LinMot®

ETHERNET POWERLINK

MC-Link with Ethernet POWERLINK Interface for SG5

User Manual

This document applies to the following controllers:

B8050-ML-PL-xxx
MB8050-ML-PL-xxx

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1 System Overview

The LinMot POWERLINK devices are Ethernet POWERLINK CNs (Controlled Nodes) with the following parameters (according to EPSG-DS-301-V1.1.0):

Device Property	Value
Minimal POWERLINK cycle time	2 ms
Size of isochronous transmit buffer (maximal size of isochronous frames)	256 Byte
Size of isochronous receive buffer (maximal size of isochronous frames)	256 Byte
Overall buffer size available for isochronous data	512 Byte
PReq to PRes latency (CN isochronous reaction time)	~ 1 µs
SoA to ASnd latency (CN asynchronous reaction time)	< 100 µs
Maximum asynchronous MTU	300 Byte
Ability to support multiplexed isochronous access	No
Asynchronous SDO transfer method (UDP/IP and/or POWERLINK ASnd)	POWERLINK ASnd only

For further information on Ethernet POWERLINK please visit:

http://www.ethernet-powerlink.org

2 POWERLINK Parameters and Variables

2.1 Parameters

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

With these parameters, the POWERLINK behaviour can be configured. The LinMot-Talk software can be downloaded from http://www.linmot.com in the section download, software & manuals.

POWERLINK → Dis-/Enable

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

POWERLINK → Dis-/Enable	
Disable	Device runs without POWERLINK.
Enable	Device runs with POWERLINK.

IMPORTANT: If the POWERLINK Interface is disabled, the integrated POWERLINK-Hub is not powered! No messages will be sent to other devices connected to the POWERLINK-Network via the LinMot device.

POWERLINK → NodeID

In this section the NodeID of the POWERLINK CN can be configured.

POWERLINK → NodeID	
NodeID Source Select	Shows which source is selected to provide the NodeID.
NodeID Parameter Value	Value of the NodeID if 'By Parameter' is selected. The default value of this parameter is 63 (3Fh).

POWERLINK → NodeID → NodeID Source Select

In this section the source of the NodeID of the POWERLINK CN can be configured.

POWERLINK → NodeID → NodeID Source Select	
By Hex Switches S1 and S2	The NodeID is determined by the Switches S1 (ID High) and S2 (ID Low)
By Parameter	The NodeID is determined by the Parameter 'NodeID Parameter Value' in the LinTalk1100 Software.

2.2 Variables

POWERLINK

Name	Type	Description
Node-ID	UInt16	Current Node-ID
NMT State	UInt16 Enumerator	Current NMT State

Description of the different NMT-States

NMT_CS_NOT_ACTIVE

NMT_CS_NOT_ACTIVE is a non-permanent state which allows a starting node to recognize the current network state.

NMT_CS_PRE_OPERATIONAL_1

In NMT_CS_PRE_OPERATIONAL_1 the node is identified by the master via IdentRequest. The transition from NMT_CS_PRE_OPERATIONAL_1 to the following state is triggered by a SoC frame being received.

NMT_CS_PRE_OPERATIONAL_2

In the state NMT_CS_PRE_OPERATIONAL_2, the controller waits for the configuration to be completed. Precondition for the transition from NMT_CS_PRE_OPERATIONAL_2 to NMT_CS_READY_TO_OPERATE is the reception of an NMTEnableReadyToOperate command.

NMT_CS_READY_TO_OPERATE

With the state NMT_CS_READY_TO_OPERATE, the controller shall signal its readiness to operation to the master.

NMT_CS_OPERATIONAL

NMT_CS_OPERATIONAL is the normal operating state of a controller.

NMT_CS_STOPPED

In the NMT_CS_STOPPED state, the node shall be largely passive. NMT_CS_STOPPED shall be used for controlled shutdown of a selected CN while the system is still running.

MC-Link Master

Name	Type	Description
Logic Supply Voltage	UInt16	Level of the logic supply voltage
CPU Temperature	UInt16	CPU Temperature of the controller

Axis x

Name	Type	Description
Connected Device Information		
MC-Link Connection State	UInt16 Enumerator	No Connection
		Device is not connected or connection has been lost
		Cfg Msg x sent
		Connection is being established
		Connected
		Connection is established
Article Number	UInt16	Article Number of the connected Device
Controller Version	UInt16	Controller Version of the connected Device
Serial Number Low	UInt16	Lower 16 Bit of the serial number of the connected device
Serial Number High	UInt16	Higher 16 Bit of the serial number of the connected device
SW Release Sub Version	UInt16	Sub Version of the installed firmware of the connected device
SW Release Main Version	UInt16	Main Version of the installed firmware of the connected device
MC-Link SW Version	UInt16	Version of the MC-Link SW of the connected device
MC-Link Data Version	UInt16	Version of the MC-Link Data of the connected device
OS Version Counter	UInt16	Version counter of the operating system of the connected device
MC Version Counter	UInt16	Version counter of the motion control software of the connected device
Intf Version Counter	UInt16	Version counter of the interface software of the connected device
Appl Version Counter	UInt16	Version counter of the application software of the connected device

Process Data from the PLC to the MC-Link Device		
TX_ControlWord	UInt16	-
TX_MC_Header	UInt16	-
TX_MC_Par_Word_0	UInt16	-
TX_MC_Par_Word_1	UInt16	-
TX_MC_Par_Word_2	UInt16	-
TX_MC_Par_Word_3	UInt16	-
TX_MC_Par_Word_4	UInt16	-
TX_MC_Par_Word_5	UInt16	-
TX_MC_Par_Word_6	UInt16	-
TX_MC_Par_Word_7	UInt16	-
TX_MC_Par_Word_8	UInt16	-
TX_MC_Par_Word_9	UInt16	-
TX_Cfg_Module_Control	UInt16	-
TX_Cfg_Module_Index_Out	UInt16	-
TX_Cfg_Module_Value_Out	Int32	-
Process Data from the MC-Link Device to the PLC		
RX_StateVar	UInt16	-
RX_StatusWord	UInt16	-
RX_WarnWord	UInt16	-
RX_DemandCurrent	UInt16	-
RX_ActualPosition	Int32	-
RX_DemandPosition	Int32	-
RX_Cfg_Module_Status	UInt16	-
RX_Cfg_Module_Index_In	UInt16	-
RX_Cfg_Module_Value_In	Int32	-
Message Lost Counter	UInt32	Number of messages to an axis from the master that that were lost due to transmission errors etc.

The message lost counters indicate communication problems between the MC-Link controller and a connected device. If at any time one of the counters is different from zero, it is recommended to take appropriate steps as described in chapter “4.2 Frequent Problems and Solutions“.

For a detailed description of the process data see the manuals of the devices in question.

3 Special Axis Errors

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

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

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

3.1 No Connection

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

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

3.2 Connection Lost

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

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

4 Troubleshooting

4.1 Analyzing traffic in POWERLINK networks

To analyze the data traffic in a POWERLINK network the use of a network protocol analyzer is strongly recommended.

Wireshark is one of the most used analyzers and can be downloaded free of charge from http://www.wireshark.org.

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

4.2 Frequent Problems and Solutions

Problem:	**The node never gets to the NMT-State Operational**
Possible Solution:	Check if the Node-ID of the controller matches with the one configured in the PLC
Possible Solution:	Check if the Node-ID of the controller is unique, and no other node in the network has the same ID.

Problem:	**The Message Lost Counters have indicated that messages were lost**
Possible Solution:	Increase the POWERLINK cycle time to at least 2 ms in your PLC
Possible Solution:	Make sure to properly connect all devices with compatible MC-Link cables (LinMot Art.-No. 0150-3308)

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