	Interface
13: Go To Inital Position	0	Interface
14: Linearizing	0	Interface
15: Phase Search	0	Interface

Control Word: **003Fh**

Override Value

Enable Manual Override

Status

0: Operation Enabled	1	0: Motor Hot Sensor	0
1: Switch On Active	1	1: Motor Short Time Overload	0
2: Enable Operation	1	2: Motor Supply Voltage Low	0
3: Error	0	3: Motor Supply Voltage High	0
4: Voltage Enable	1	4: Position Lag Always	0
5: /Quick Stop	1	5: Reserved	0
6: Switch On Locked	0	6: Drive Hot	0
7: Warning	0	7: Motor Not Homed	0
8: Event Handler Active	0	8: PTC Sensor 1 Hot	0
9: Special Motion Active	0	9: PTC Sensor 2 Hot	0
10: In Target Position	1	10: RR Hot Calculated	0
11: Homed	1	11: Speed Lag Always	0
12: Fatal Error	0	12: Position Sensor	0
13: Motion Active	0	13: Reserved	0
14: Range Indicator 1	1	14: Interface Warn Flag	0
15: Range Indicator 2	0	15: Application Warn Flag	0

Status Word: **4C37h**
Warn Word: **0000h**
Op. Main State **08h**
Logged Error Code: **0000h**
Op. Sub State C2h

Monitoring

Connection Status: Online
Firmware Status: Running
Motor Status: **Switched On**

Op. State: **Operation Enabled**

Actual Position: **0.37 mm**
Demand Position: **0.00 mm**
Force Factor: 100.00 %
Motor Current: **-0.55 A**
Logic Supply Volt.: **24.28 V**
Motor Supply Volt.: **73.61 V**

IO Panel

Enable Manual Override
Override Value
Actual Value

□ □ X4.5 - Input ○
□ □ X4.6 - Input ○
□ □ X4.7 - Input ○
□ □ X4.8 - Input ○

□ □ X4.3 - Output ○
□ □ X4.4 - Output ○
□ □ X3.6 - Output ○

Motion Comman

Enable Manual Override: □

Command Category: Most Commonly Used
Command Type: VAI Go To Pos (010xh)
Count Nibble (Toggle Bits): 2h
□ Auto Increment Count Nibble

Name	Offs.	Description	Scaled Value	Int. Value (Dec)	Int. Value (Hex)
Header	0	010xh: VAI Go To Pos	258	258	0102h
1. Par	2	Target Position	0 mm	0	00000000h
2. Par	6	Maximal Velocity	1 m/s	1000000	000F4240h
3. Par	10	Acceleration	1 m/s^2	100000	000186A0h
4. Par	14	Deceleration	0.03392 m/s^2	3392	00000D40h

Information Window

Info Motor Wizard The MotorWizard was not used, the Motor is only defined by PnP.

4 EtherNet/IP Parameters

The EtherNet/IP interface has an additional parameter tree branch (Parameters -> EtherNet/IP), which can be configured with the distributed LinMot-Talk software.
With these parameters, the EtherNet/IP communication parameters can be configured.
The LinMot-Talk software can be downloaded from http://www.linmot.com under the section download, software.

4.1 EtherNet/IP Dis-/Enable

With the Dis-/Enable parameter the LinMot drive can be operated without the Ethernet/IP interface. Therefore, the system can initially be configured and tested without any bus connection.

EtherNet/IP Dis-/Enable	
Disable	The drive runs without EtherNet/IP.
Enable	The drive runs with EtherNet/IP.

⚠ If the EtherNet/IP interface is disabled, the integrated EtherNet/IP switch is not powered. No data will be sent to other devices connected to the Ethernet network over the LinMot drive.

4.2 EtherNet/IP \ Ethernet Configuration \ IP Configuration Mode

This parameter defines how the IP address is assigned.

EtherNet/IP \ Ethernet Configuration \ IP Configuration Mode	
DHCP	IP address is acquired over DHCP.
Static by IP Configuration	IP address is set by parameters.
Static with hex switches S1 and S2 (DHCP)	IP address is set by parameters and the last byte is set with the value of the switches S1 and S2. The default IP address setting is 192.168.1.xxx (xxx denoting the value of the switches S1 and S2)

⚠ The switch value **S1 = 0** and **S2 = 0** (factory default setting) defines that the the IP address is acquired over **DHCP**.

⚠ When setting the IP address from the PLC, the IP Configuration Mode is changed to "Static by IP Configuration".

4.3 EtherNer/IP \ EtherNet Configuration \ IP Configuration

In this section the setting of the parameters for the IP address, the netmask and the default gateway is described.

EtherNet/IP Intf\Ethernet Configuration\IP Confirguration	
IP address 1st Byte	Highest byte of IP address
IP address 2nd Byte	Mid high byte of IP address
IP address 3rd Byte	Mid low byte of IP address
IP address 4th Byte	Lowest byte of IP address
Netmask 1st Byte	Highest byte of Netmask
Netmask 2nd Byte	Mid high byte of Netmask
Netmask 3rd Byte	Mid low byte of Netmask
Netmask 4th Byte	Lowest byte of Netmask
Default Gateway 1st Byte	Highest byte of Default Gateway
Default Gateway 2nd Byte	Mid high byte of Default Gateway
Default Gateway 3rd Byte	Mid low byte of Default Gateway
Default Gateway 4th Byte	Lowest byte of Default Gateway

5 Realtime IO Data Mapping

The default IO data mapping is the **Exclusive Owner, CIP Sync, 0x78/0x64**. If you want to use the legacy IO mapping without the CIP Sync functionality for backward compatibility, the **Legacy: Exclusive Owner, As_0x28_0x18** may be used.

5.1 Exclusive Owner, CIP Sync, 0x78/0x64

This IO data mapping shall be used for all IO data exchange, except if backward compatibility is explicitly needed.

It provides the possibility to exchange timestamps between the PLC and the LinMot drive which is needed for synchronized streaming using CIP Sync.

5.1.1 Configuration Assembly Instance 1

This Assembly is used to configure the data handling within the O->T and T->O assembly instances. The size of this assembly is 36 bytes.

Assembly Class Instance 1			
Byte Offset	Size / Type	Name	Description
00h	UInt32	StreamPeriod	Period time of CIP Sync streaming commands
04h	UInt32	TimingModel	Timing model of the originator PLC (1 or 2)
08h	UInt32	CFG_ParMonChannelConfigID	ID which is used to identify the currently effective configuration assembly [1]
0Ch	UInt16	ParamChannelUPID_0	UPID of the parameter which shall be written with ParChannel_0 of O->T assembly [2]
0Eh	UInt16	ParamChannelUPID_1	UPID of the parameter which shall be written with ParChannel_1 of O->T assembly [2]
10h	UInt16	ParamChannelUPID_2	UPID of the parameter which shall be written with ParChannel_2 of O->T assembly [2]
12h	UInt16	ParamChannelUPID_3	UPID of the parameter which shall be written with ParChannel_3 of O->T assembly [2]
14h	UInt16	MonChannelUPID_0	UPID of the variable which shall be returned in MonChannel_0 of T->O assembly [2]
16h	UInt16	MonChannelUPID_1	UPID of the variable which shall be returned in MonChannel_1 of T->O assembly [2]
18h	UInt16	MonChannelUPID_2	UPID of the variable which shall be returned in MonChannel_2 of T->O assembly [2]
1Ah	UInt16	MonChannelUPID_3	UPID of the variable which shall be returned in MonChannel_3 of T->O assembly [2]
1Ch	UInt32	MCSW_MaximalCurrentPositiveActive	Set to 1 if the positive current limit MCSW_MaximalCurrentPositive of O->T assembly shall be applied, 0 otherwise
20h	UInt32	MCSW_MaximalCurrentNegativeActive	Set to 1 if the negative current limit MCSW_MaximalCurrentNegative of O->T assembly shall be applied, 0 otherwise

[1] If the configuration assembly 1 is sent to the drive with new parameter channel UPIDs, this ID is needed to identify if the parameter data in the O->T assembly sent to the drive belong to the last configured UPIDs or already to the newly configured UPIDs.
The same holds if the monitoring channel UPIDs are changed. This ID may be used on the PLC to identify if the monitoring data in the T->O assembly belong to the last configured UPIDs or already to the newly configured UPIDs.

[2] Set to 0 if no parameter/variable shall be written/read. Values will **not** be written to **ROM** in the parameter channel.

5.1.2 O->T Assembly Instance 120 (0x78)

This output data mapping contains the real time data sent to the LinMot drive. The size is 76 bytes. The AB generic Ethernet module adds 6 bytes (status and sequence count) so the real exchanged size is 82 bytes.

Assembly Class Instance 120

Byte Offset	Size / Type	Name	Description
00h	UInt64	StreamTimestamp	Time stamp of streaming command [1]
08h	UInt64	StreamClockOffset/reserved	Shall be set to 0
10h	UInt16	MCSW_ControlWord	Bit coded control word
12h	UInt16	MCSW_MotionCommandHeader	12 Bit Command, 4Bit count nibble [2]
14h	UInt32	MCSW_MotionCommand_Bytes_00..03	Command specific [2]
18h	UInt32	MCSW_MotionCommand_Bytes_04..07	Command specific [2]
1Ch	UInt32	MCSW_MotionCommand_Bytes_08..11	Command specific [2]
20h	UInt32	MCSW_MotionCommand_Bytes_12..15	Command specific [2]
24h	UInt32	MCSW_MotionCommand_Bytes_16..19	Command specific [2]
28h	UInt16	TX_Cfg_Module_Control	Config module header [3]
2Ah	UInt16	TX_Cfg_Module_Index	Config module index [3]
2Ch	UInt32/SInt32	TX_Cfg_Module_Value	Config module value [3]
30h	UInt32	MCSW_MaximalCurrentPositive	Maximal current in positive direction. [4]
34h	UInt32	MCSW_MaximalCurrentNegative	Maximal current in negative direction. [4]
38h	UInt32	TX_ParChannelConfigID	ID to identify to which configuration assembly data set the parameters below belong to. [5]
3Ch	UInt32/SInt32	ParChannel_0	Value which shall be written to parameter defined in config assembly ParamChannelUPID_0. [5]
40h	UInt32/SInt32	ParChannel_1	Value which shall be written to parameter defined in config assembly ParamChannelUPID_1. [5]
44h	UInt32/SInt32	ParChannel_2	Value which shall be written to parameter defined in config assembly ParamChannelUPID_2. [5]
48h	UInt32/SInt32	ParChannel_3	Value which shall be written to parameter defined in config assembly ParamChannelUPID_3. [5]

[1] This time stamp is needed for CIP Sync based streaming. It represents the point in time when the corresponding command target shall be reached on the drive.

[2] Motion command fields, see [1] "0185-1093-E_XXX_MA_MotionCtrlSW-SG5-SG7".

[3] Config module fields, see [2] "0185-1074-E_XXX_MA_Drive-Configuration-Over-Fieldbus-SG5-SG7".

[4] Sets the actual current limit for positive and negative direction in 0.1% resolution. Only positive values allowed. Fields only take effect if the corresponding field in the configuration assembly is set to active.

[5] The parameter channel values are only written to the corresponding UPIDs if the TX_ParChannelConfigID is equal to the CFG_ParMonChannelConfigID of the last configuration assembly.

5.1.3 T->O Assembly Instance 100 (0x64)

This input data mapping contains the real time data sent by the LinMot drive. The size is 72 bytes. For the AB generic Ethernet module another 2 bytes (status and sequence count) are added, so the real exchanged size is 74 bytes.

Assembly Class Instance 100			
Byte Offset	Size / Type	Name	Description
00h	UInt64	StreamTimestamp	unused, set to 0
08h	UInt64	StreamClockOffset/reserved	unused, set to 0
10h	UInt16	MCSW_StateVar	coded state dependent
12h	UInt16	MCSW_StatusWord	Bit coded
14h	UInt16	MCSW_WarnWord	Bit coded
16h	UInt16	reserved16	reserved 16 bits
18h	Int32	MCSW_DemandPosition	Position [100nm]
1Ch	Int32	MCSW_ActualPosition	Position [100nm]
20h	Int32	MCSW_DemandCurrent	Current [1mA]
24h	Int32	MCSW_DifferencePosition	Position [100nm]
28h	Int32	MCSW_ActualVelocityFiltered	Velocitiy [1um/s]
2Ch	UInt16	RX_Cfg_Module_Status	Config module status [1]
2Eh	UInt16	RX_Cfg_Module_Index	Config module index [1]
30h	UInt32/ SInt32	RX_Cfg_Module_Value	Config module value [1]
34h	UInt32	RX_MonChannelConfigID	ID to identify to which configuration assembly data set the following monitoring variables belong to. [2]
38h	UInt32/ SInt32	MonChannel_0	Value of the variable defined in the configuration assembly MonChannelUPID_0. [2]
3Ch	UInt32/ SInt32	MonChannel_1	Value of the variable defined in the configuration assembly MonChannelUPID_1. [2]
40h	UInt32/ SInt32	MonChannel_2	Value of the variable defined in the configuration assembly MonChannelUPID_2. [2]
44h	UInt32/ SInt32	MonChannel_3	Value of the variable defined in the configuration assembly MonChannelUPID_3. [2]

[1] Config module fields, see [2] "0185-1074-E_XXX_MA_Drive-Configuration-Over-Fieldbus-SG5-SG7".

[2] RX_MonChannelConfigID contains the ID of CFG_ParMonChannelConfigID of the last configuration assembly. This can be used on the PLC to identify to which configuration assembly data set the monitoring channel values belong to.

5.2 Legacy: Exclusive Owner, As_0x28_0x18

This IO data mapping may be used if backward compatibility is needed.

CIP Sync streaming is **not supported** when using this IO data mapping.

5.2.1 O->T Assembly Instance 40

In this real time IO Mapping the 16 bit control word, the 16 bit motion command header and the motion command parameters are exchanged. The size of this mapping is 32 bytes or **16 words**. The AB generic Ethernet module adds another 6 bytes (status and sequence count) so the real exchanged size is 38 bytes.

Assembly Class Instance 40			
Byte Offset	Size / Type	Name	Description
00h	UInt16	MCSW_ControlWord	Bit coded
02h	UInt16	MCSW_MotionCommand Header	12Bit Command 4Bit count nibble [1]
04h	UInt32	MCSW_MotionCommand Byte_00..03	Command specific [1]
08h	UInt32	MCSW_MotionCommand Byte_04..07	Command specific [1]
0Ch	UInt32	MCSW_MotionCommand Byte_08..11	Command specific [1]
10h	UInt32	MCSW_MotionCommand Byte_12..15	Command specific [1]
14h	UInt32	MCSW_MotionCommand Byte_16..19	Command specific [1]
18h	UInt16	TX_Cfg_Module_Control	Config module header [2]
1Ah	UInt16	TX_Cfg_Module_Index	Config module index [2]
1Ch	UInt32/ SInt32	TX_Cfg_Module_Value	Config module value [2]

[1] Motion command fields, see [1] "0185-1093-E_XXX_MA_MotionCtrlSW-SG5-SG7".

[2] Config module fields, see [2] "0185-1074-E_XXX_MA_Drive-Configuration-Over-Fieldbus-SG5-SG7".

5.2.2 T->O Assembly Instance 24

In this real time IO mapping the StateVar for the main state machine and several other helpful data is exchanged. The size of this mapping is 26 bytes or **13 words**. For the AB generic Ethernet module another 2 bytes (status and sequence count) are added, so the real exchanged size is 28 bytes.

Assembly Class Instance 24			
Byte Offset	Size / Type	Name	Description
00h	UInt16	MCSW_StateVar	coded state dependent
02h	UInt16	MCSW_StatusWord	Bit coded
04h	UInt16	MCSW_WarnWord	Bit coded
06h	Int32	MCSW_DemandPosition	Position [100nm]
0Ah	Int32	MCSW_ActualPosition	Position [100nm]
0Eh	Int32	MCSW_DemandCurrent	Current [1mA]
12h	UInt16	RX_Cfg_Module_Status	Config module status [1]
14h	UInt16	RX_Cfg_Module_Index	Config module index [1]
16h	UInt32/ SInt32	RX_Cfg_Module_Value	Config module value [1]

[1] Config module fields, see [2] "0185-1074-E_XXX_MA_Drive-Configuration-Over-Fieldbus-SG5-SG7".

6 CIP Sync Streaming

CIP Sync streaming describes position, velocity and acceleration setpoint streaming using a controller generated time stamp.
This streaming mode is based on standard PVA streaming described in [1] "0185-1093-E_XXX_MA_MotionCtrlSW-SG5-SG7".
Additionally, the time stamp of the command has to be generated by the controller and sent to the LinMot drive in the O->T Output Assembly Instance 120. Using this time stamp, the jitter added to the telegram by the network does not influence the motion anymore. Therefore, the time of the LinMot drive and the controller need to be synchronized. This is achieved with the precision time protocol PTP (IEEE 1588).

The timing model must be set with the Configuration Assembly Instance 1.
Timing model 1 expects that the target time stamp lies 2 streaming periods in the future from when the telegram is calculated.
Timing model 2 expects that the target time stamp lies 3 streaming periods in the future from when the telegram is calculated.

Limitations
A streaming telegram must not arrive at the LinMot drive later than one streaming period before the target time stamp. Otherwise, the telegram is too late and cannot be processed anymore. It is important that the network and the streaming period length are designed in a way that there is always enough margin such that in a worst case scenario no telegram will arrive late.

In order to achieve short streaming periods, the network traffic must be minimized to the essential telegrams in order not to interfere with the tight timing requirements. Broadcast bursts, such as ARP-requests sent by a controller looking for multiple devices which are not online, may create delays which result in late telegrams.

Once the clocks of all devices are synchronized and streaming is running, no time steps shall occur. Otherwise, the LinMot drives cannot handle the time stamp information correctly and the drives will stop the motion.
For example

- the time of the grand master clock must not be changed by any means during streaming motion,

- no controller which is capable of acting as a grand master clock shall be connected to a running system, even if its clock priority is lower than that of the current grand master clock.

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