

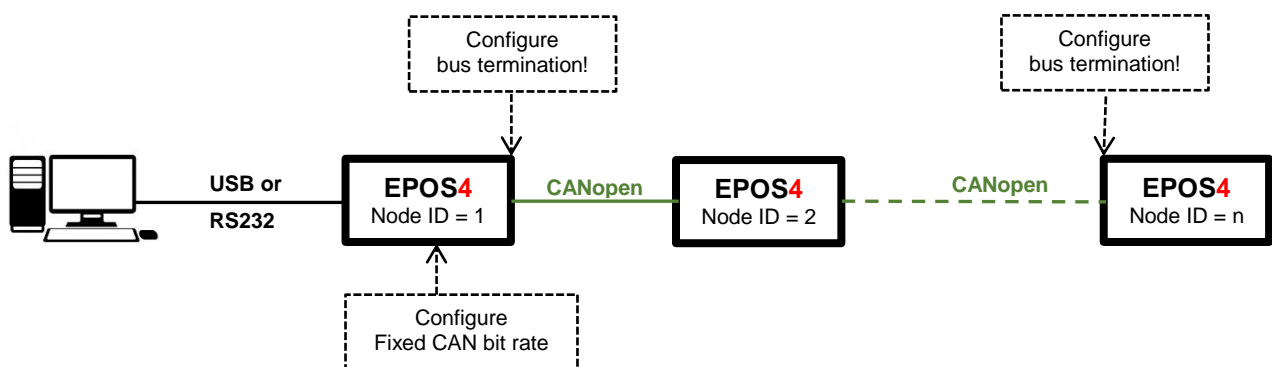
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maxon motor ag Brünigstrasse 220 CH – 6072 Sachseln <a href="http://www.maxonmotor.com">www.maxonmotor.com</a>	<b>EPOS4 Gateway / CAN  Configuration</b>	Version:           2018-02-22 Author:             ROMA

## EPOS4 CAN Network with Gateway functionality

### General Remarks

If the gateway functionality of EPOS4 is in use, there must be a couple of key points be considered to ensure that scanning and communication of EPOS4 within the CAN network will be possible.

### Hardware Setup



### CAN Bus Hardware and Parameter Configuration

- **CAN bus topology**

The CAN bus wiring always have to be a daisy-chain from one CANopen device to the next one.

- ⇒ There is no star wiring allowed!
- ⇒ There are no stub lines (longer than 30 cm) allowed!

- **Node ID configuration**

Configure an **unique Node ID for each device** (e.g. EPOS2, EPOS4, ...) in the CANopen network.

- ⇒ The Node ID can be configured by DIP switches located on the EPOS4 (or EPOS2) device in case of housed or compact product types.
- ⇒ Please refer to the “Hardware Reference” of your controller to find more information about these DIP switches and the configuration.
- ⇒ In case of “Module” product types the motherboard or connector board must take care about the correct wiring of the module’s pins assigned to the CAN ID.

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- **Bus termination**

Do not miss to add bus termination resistors (120 Ohm) or configure the **bus termination** by the corresponding DIP switch **at both physical end points of the CAN network**.

- ⇒ Quite often the CANopen devices with the lowest (= 1) and highest Node IDs are the ones located at the physical end points of the bus but this is not mandatory. Therefore it is recommended to check by the CAN wiring which CANopen devices are actually placed at the physical end points of the CAN bus and require the bus termination.
- ⇒ The EPOS4 in use as the gateway is typically one physical end point of the CAN bus, i.e. add or configure the bus termination for this EPOS4 in that common case.
- ⇒ Add or configure the bus termination for the CANopen device (e.g. EPOS2 or EPOS4) at the other physical end point of the CAN network.
- ⇒ Ensure that there is no additional bus termination configured or resistors present somewhere in between the CAN network. The measured resistance in between the “CAN High” and “CAN Low” has to be about 60 Ohm in power-off state.

- **CAN bit rate configuration**

It is important that at least **one device in the CAN network has a “Fixed CAN bit rate”** configuration.

- ⇒ The default “CAN bit rate” configuration of the EPOS4 DIP switch is “Automatic bit rate”.
- ⇒ **IMPORTANT:**
  - Ensure that at least **one EPOS4 (typ. gateway) has set the DIP switch “Auto bit rate” to “OFF” and a “Fixed CAN bit rate”** is configured by object 0x2001.  
Remark:  
If the DIP switch “CAN automatic Bit Rate Detection” is not set to “OFF”, the bit rate configured by the object 0x2001 is not taken into account.
  - In case of a “CAN bit rate” configuration higher than 125 kbit/s it is mandatory that the bus terminations, bus topology as well as the CAN wiring is perfect and not influenced by EMI. Otherwise CAN communication might fail later on.
  - Do not miss to save an updated “Fixed CAN bit rate” by “Saving All Parameters” before you power down / power up all devices again.
- ⇒ It is sufficient to configure just one CANopen device for a “Fixed CAN bit rate”. Other EPOS2 or EPOS4 can keep the “CAN Automatic Bit Rate detection” set.
  - If more than one CANopen device has a “Fixed CAN bit rate”, please ensure that the “CAN bit rate” is the same for any device with a “Fixed CAN bit rate” configuration.

**General note:**

Please refer to the “Hardware Reference” of the EPOS2 or EPOS4 in use concerning the DIP switch location and configuration in case of “Housed” or “Compact” product types or the pin assignment of “Modules”.

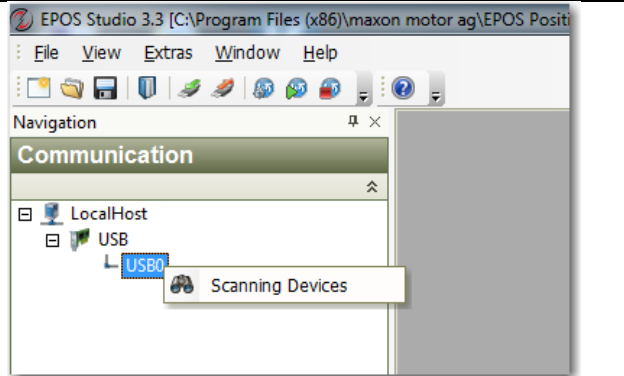
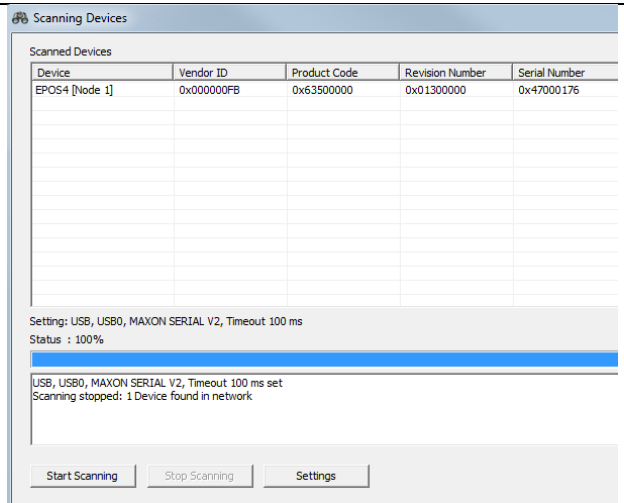
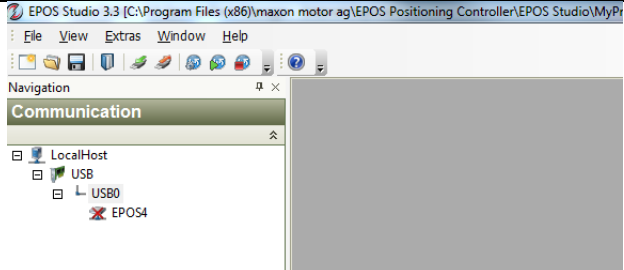
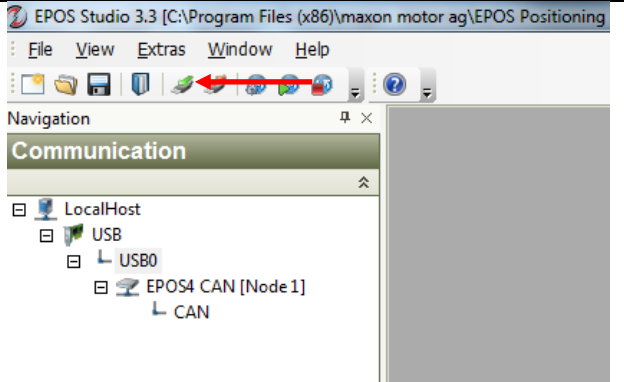
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### EPOS4 Gateway / CAN Configuration

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#### Configure Gateway Device

<ul style="list-style-type: none"> <li>• Right-click on the USBx (or RS232) port in the communication tree.</li> <li>• Select “Scanning Devices”.</li> </ul>											
<ul style="list-style-type: none"> <li>• “Start Scanning” will check and find EPOS4 devices connected to USBx (or RS232) ⇒ e.g. EPOS4 [Node 1]</li> <li>• Press “OK”.</li> </ul>	 <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Device</th> <th>Vendor ID</th> <th>Product Code</th> <th>Revision Number</th> <th>Serial Number</th> </tr> </thead> <tbody> <tr> <td>EPOS4 [Node 1]</td> <td>0x000000FB</td> <td>0x63500000</td> <td>0x01300000</td> <td>0x47000176</td> </tr> </tbody> </table>	Device	Vendor ID	Product Code	Revision Number	Serial Number	EPOS4 [Node 1]	0x000000FB	0x63500000	0x01300000	0x47000176
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<ul style="list-style-type: none"> <li>• The detected EPOS4 device will be added to the communication tree.</li> </ul>											
<ul style="list-style-type: none"> <li>• Establish the connection of the EPOS4 device. <ul style="list-style-type: none"> <li>⇒ Right click on the EPOS4 and select “Connect”.</li> </ul>                     OR <ul style="list-style-type: none"> <li>⇒ Click on the icon with the “connector symbol and green arrow”.</li> </ul> </li> </ul>											

### Configuration of the CAN Bitrate of the EPOS4 Gateway

<ul style="list-style-type: none"> <li>The EPOS “Gateway” device has to be present by the “Device Selection” ⇒ e.g. “EPOS4 CAN [Node 1]”</li> <li>Open the “Tools” overview.</li> <li>Click on “Object Dictionary” to open it up.</li> </ul>																																																																																																																									
<ul style="list-style-type: none"> <li>Select the “CAN bit rate” object: ⇒ Index: 0x2001 / SubIndex: 0x00</li> <li>Configure a fixed CAN bit rate ⇒ e.g. 1000 kbit/s or 125 kbit/s</li> </ul>	<table border="1"> <thead> <tr> <th>Index</th> <th>SubIndex</th> <th>Name</th> <th>Type</th> <th>Access</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>0x1A03</td> <td></td> <td>Transmit PDO 4 mapping</td> <td></td> <td></td> <td></td> </tr> <tr> <td>0x2000</td> <td>0x00</td> <td>Node-ID</td> <td>UInt8</td> <td>RW</td> <td>1</td> </tr> <tr style="background-color: #e0e0e0;"> <td>0x2001</td> <td>0x00</td> <td>CAN bit rate</td> <td>Enum</td> <td>RW</td> <td>1000 kbit/s</td> </tr> <tr> <td>0x2002</td> <td>0x00</td> <td>RS232 bit rate</td> <td>Enum</td> <td>RW</td> <td>115.2 kbits/s</td> </tr> <tr> <td>0x2005</td> <td>0x00</td> <td>RS232 frame timeout</td> <td>UInt16</td> <td>RW</td> <td>500 ms</td> </tr> <tr> <td>0x2006</td> <td>0x00</td> <td>USB frame timeout</td> <td>UInt16</td> <td>RW</td> <td>474 ms</td> </tr> <tr> <td>0x200A</td> <td>0x00</td> <td>CAN bit rate display</td> <td>Enum</td> <td>RO</td> <td>1000 kbit/s</td> </tr> <tr> <td>0x2010</td> <td>0x00</td> <td>Active fieldbus</td> <td>Enum</td> <td>RO</td> <td>CANopen</td> </tr> </tbody> </table>	Index	SubIndex	Name	Type	Access	Value	0x1A03		Transmit PDO 4 mapping				0x2000	0x00	Node-ID	UInt8	RW	1	0x2001	0x00	CAN bit rate	Enum	RW	1000 kbit/s	0x2002	0x00	RS232 bit rate	Enum	RW	115.2 kbits/s	0x2005	0x00	RS232 frame timeout	UInt16	RW	500 ms	0x2006	0x00	USB frame timeout	UInt16	RW	474 ms	0x200A	0x00	CAN bit rate display	Enum	RO	1000 kbit/s	0x2010	0x00	Active fieldbus	Enum	RO	CANopen																																																																		
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<ul style="list-style-type: none"> <li>Right-click on an object. ⇒ A pop-up menu opens up.</li> <li>Execute “Save All Parameter” ⇒ It is important to execute “Save All Parameter”. Otherwise the modified “CAN bit rate” setting is not valid after power off / on. ⇒ Ensure that the DIP switch setting of “Automatic bit rate” is in “OFF” state for this EPOS4.</li> <li>Power off / on all devices.</li> </ul>	<table border="1"> <thead> <tr> <th>Index</th> <th>Name</th> <th>Type</th> <th>Access</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td></td> <td>Transmit PDO 4 mapping</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>Node-ID</td> <td>UInt8</td> <td>RW</td> <td>1</td> </tr> <tr style="background-color: #e0e0e0;"> <td></td> <td>CAN bit rate</td> <td>Enum</td> <td>RW</td> <td>1000 kbit/s</td> </tr> <tr> <td></td> <td>RS232 bit rate</td> <td>Enum</td> <td>RW</td> <td>115.2 kbits/s</td> </tr> <tr> <td></td> <td>RS232 frame timeout</td> <td>UInt16</td> <td>RW</td> <td>500 ms</td> </tr> <tr> <td></td> <td>USB frame timeout</td> <td>UInt16</td> <td>RW</td> <td>474 ms</td> </tr> <tr> <td></td> <td>CAN bit rate display</td> <td>Enum</td> <td>RO</td> <td>1000 kbit/s</td> </tr> <tr> <td></td> <td>Active fieldbus</td> <td>Enum</td> <td>RO</td> <td>CANopen</td> </tr> <tr> <td></td> <td>Additional identity</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>Extension 1 identity</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>Custom persistent memory</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>Power supply</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>Axis configuration</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>Motor data</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>Electrical system parameters</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>Digital incremental encoder 1</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>SSI absolute encoder</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>Digital Hall sensors</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>Current control parameter set</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>Position control parameter set</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>Velocity control parameter set</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>Velocity observer parameter set</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>Home position</td> <td>Int32</td> <td>RW</td> <td>0 inc</td> </tr> </tbody> </table>	Index	Name	Type	Access	Value		Transmit PDO 4 mapping					Node-ID	UInt8	RW	1		CAN bit rate	Enum	RW	1000 kbit/s		RS232 bit rate	Enum	RW	115.2 kbits/s		RS232 frame timeout	UInt16	RW	500 ms		USB frame timeout	UInt16	RW	474 ms		CAN bit rate display	Enum	RO	1000 kbit/s		Active fieldbus	Enum	RO	CANopen		Additional identity					Extension 1 identity					Custom persistent memory					Power supply					Axis configuration					Motor data					Electrical system parameters					Digital incremental encoder 1					SSI absolute encoder					Digital Hall sensors					Current control parameter set					Position control parameter set					Velocity control parameter set					Velocity observer parameter set					Home position	Int32	RW	0 inc
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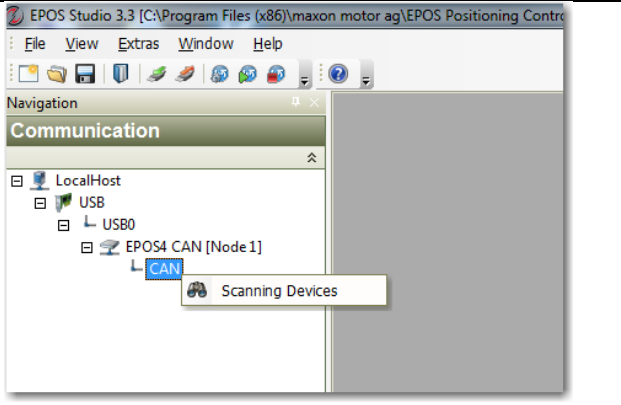
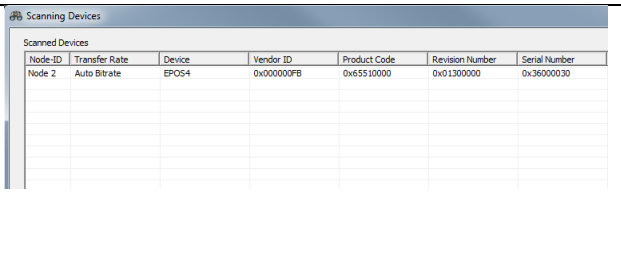
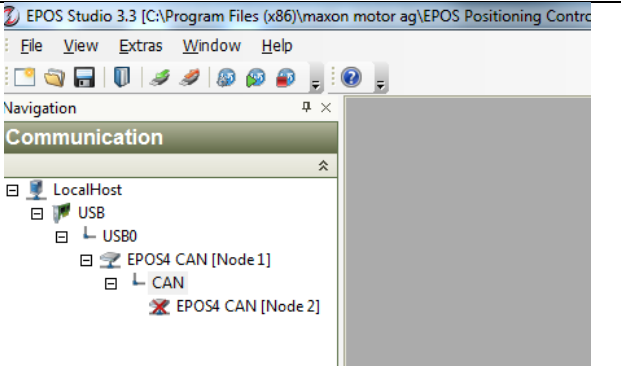
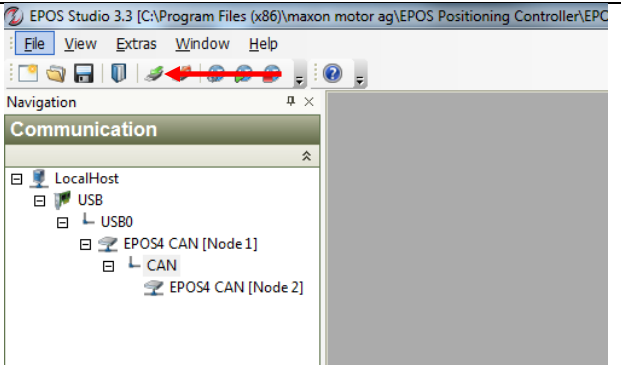
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**EPOS4 Gateway / CAN Configuration**

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**Scanning the Devices in the CANopen Network**

<ul style="list-style-type: none"> <li>• Right-click on the “CAN” branch of the EPOS4 (in use as the gateway)</li> <li>• Execute “Scanning Devices” of the CAN network.</li> </ul>															
<ul style="list-style-type: none"> <li>• The additional EPOS4(s) present on the CANopen network will be listed up.</li> <li>• Press “OK”.</li> </ul>	 <table border="1" data-bbox="829 884 1452 1041"> <thead> <tr> <th>Node-ID</th> <th>Transfer Rate</th> <th>Device</th> <th>Vendor ID</th> <th>Product Code</th> <th>Revision Number</th> <th>Serial Number</th> </tr> </thead> <tbody> <tr> <td>Node 2</td> <td>Auto Btrate</td> <td>EPOS4</td> <td>0x000000FB</td> <td>0x65510000</td> <td>0x01300000</td> <td>0x36000030</td> </tr> </tbody> </table>	Node-ID	Transfer Rate	Device	Vendor ID	Product Code	Revision Number	Serial Number	Node 2	Auto Btrate	EPOS4	0x000000FB	0x65510000	0x01300000	0x36000030
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Node 2	Auto Btrate	EPOS4	0x000000FB	0x65510000	0x01300000	0x36000030									
<ul style="list-style-type: none"> <li>• The detected EPOS4(s) will be added to the CAN branch of the EPOS4 gateway now.</li> </ul>															
<ul style="list-style-type: none"> <li>• Connect the EPOS4 of the CAN network by pressing “Connect All”             <ul style="list-style-type: none"> <li>⇒ Click on the icon with the “connector symbol and green arrow”.</li> </ul> </li> </ul>															

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### EPOS4 Gateway / CAN Configuration

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- Ensure that any modified setting of the EPOS4 in the CAN network is persistently saved.
  - ⇒ Right-click on any of the EPOS4.
  - ⇒ Select “Save All Parameter”.
- When all parameters are saved persistently, the EPOS4 can be switched on and off at any time later on.

