

Development Kits sysWORXX CANopen Chip

Quickstart Instructions

Edition June 2020

system house for distributed automation

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1 Introduction to the Development Kits

The Quickstartmanual for Development Kit sysWORXX CANopen Chip is a low-cost entry into the development of your own CANopen products and gives an overview of the possibilities and features of the CANopen software and the CAN hardware. The different Kits includes all components of a CANopen network, such as microcontroller module, the PC-to-CAN interface and a CANopen configuration tool.

System Requirements

Use of this CANopen Chip Development Kit requires:

- an PC (with Windows8/10) for use with sysWORXX USB-CANmodul1
- one free USB port for the sysWORXX USB-CANmodul1

1.1 Note for intended usage

This product is intended as a customer and application-specific test module for applications that are only used by experts in research and development facilities.

1.2 Contents of the Development Kit sysWORXX CANopen ChipF40

- 1x MM-217-Y sysWORXX CANopen ChipF40
- 1x 4002003 Developmentboard DIPmodul (5V)
- 1x 3204000 sysWORXX USB-CANmodul1
- 1x WK045 CAN cableset
- 1x SV007 Power Supply 9V/500mA

1.3 Contents of the Development Kit sysWORXX CANopen Chip CoC-100 (5V)

- 1x 4003001 sysWORXX CANopen Chip CoC-100 (5V)
- 1x 4002003 Developmentboard DIPmodul (5V)
- 1x 3204000 sysWORXX USB-CANmodul1
- 1x WK045 CAN cableset
- 1x SV007 Power Supply 9V/500mA

1.4 Contents of the Development Kit sysWORXX CANopen Chip CoC-100 (3.3V)

- 1x 4003002 sysWORXX CANopen Chip CoC-100 (3.3V)
- 1x 4002026 Developmentboard DIPmodul (3.3V)
- 1x 3204000 sysWORXX USB-CANmodul1
- 1x WK045 CAN cableset
- 1x SV007 Power Supply 9V/500mA

1.5 Documentation

The following table lists all manuals relevant for the CANopen Chip. These can be found on the corresponding product website.

L-1151	QuickStart Manual Development Kit sysWORXX CANopen Chip (this document)
L-1000	Hardware Manual Developmentboard sysWORXX CANopen Chip
L-1062	System Manual sysWORXX CANopen Chip F40
L-2365	System Manual sysWORXX CANopen Chip CoC-100
L-487	Manual sysWORXX USB-CANmodul1

1.6 Required Software

All documents and software can be found on the corresponding product website.

SO-1057	sysWORXX CANopen Chip F40, .eds and .bmp files
SO-1134	sysWORXX CANopen Chip CoC-
	100, .eds files
SO-1124	sysWORXX CANopen DeviceExplorer, evaluation
	version
SO-387	sysWORXX USB-CANmodul drivers and tools

2 Hardware Installation

Note: Modifications to the hardware configuration and cables should only be carried out while all devices are powered off!

2.1 Installing the CANopen Chip on the Developmentboard

Before installing the CANopen Chip on the Developmentboard, check the configuration of dip-switch on the top side of the CANopen Chip. The dips 1..8 must be on position OFF. This configuration results in the following:

- a NodeID of 40h
- a bitrate of 125kBit/s (refer to CANopen Chip System-Manual, L-1062).
- the I/O configuration 0 (see L-1062 for more information; only this configuration can be used on the Developmentboard)

If the CANopen Chip is not already pre-installed, mount it pins-down onto the Developmentboard's receptacle footprint (X101) for DIPmodules as shown in *Figure 1* below. Ensure that pin 1 on the module matches pin 1 of the receptacle on the Developmentboard.

Development Kits sysWORXX CANopen Chip



Figure 1: Developmentboard Overview

Configure the Jumpers on the Developmentboard as indicated below. This correctly routes the CAN signals to the DB-9 connector (P2) and connects the onboard peripheral devices to the CANopen Chip



Figure 2: Suitable Developmentboard Jumper Settings

The Jumpers JP201 ... JP204 have the following settings:





Figure 3: Suitable Developmentboard I/O-Jumper Settings

2.2 Selecting the Power Supply

There are two ways to connect a power supply to the Developmentboard:

- Connection via the low voltage socket at (8 13VDC), X102
- Connection via the low voltage terminal block (8 13VDC), X103

Note: Please avoid changing jumpers or modules while the Developmentboard is powered on!

Connection via the Low Voltage Socket X102

An unregulated power supply ranging from 8V to 13V can be connected to the Developmentboard at low voltage socket X102.



Figure 4: Power Connector

Connection via the Low Voltage Terminal Block X103

The low voltage terminal block is located next to the voltage socket at X102.

Ensure that the correct polarity is applied to the terminal block. The GND-Connection is near X102.

The configuration of the Developmentboard is now complete.

2.3 Physical Connection of the CAN Interface

The Developmentboard provides a DB-9 connector for the physical CAN bus connection. The pin definition for the CAN plug P2 is shown in the table below:

Pin	Pin description
2	CAN_L (dominant low)
3	CAN_GND
7	CAN_H (dominant high)

Figure 5: Developmentboard DB-9 CAN Plug Pinout

The CAN bus cable can be either a twisted pair or a ribbon cable. The wave resistance of the cable should be 120 Ohm. A 120 Ohm termination resistor has to be connected to the cable between CAN_H and CAN_L at both ends of the bus cable (see chapt. 0). The Jumper JP112 on the Developmentboard must be open.

The next figure shows the general CAN bus connection circuitry.



Figure 6: CAN Bus Connection Circuitry

2.4 Installing the USB-CANmodul1

Note: Install the software before connecting the USB-CANmodul to the host-PC. For software installation see chapter 0.

For more information, see the manual L-487. You can find the manual on the product website of the USB-CANmodul1.

2.5 Connecting the CAN Cable

The CANopen Chip Development Kit includes the cable set WK054. This set contains a 10 foot 9-pin ribbon cable with 5 DB-9 sockets and 2 DB-9 plugs with 120 Ohm termination resistors.

This cable set is intended for rapid setup and demonstration purposes only. For continuous operation use of a CAN cable as described in section 2.3 *Physical Connection* is recommended.

Connect the DB-9 plugs with the built in 120 Ohm termination resistors to each end of the CAN cable. Connect the remaining DB-9 sockets of the cable to the Developmentboard and the PC to CAN interface.

All hardware components of the Development Kit should now be properly configured and connected to the CAN bus cable. You are now ready to turn on the power supply to the Developmentboard.

3 Software installation and configuration

The needed software is listed in section 1.6.

3.1 Installation of the USB-CANmodul driver

Note: Install the software before connecting the USB-CANmodul to the host-PC. Installation under Windows might require to have administrator rights during the installation process!

Installation and operation of the USB-CANmodul requires a host-PC with a USB port that is running Microsoft Windows 7, 8, 8.1 or 10.

- a) Download the Utility Disk from the product website.
- b) Unpack the archive and start the *SO-387.exe*.
- c) Follow the setup instructions to install the software.

Note: You will need to restart your PC at the end of the installation procedure.

Make sure that the PC has finished boot before connecting the USB-CANmodul.

3.2 Installation of CANopen DeviceExplorer

- a) Download the DeviceExplorer from the product website.
- b) Unpack the archive and start the *SO-1124.exe*.
- c) Follow the setup instructions to install the software

3.3 Configuration of CANopen DeviceExplorer

Start the CANopen DeviceExplorer Demo by selecting the shortcut from the desktop or quickbar.

The CANopen DeviceExplorer Demo main window will now appear:



Figure 7: Window DeviceExplorer

Before accessing the device, please verify the settings for hardware environment in the menu *Connection – CAN Interface Settings*. Please make the following settings:

CAN Interface Settings			×
Interface Type		-	
CAN Device	Usb0Chn0		-
Bitrate	125 kbit/s		•
Available interface settin	gs		
Listen-Only Mode	✓ Auto bus on		
Log error frames	Low speed		
Show Advanced Cont	figuration		
	ок	Can	cel

Figure 8: CAN Interface Settings

As Interface Type, the USB-CAN modul must be selected and the baudrate of 125kBit/s has to be used. Now acknowledge the settings by selecting *OK*.

Additionally the Node-Id has to match the number, the CANopen-Chip is using. This depends on the used configuration of the dipswitch (see section 2.1).

Now the EDS-File for CANopen Chip must be selected, before an access to the device is possible. To load an EDS-File, select the "…" button next to the EDS-Filepath and select the downloaded EDS-File:

→ ~ ↑	Dieser PC > Desktop > SO-1134		✓ [™] SO-113	4" durchsuchen 🔎
ganisieren 👻 🛛 Neu	uer Ordner			III 🔹 🔟 ?
- Calanallau aniff	Name	Änderungsdatum	Тур	Größe
Schneilzügnin	4003001_0.eds	08.06.2020 11:09	EDS-Datei	32 KB
OneDrive	4003001_1.eds	08.06.2020 11:09	EDS-Datei	37 KB
Dieser PC	4003001_2.eds	08.06.2020 11:09	EDS-Datei	28 KB
Dieserre	4003001_3.eds	08.06.2020 11:09	EDS-Datei	29 KB
Netzwerk	4003001_4.eds	08.06.2020 11:09	EDS-Datei	37 KB
	4003001_5.eds	08.06.2020 11:09	EDS-Datei	27 KB
	4003001_6.eds	08.06.2020 11:09	EDS-Datei	34 KB
Dat	teiname: 4003001 0.eds		~ EDS/XE	D Files (*.eds *.xdd) v

Development Kits sysWORXX CANopen Chip

Figure 9: Load EDS-File

As mentioned earlier, only the configuration 0 can be used with the Developmentboard, so the EDS-File with 0 at the end has to be selected.

- To establish a connection to the CANopen Chip click on the connect-button or select *connect* in menu *Connection*
- On the Tab *Network* set the device to state *Operational* by selecting *Start Node*.

	Device Name NMT State HB	State	Last Emergency		
	0 Network	-			
	64 sysWORXX Boot-up -	0x0080 0x00 0x40 0x00 0x00 0x0	0 0x00		
	Enter Preop	Start Node Stop	Node Reset Con	nm Reset Noo	le
H	Heartbeat		Node Guarding		
	Deaduran Time	1000	Guarding Interval (Master)	1000 ms	\$
	Consumer Timer	1300 ms	Guarding Interval (slave)	1200 ms	\$
	Start Heartheat	1300 ms	Life Time Factor	3	\$
	Start Heartbear	Stop Hear beat	Start Guarding	Stop Guarding	

Figure 10: Set device Operational

Now the access to the CANopen Chip is established. In the next chapter the access to the Object Dictionary is described.

4 Accessing to the CANopen device

The IOs of the CANopen Chip are accessed via the Object Dictionary Entries using the DeviceExplorer.

4.1 Access to Digital Outputs

In order to set an output from within the CANopen DeviceExplorer Demo, it is necessary to navigate through the Object Dictionary (OD) structure.

💷 emotas - CANopen DeviceExplorer 2.12.0			_		×		
<u>File C</u> onnection <u>S</u> ettings <u>M</u> isc <u>C</u> AN Analyzer <u>P</u> lugIns <u>W</u> indows <u>H</u> elp							
🔊 🔊 🔢 🖻 🖶 🕘 🍫 ⊅ Update avail	able e <mark>n</mark> otas				8		
32 Object Browser Image: Network Image: PDO Configuration 64 Node-Id: 64/0x40 - sysWORXX CANopen Chip CoC-100 EDS: C:/Use	on PDO Tx	&Rx D-1134/4003001_0.eds			×		
Objects 🛠	Index 0x6200 - Su	ibindex 0x1					
> Communication Segment		Attribut	es				
> Manufacturer Segment	Index	0+6200					
 Device Profile Segment 0x6000 - Road Input 9 Bit 	muex	0x0200					
 0x6200 - Write Output 8 Bit 	SubIndex	1					
0 - Number of Output 8-Bit	Name	D00_D07					
1 - DO0_DO7	Datatype	UNSIGNED8					
0x6200 - Error Violde Output 8-Bit 0x6207 - Error Value Output 8-Bit	Access	DA0A/			1		
> 0x6401 - Read Analogue Input 16-Bit	DDO Manaian	antianal RRDO anti-					
> 0x6421 - Analogue Input Interrupt Trigger Selection	PDO Wapping	optional, RPDO only					
> 0x6422 - Analogue Input Interrupt Source	Default Value	0x0					
> 0x6423 - Analogue Input Global Interrupt Enable	Current value				n I		
0x6425 - Analogue Input Interrupt Opper Limit Integer	- Current value				4		
> 0x6426 - Analogue Input Interrupt Delta Unsigned	Status						
> 0x642E - Analogue Input Offset float							
Ox642F - Analogue Input pre-scaling float	Cyclic Read	Read	Write				
> 0x6500 - PWM Output Pulse		•			ñ I		
> 0x6543 - PWM Output Pulse Error Mode		Incr	Decr				
> 0x6544 - PWM Output Pulse Error Value	No description foun	nd					
Company license for SYS TEC electronic GmbH	USB-CAN	Imodul (SYS TEC electronic) - Usb0C	hn0 (125 kBit/s)) active -	0 %		

Figure 11: Write digital Input

Digital outputs are accessed via the entry 6200 Write Output 8Bit. The LEDs DO0...DO3 on the Developmentboard can be accessed in the subindex 6200,1 Digital Output. In the right window it is then possible to assign HEX values to the four possible ouputs and to subsequently send these values to the CANopen Chip via the *Write* button. As an example, a value of 0x5 could be written to the device and so the LEDs DO0 and DO2 would then be addressed and illuminate.

4.2 Reading Digital Inputs

The CANopen DeviceExplorer can also be used to read inputs on the CANopen Chip. The procedure is similar to the write access of outputs.

Object Browser Network Option Node-Id: 64/0x40 - sysWORXX CANopen Chip CoC-100 EDS: C:/User	n I PDO Tx s/Develop/Desktop/SC	& Rx D-1134/4003001_0.eds	
Objects 🛠	Index 0x6000 - Su	bindex 0x1	
Communication Segment		Attributes	
Device Profile Segment	Index	0x6000	
 0x6000 - Read Input 8 Bit 	SubIndex	1	
0 - Number of Input 8-Bit	Name		
2 - DI8 DI15	Datature		
> 0x6200 - Write Output 8 Bit	Datatype	UNSIGNEDO	
> 0x6206 - Error Mode Output 8-Bit	Access	ro	
> 0x6401 - Read Analogue Input 16-Bit	PDO Mapping	optional, TPDO only	
> 0x6421 - Analogue Input Interrupt Trigger Selection	Default Value		
> 0x6422 - Analogue Input Interrupt Source	i constructor		
0x6423 - Analogue Input Global Interrupt Enable 0x6424 - Analogue Input Interrupt Upper Limit Integer	. Current value		
> 0x6425 - Analogue Input Interrupt Lower Limit Integer	Status		
> 0x6426 - Analogue Input Interrupt Delta Unsigned			
> 0x642E - Analogue Input Offset float	Cyclic Read	Read Write	
> 0x6500 - PWM Output Pulse		Incr Decr	
> 0x6510 - PWM Output Period			
> 0x6543 - PWM Output Pulse Error Mode	No description foun	d	
vxo344 - PWM Output Pulse Error value			

Figure 12: Read digital output

Digital inputs can be accessed via the entry 6000 Read Input 8Bit. In the subindex 6000,1 DI0_DI7 it is possible to read the state of push buttons DI0...DI3. The current input values appear in the right

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window after the Read – button has been pushed. If, for example, one of the four push buttons on the Developmentboard has been pushed during the Read – Button is pressed, the adjusted value appears in the right window.

Document:	Development Chip	Kits	sysWORXX	CANopen		
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