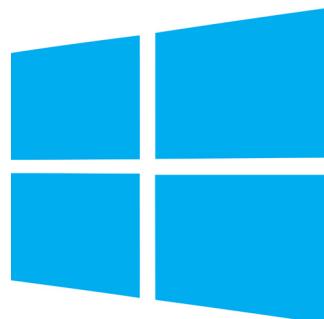


***EPOS***  
***Positioning Controllers***  
***Command Library***



epos.maxonmotor.com

***Document ID: rel8212***

## TABLE OF CONTENTS



### Function Group Overview

For a detailed overview on function groups see page 12-163.

<b>1</b>	<b>About this Document</b>	<b>5</b>
<b>2</b>	<b>Introduction</b>	<b>9</b>
<b>3</b>	<b>Initialization Functions</b>	<b>13</b>
3.1	Communication .....	13
3.2	Info .....	22
3.3	Advanced Functions.....	24
<b>4</b>	<b>Configuration Functions</b>	<b>33</b>
4.1	General.....	33
4.2	Advanced Functions.....	38
<b>5</b>	<b>Operation Functions</b>	<b>59</b>
5.1	Operation Mode .....	59
5.2	State Machine .....	61
5.3	Error Handling .....	66
5.4	Motion Info .....	68
5.5	Profile Position Mode (PPM) .....	72
5.6	Profile Velocity Mode (PVM) .....	76
5.7	Homing Mode (HM) .....	80
5.8	Interpolated Position Mode (IPM).....	85
5.9	Position Mode (PM) .....	90
5.10	Velocity Mode (VM) .....	94
5.11	Current Mode (CM) .....	98
5.12	Master Encoder Mode (MEM) .....	102

## READ THIS FIRST

**These instructions are intended for qualified technical personnel. Prior commencing with any activities...**

- you must carefully read and understand this manual and
- you must follow the instructions given therein.

**EPOS positioning controllers are considered as partly completed machinery according to EU Directive 2006/42/EC, Article 2, Clause (g) and are intended to be incorporated into or assembled with other machinery or other partly completed machinery or equipment.**

**Therefore, you must not put the device into service,...**

- unless you have made completely sure that the other machinery fully complies with the EU directive's requirements!
- unless the other machinery fulfills all relevant health and safety aspects!
- unless all respective interfaces have been established and fulfill the herein stated requirements!

---

5.13 Step Direction Mode (SDM) . . . . .	104
5.14 Inputs & Outputs . . . . .	106
<b>6 Data Recording Functions</b>	<b>119</b>
6.1 Operation Mode . . . . .	119
6.2 Data Recorder Status . . . . .	122
6.3 Data Recorder Data . . . . .	125
6.4 Advanced Functions . . . . .	127
<b>7 Low Layer Functions</b>	<b>129</b>
7.1 CAN Layer . . . . .	129
<b>8 Error Overview</b>	<b>131</b>
8.1 Communication Errors . . . . .	131
8.2 Library Errors . . . . .	132
<b>9 Supported Operating Systems</b>	<b>135</b>
9.1 Windows . . . . .	136
9.1.1 Overview . . . . .	136
9.1.2 Integration into Programming Environment . . . . .	137
9.1.3 Programming . . . . .	145
9.2 Linux . . . . .	148
9.2.1 Overview . . . . .	148
9.2.2 Installation / Uninstallation . . . . .	150
9.2.3 Integration into Programming Environment . . . . .	151
9.2.4 Programming . . . . .	151
<b>10 Version History</b>	<b>153</b>
<b>Appendix A — Hardware vs. Functions</b>	<b>157</b>
<b>Appendix B — Function Groups Overview</b>	<b>163</b>

---

*••page intentionally left blank••*

# 1 About this Document



## We strongly stress the following facts:

- The present document does not replace any other documentation covering the basic installation and/or parameterization described therein!
- Also, any aspect in regard to health and safety as well as to secure and safe operation are not covered in the present document – it is intended and must be understood as complimenting addition to those documents!

## 1.1 Intended Purpose

The present document provides instructions on the implemented functions of the...

- Windows Dynamic-Link Libraries «EposCmd.dll» and «EposCmd64.dll», as well as the
- Linux Shared Object Library «libEposCmd.so»

...which can be used for EPOS, EPOS2, and EPOS4 devices.

In addition, the document explains on how to integrate the DLLs into a variety of common programming environments.

## 1.2 Target Audience

This document is meant for trained and skilled personnel working with the equipment described. It conveys information on how to understand and fulfill the respective work and duties.

This document is a reference book. It does require particular knowledge and expertise specific to the equipment described.

## 1.3 How to use

Take note of the following notations and codes which will be used throughout the document.

Notation	Explanation
EPOS2	stands for “EPOS2 Positioning Controller”
EPOS4	stands for “EPOS4 Positioning Controller”
«Abcd»	indicating a title or a name (such as of document, product, mode, etc.)
¤Abcd¤	indicating an action to be performed using a software control element (such as folder, menu, drop-down menu, button, check box, etc.) or a hardware element (such as switch, DIP switch, etc.)
(n)	referring to an item (such as order number, list item, etc.)
➔	denotes “see”, “see also”, “take note of” or “go to”

Table 1-1      Notations used in this document

## 1.4 Symbols and Signs



### Requirement / Note / Remark

Indicates an action you must perform prior continuing or refers to information on a particular item.



### Best Practice

Gives advice on the easiest and best way to proceed.



### Material Damage

Points out information particular to potential damage of equipment.

## 1.5 Sources for additional Information

For further details and additional information, please refer to below listed sources:

Topic	Reference
Eclipse	<a href="http://eclipse.org/">http://eclipse.org/</a>
FTDI Driver	<a href="http://www.ftdichip.com">www.ftdichip.com</a>
Functions	Not all functions are supported by all devices as they are dependent on the device version and the firmware version. For details → separate documents «Firmware Specification» and «Hardware Reference» of the respective positioning controller.
Index / Subindex	For detailed descriptions on used objects → separate document «Firmware Specification».
IXXAT	<a href="http://www.ixxat.de">www.ixxat.de</a>
Kvaser	<a href="http://www.kvaser.com">www.kvaser.com</a>
maxon motor	<a href="http://www.maxonmotor.com">www.maxonmotor.com</a>
Microsoft Developer Network (MSDN)	<a href="http://msdn.microsoft.com/">http://msdn.microsoft.com/</a>
National Instruments (NI)	<a href="http://www.ni.com/can">www.ni.com/can</a>
Objects	Not all objects are supported by all devices as they are dependent on the device version and the firmware version. For details → separate documents «Firmware Specification» and «Hardware Reference» of the respective positioning controller.
Vector	<a href="http://www.vector-informatik.com">www.vector-informatik.com</a>

Table 1-2      Sources for additional information

## 1.6 Trademarks and Brand Names

For easier legibility, registered brand names are listed below and will not be further tagged with their respective trademark. It must be understood that the brands (the below list is not necessarily concluding) are protected by copyright and/or other intellectual property rights even if their legal trademarks are omitted in the later course of this document.

Brand Name	Trademark Owner
Adobe® Reader®	© Adobe Systems Incorporated, USA-San Jose, CA
Borland C++ Builder™ Borland®	© Borland Software Corporation, USA-Rockville MD
CANopen® CiA®	© CiA CAN in Automation e.V, DE-Nuremberg
Eclipse™	© Eclipse Foundation, Inc., CDN-Ottawa ON
LabVIEW™ LabWindows™	© National Instruments Corporation, USA-Austin TX
Linux®	© Linus Torvalds (The Linux Foundation, USA-San Francisco CA)
NI-CAN™ NI-XNET™	© National Instruments Corporation, USA-Austin TX
Ubuntu	© Canonical Group Limited, UK-London
Visual Basic® Visual C#® Visual C++®	© Microsoft Corporation, USA-Redmond WA
Windows®	© Microsoft Corporation, USA-Redmond WA

Table 1-3      Brand Names and trademark owners

## 1.7 Legal Notice

The present document is based on maxon motor's experience. maxon motor explicitly states that its content is true and correct as to maxon motor's best knowledge.

Note that all legal aspects, such as terms of use, property rights, warranty, applicable law, and others are covered and valid as stated in the maxon motor's «EPOS Studio» End User License Agreement (EULA) which you have agreed to upon initial installation and prior employment of the «EPOS Studio».

## 1.8 Copyright

© 2018 maxon motor. All rights reserved.

The present document – including all parts thereof – is protected by copyright. Any use (including reproduction, translation, microfilming, and other means of electronic data processing) beyond the narrow restrictions of the copyright law without the prior approval of maxon motor ag, is not permitted and subject to prosecution under the applicable law.

**maxon motor ag**

Brünigstrasse 220  
P.O.Box 263  
CH-6072 Sachseln

Phone +41 41 666 15 00  
Fax +41 41 666 16 50  
Web [www.maxonmotor.com](http://www.maxonmotor.com)

## About this Document

*••page intentionally left blank••*

## 2 Introduction

### 2.1 Documentation Structure

The present document is part of a documentation set. Find below an overview on the documentation hierarchy and the interrelationship of its individual parts:

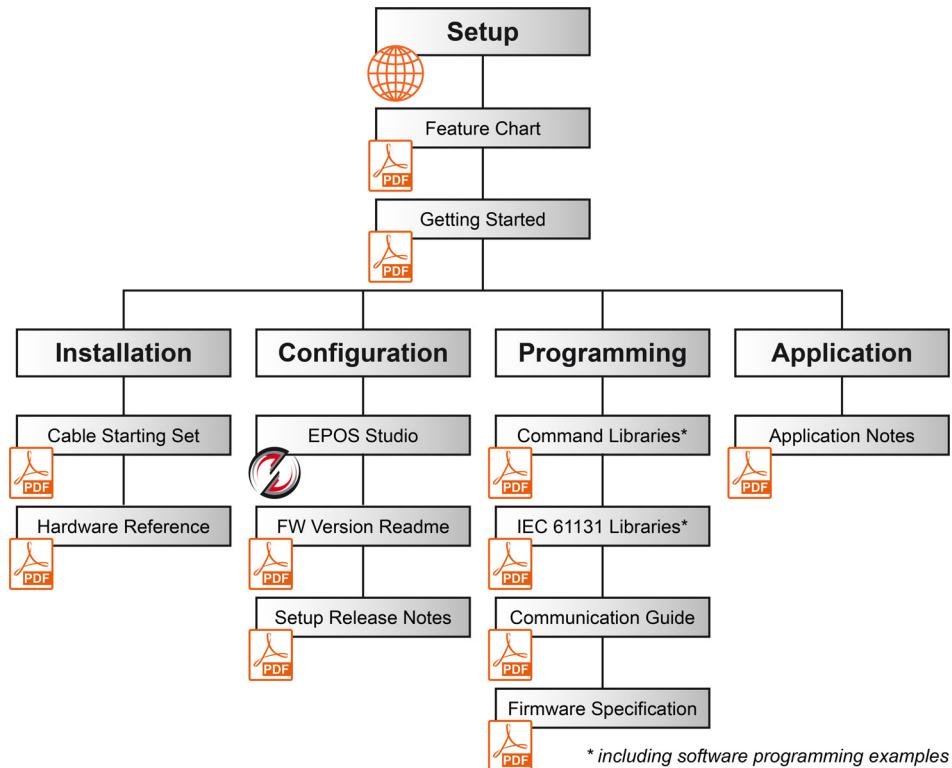


Figure 2-1 EPOS2 documentation structure

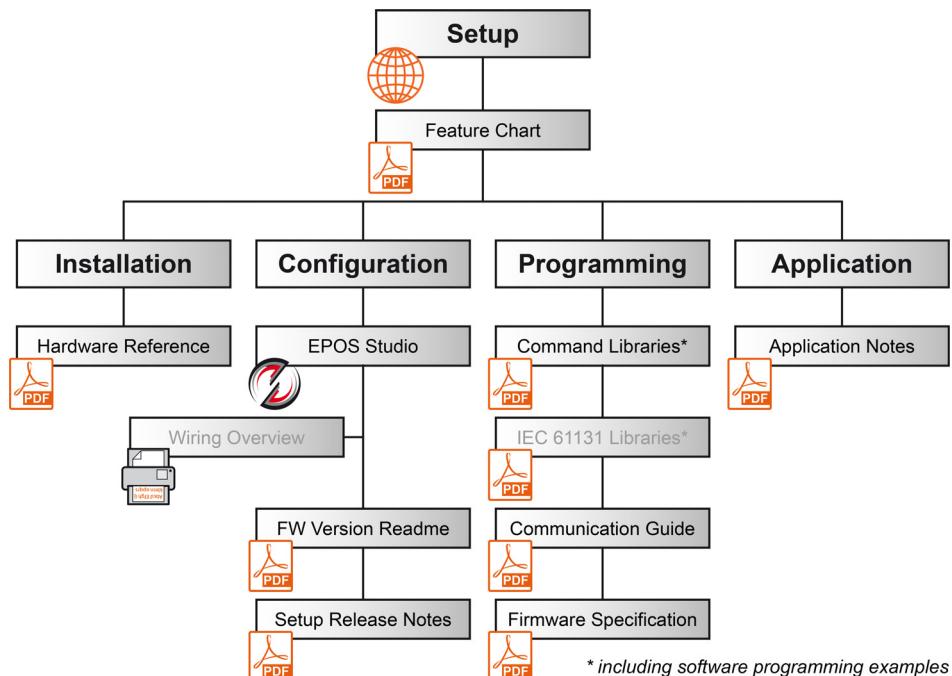


Figure 2-2 EPOS4 documentation structure

## 2.2 General Information

The «EPOS Command Libraries» are arranged in groups of functions and are intended to assist you in programming the control software based on Microsoft Windows 32-bit and 64-bit as well as Linux operating systems.

The document describes the interfaces between the control software and the libraries. They support maxon motor's EPOS devices, which are connected to a serial RS232, USB, or CAN interface.

The parameters for 32-bit and 64-bit interfaces are identical. The libraries support the CANopen SDO protocol but are not suitable for real-time communication.

Refer to these chapters for in detail information on library functions and integration into your programming environment:

3 Initialization Functions . . . . .	3-13
4 Configuration Functions . . . . .	4-33
5 Operation Functions . . . . .	5-59
6 Data Recording Functions . . . . .	6-119
7 Low Layer Functions . . . . .	7-129
9 Supported Operating Systems . . . . .	9-135

Find the latest edition of the present document, as well as additional documentation and software to the EPOS Positioning Controllers also on the Internet: ➔[www.maxonmotor.com](http://www.maxonmotor.com)

## 2.3 Products by Third Party Suppliers

For manufacturers' contact information ➔“Sources for additional Information” on page 1-6.

Supplier	Products
IXXAT	IXXAT CANopen interfaces can be operated with the hardware-independent “VCI driver V3” or “VCI driver V4” (Virtual CAN Interface). Check in advanced whether the interface is supported by VCI 3 or VCI 4.
Kvaser	Kvaser CAN interfaces are supported. Thereby, respective driver software and hardware must be installed.
National Instruments	National Instruments CAN interfaces are supported. Thereby, «NI-XNET» or «NI-CAN» software and hardware must be installed.
Vector	For Vector CANopen cards, the “XL-Driver-Library” will be required. The library must be manually installed in the appropriate working directory (or system directory). With this library, you may write your own CANopen applications based on Vector's CAN hardware.

Table 2-4      Third party supplier products

## 2.4 Communication Structure

### 2.4.1 Windows / Linux

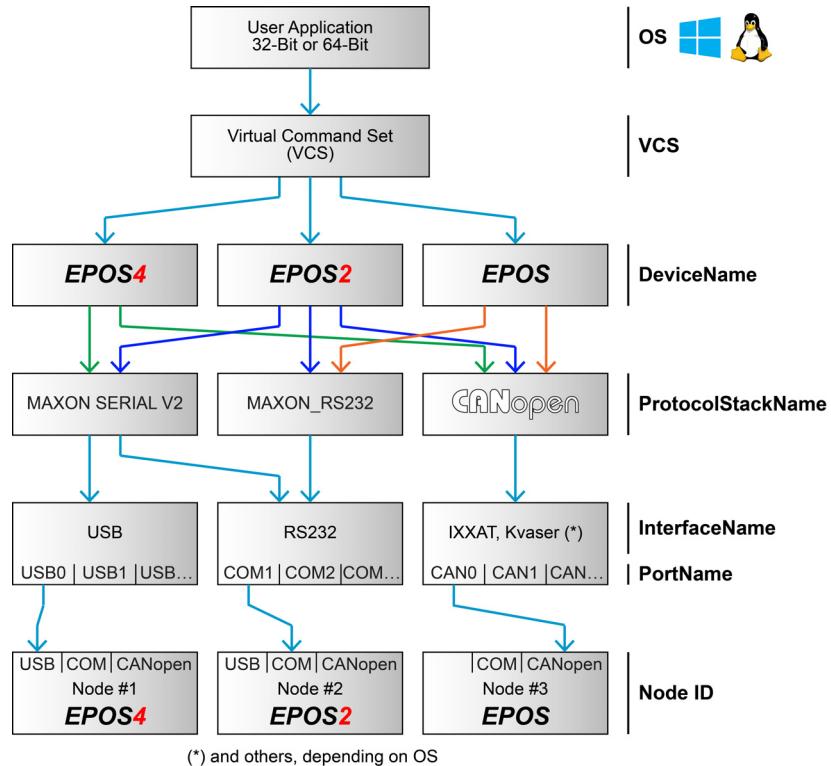


Figure 2-3 Windows / Linux – Communication structure (example)

### 2.4.2 Gateway

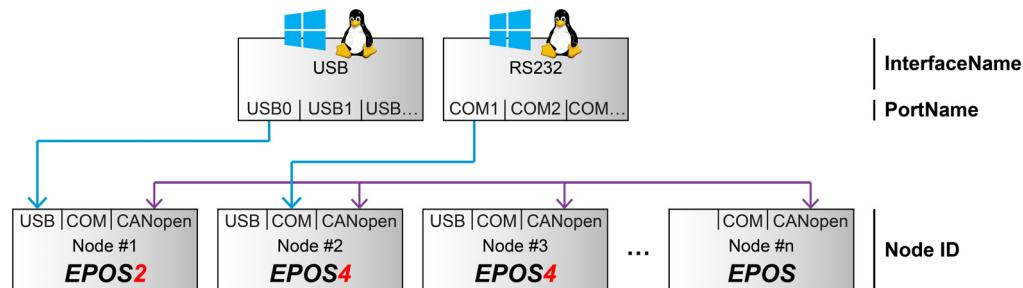


Figure 2-4 Gateway – Communication structure (example)

## 2.5 Data Type Definitions

Name	Data Types	Size Bits	Size Bytes	Range	Comment
char, __int8	signed integer	8	1	-128...127	
BYTE	unsigned integer	8	1	0...256	
short	signed integer	16	2	-32'768...32'767	
WORD	unsigned integer	16	2	0...65'535	
long	signed integer	32	4	-2'147'483'648...2'147'483'647	
DWORD	unsigned integer	32	4	0...4'294'967'295	
BOOL	signed integer	32	4	TRUE = 1 FALSE = 0	
HANDLE	pointer to an object	32	4	0...4'294'967'295	Depending on OS
		64	8	0...18'446'744'073'709'551'615	

Table 2-5 Data type definitions

### 3 Initialization Functions



#### Availability of functions

The availability of certain functions depends on the used hardware. For an overview → “Appendix A — Hardware vs. Functions” on page 11-157.

#### 3.1 Communication

##### 3.1.1 VCS\_OpenDevice

###### FUNCTION

```
HANDLE VCS_OpenDevice(char* DeviceName, char* ProtocolStackName, char* InterfaceName,
char* PortName, DWORD* pErrorCode)
```

###### DESCRIPTION

VCS\_OpenDevice opens the port to send and receive commands. Ports can be RS232, USB, and CANopen interfaces.

For correct designations on DeviceName, ProtocolStackName, InterfaceName, and PortName, use the functions → [VCS\\_GetDeviceNameSelection](#), → [VCS\\_GetProtocolStackNameSelection](#), → [VCS\\_GetInterfaceNameSelection](#), and → [VCS\\_GetPortNameSelection](#).

For gateway topologies use function → [VCS\\_OpenSubDevice](#).

###### PARAMETERS

DeviceName	char*	Name of connected device: <ul style="list-style-type: none"> <li>• EPOS</li> <li>• EPOS2</li> <li>• EPOS4</li> </ul>
ProtocolStackName	char*	Name of used communication protocol: <ul style="list-style-type: none"> <li>• MAXON_RS232</li> <li>• MAXON SERIAL V2</li> <li>• CANopen</li> </ul>
InterfaceName	char*	Name of interface: <ul style="list-style-type: none"> <li>• RS232</li> <li>• USB</li> <li>• IXXAT_&lt;&gt;BoardName&gt;&lt;&gt;DeviceNumber&gt;</li> <li>• Kvaser_&lt;&gt;BoardName&gt;&lt;&gt;DeviceNumber&gt;</li> <li>• NI_&lt;&gt;BoardName&gt;&lt;&gt;DeviceNumber&gt;</li> <li>• Vector_&lt;&gt;BoardName&gt;&lt;&gt;DeviceNumber&gt;</li> </ul> <p><i>Remark:</i> Use “VCS_OpenDeviceDlg” or “VCS_GetInterfaceNameSel” to identify the exact name</p>
PortName	char*	Name of port: <ul style="list-style-type: none"> <li>• COM1, COM2, ...</li> <li>• USB0, USB1, ...</li> <li>• CAN0, CAN1, ...</li> </ul>

###### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	HANDLE	Handle for communication port access. Nonzero if successful; otherwise “0”.
--------------	--------	--

Continued on next page.

## PROGRAMMING EXAMPLE

```
HANDLE keyHandle = 0;
char* deviceName = "EPOS2";
char* protocolStackName = "MAXON SERIAL V2";
char* interfaceName = "RS232";
char* portName = "COM1";
DWORD errorCode = 0;

keyHandle = VCS_OpenDevice(deviceName, protocolStackName, interfaceName, portName, &errorCode)
if (keyHandle > 0)
{
    //.....
    VCS_CloseDevice(keyHandle);
}
```

Figure 3-5 VCS\_OpenDevice (programming example)

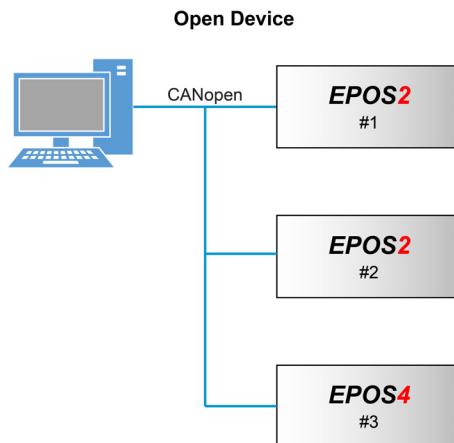


Figure 3-6 VCS\_OpenDevice (example)

For gateway topologies use OpenSubDevice (→chapter “3.1.8 VCS\_OpenSubDevice” on page 3-18).

### 3.1.2 VCS\_OpenDeviceDlg

#### FUNCTION

HANDLE VCS\_OpenDeviceDlg(DWORD\* pErrorCode)

#### DESCRIPTION

VCS\_OpenDeviceDlg recognizes available interfaces capable to operate with EPOS and opens the selected interface for communication. Not available with Linux.

#### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	HANDLE	Handle for communication port access. Nonzero if successful; otherwise “0”.
--------------	--------	--

### 3.1.3 VCS\_SetProtocolStackSettings

#### FUNCTION

BOOL VCS\_SetProtocolStackSettings(HANDLE KeyHandle, DWORD Baudrate, DWORD Timeout, DWORD\* pErrorCode)

#### DESCRIPTION

VCS\_SetProtocolStackSettings writes the communication parameters. For exact values on available baud rates, use function → **VCS\_GetBaudRateSelection**.

For correct communication, use the same baud rate as the connected device.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Baudrate	DWORD	Actual baud rate from opened port [bit/s]
Timeout	DWORD	Actual timeout from opened port [ms]

#### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

#### PROGRAMMING EXAMPLE

```

HANDLE keyHandle = 0;
char* deviceName = "EPOS2";
char* protocolStackName = "MAXON SERIAL V2";
char* interfaceName = "RS232";
char* portName = "COM1";
DWORD errorCode = 0;

keyHandle = VCS_OpenDevice(deviceName, protocolStackName, interfaceName, portName, &errorCode);
if (keyHandle > 0)
{
    if(VCS_SetProtocolStackSettings(keyHandle, 19200, 500, &errorCode) > 0)
    {
        //.....
    }

    VCS_CloseDevice(keyHandle);
}

```

Figure 3-7     VCS\_SetProtocolStackSettings (programming example)

### 3.1.4 VCS\_GetProtocolStackSettings

#### FUNCTION

BOOL VCS\_GetProtocolStackSettings(HANDLE KeyHandle, DWORD\* pBaudrate, DWORD\* pTimeout, DWORD\* pErrorCode)

#### DESCRIPTION

VCS\_GetProtocolStackSettings returns the baud rate and timeout communication parameters.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
-----------	--------	------------------------

#### RETURN PARAMETERS

pBaudrate	DWORD*	Actual baud rate from opened port [bit/s]
pTimeout	DWORD*	Actual timeout from opened port [ms]
pErrorCode	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

### 3.1.5 VCS\_FindDeviceCommunicationSettings

#### FUNCTION

```
BOOL VCS_FindDeviceCommunicationSettings(HANDLE* pKeyHandle, char* pDeviceName, char*  
pProtocolStackName, char* pInterfaceName, char* pPortName, WORD SizeName, DWORD*  
pBaudrate, DWORD* pTimeout, WORD* pNodeId, int DialogMode, DWORD* pErrorCode)
```

#### DESCRIPTION

VCS\_FindDeviceCommunicationSettings searches the communication setting parameters. Parameters can be defined to accelerate the process. The search will be terminated as the first device is found. Not available with Linux.

#### PARAMETERS

pKeyHandle	HANDLE*	Handle for port access
pDeviceName	char*	Device name
pProtocolStackName	char*	Protocol stack name
pInterfaceName	char*	Interface name
pPortName	char*	Port name
SizeName	WORD	Reserved memory size for return parameters
DialogMode	int	0: Show progress dialog 1: Show progress and confirmation dialog 2: Show confirmation dialog 3: Do not show any dialog

#### RETURN PARAMETERS

pKeyHandle	HANDLE*	Handle for port access
pDeviceName	char*	Device name
pProtocolStackName	char*	Protocol stack name
pInterfaceName	char*	Interface name
pPortName	char*	Port name
pBaudrate	DWORD*	Baud rate [bit/s]
pTimeout	DWORD*	Timeout [ms]
pNodeId	WORD*	Node ID
pErrorCode	DWORD*	Error information on the executed function

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

### 3.1.6 VCS\_CloseAllDevices

#### FUNCTION

```
BOOL VCS_CloseAllDevices(DWORD* pErrorCode)
```

#### DESCRIPTION

VCS\_CloseAllDevices closes all opened ports for devices and subdevices and releases them for other applications. If no opened ports are available, the function returns “0”.

#### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

**3.1.7 VCS\_CloseDevice****FUNCTION**

BOOL VCS\_CloseDevice(HANDLE KeyHandle, DWORD\* pErrorCode)

**DESCRIPTION**

VCS\_CloseDevice closes the port and releases it for other applications. If no opened ports are available, the function returns "0".

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
-----------	--------	------------------------

**RETURN PARAMETERS**

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise "0"
---------------------	------	--------------------------------------

### 3.1.8 VCS\_OpenSubDevice

#### FUNCTION

```
HANDLE VCS_OpenSubDevice(HANDLE DeviceHandle, char* DeviceName, char*
ProtocolStackName, DWORD* pErrorCode)
```

#### DESCRIPTION

VCS\_OpenSubDevice opens the subdevice connected to the gateway device to send and receive commands.

#### PARAMETERS

DeviceHandle	HANDLE	Handle from opened device
DeviceName	char*	Name of connected subdevice: <ul style="list-style-type: none"> <li>• EPOS</li> <li>• EPOS2</li> <li>• EPOS4</li> </ul>
ProtocolStackName	char*	Name of used communication protocol: <ul style="list-style-type: none"> <li>• CANopen</li> </ul>

#### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	HANDLE	Handle for gateway port access. Nonzero if successful; otherwise "0".
--------------	--------	--

#### PROGRAMMING EXAMPLE

```
// device (gateway)
HANDLE keyHandle = 0;
char* deviceName = "EPOS2";
char* protocolStackName = "MAXON SERIAL V2";
char* interfaceName = "RS232";
char* portName = "COM1";
DWORD errorCode = 0;

// subdevice
HANDLE subkeyHandle = 0;
char* subdeviceName = "EPOS4";
char* subProtocolStackName = "CANopen";

keyHandle = VCS_OpenDevice(deviceName, protocolStackName, interfaceName, portName, &errorCode);
if(keyHandle > 0)
{
    subkeyHandle = VCS_OpenSubDevice(keyHandle, subdeviceName, subProtocolStackName, errorCode);
    if(subkeyHandle > 0)
    {
        //.....
        VCS_CloseSubDevice(subkeyHandle, errorCode);
    }

    VCS_CloseDevice(keyHandle, errorCode);
}
```

Figure 3-8 VCS\_OpenSubDevice (programming example)

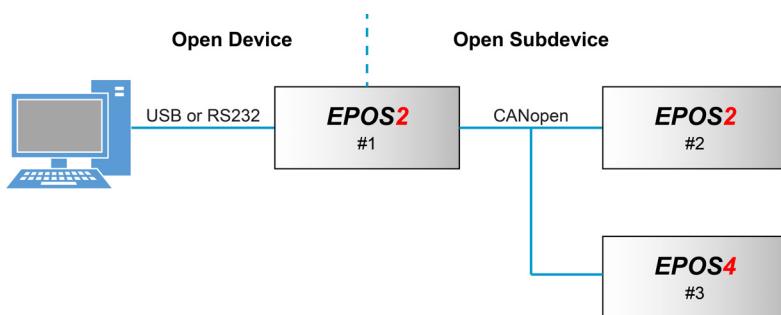


Figure 3-9 VCS\_OpenSubDevice (example)

**3.1.9 VCS\_OpenSubDeviceDlg****FUNCTION**

```
HANDLE VCS_OpenSubDeviceDlg(HANDLE DeviceHandle, DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_OpenSubDeviceDlg recognizes available subdevices capable to operate with the gateway device and opens the selected device for communication. Not available with Linux.

**PARAMETERS**

DeviceHandle	HANDLE	Handle from opened device
--------------	--------	---------------------------

**RETURN PARAMETERS**

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	HANDLE	Handle for gateway port access. Nonzero if successful; otherwise “0”.
---------------------	--------	--

**3.1.10 VCS\_SetGatewaySettings****FUNCTION**

```
BOOL VCS_SetGatewaySettings(HANDLE KeyHandle, DWORD Baudrate, WORD* pErrorCode)
```

**DESCRIPTION**

VCS\_SetGatewaySettings writes the gateway communication parameters to the device, stores them, and resets the gateway device. Not available with Linux.

The function does not set the communication parameters to all devices on the bus.

For correct communication, use the same baud rate as the connected devices.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Baudrate	DWORD	Actual baud rate from opened port [bit/s]

**RETURN PARAMETERS**

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”.
---------------------	------	---------------------------------------

### 3.1.11 VCS\_GetGatewaySettings

#### FUNCTION

BOOL VCS\_GetGatewaySettings(HANDLE KeyHandle, DWORD\* pBaudrate, DWORD\* pErrorCode)

#### DESCRIPTION

VCS\_GetGatewaySettings returns the baud rate gateway communication parameter.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
-----------	--------	------------------------

#### RETURN PARAMETERS

pBaudrate	DWORD*	Actual baud rate from opened port [bit/s]
pErrorCode	DWORD*	Error information on the executed function

Return Value	BOOL	Nonzero if successful; otherwise “0”.
--------------	------	---------------------------------------

### 3.1.12 VCS\_FindSubDeviceCommunicationSettings

#### FUNCTION

BOOL VCS\_FindSubDeviceCommunicationSettings(HANDLE DeviceHandle, HANDLE\* pKeyHandle, char\* pDeviceName, char\* pProtocolStackName, WORD SizeName, DWORD\* pBaudrate, WORD\* pNodeld, int DialogMode, DWORD\* pErrorCode)

#### DESCRIPTION

VCS\_FindSubDeviceCommunicationSettings searches the subdevice communication setting parameters. The parameters can be defined to accelerate the process. The search will be terminated as the first device is found. Not available with Linux.

#### PARAMETERS

DeviceHandle	HANDLE	Handle from opened device
SizeName	WORD	Reserved memory size for return parameters
DialogMode	int	0: Show progress dialog 1: Show progress and confirmation dialog 2: Show confirmation dialog 3: Do not show any dialog

#### RETURN PARAMETERS

pKeyHandle	HANDLE*	Handle for port access
pDeviceName	char*	Device name
pProtocolStackName	char*	ProtocolStack name
pBaudrate	DWORD*	Baud rate [bit/s]
pNodeld	WORD*	Node ID
pErrorCode	DWORD*	Error information on the executed function

Return Value	BOOL	Nonzero if successful; otherwise “0”.
--------------	------	---------------------------------------

**3.1.13 VCS\_CloseAllSubDevices****FUNCTION**

BOOL VCS\_CloseAllSubDevices(HANDLE DeviceHandle, DWORD\* pErrorCode)

**DESCRIPTION**

VCS\_CloseAllSubDevices closes all opened subdevices and releases them for other applications.

**PARAMETERS**

DeviceHandle	HANDLE	Handle from opened device
--------------	--------	---------------------------

**RETURN PARAMETERS**

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

**Return Value**

BOOL

Nonzero if successful; otherwise “0”.

**3.1.14 VCS\_CloseSubDevice****FUNCTION**

BOOL VCS\_CloseSubDevice(HANDLE KeyHandle, DWORD\* pErrorCode)

**DESCRIPTION**

VCS\_CloseSubDevice closes the subdevice and releases it for other applications.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
-----------	--------	------------------------

**RETURN PARAMETERS**

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

**Return Value**

BOOL

Nonzero if successful; otherwise “0”.

## 3.2 Info

### 3.2.1 VCS\_GetErrorInfo

#### FUNCTION

BOOL VCS\_GetErrorInfo(DWORD ErrorCodeValue, char\* pErrorInfo, WORD MaxStrSize)

#### DESCRIPTION

VCS\_GetErrorInfo returns the error information on the executed function from a received error code. It returns communication and library errors (but not device error descriptions). For error codes → chapter “8 Error Overview” on page 8-131.

#### PARAMETERS

ErrorCodeValue	DWORD	Received error code
MaxStrSize	WORD	Max. length of error string

#### RETURN PARAMETERS

pErrorCode	char*	Error string
------------	-------	--------------

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

### 3.2.2 VCS\_GetDriverInfo

#### FUNCTION

BOOL VCS\_GetDriverInfo(char\* pLibraryName, WORD MaxStrNameSize, char\* pLibraryVersion, WORD MaxStrVersionSize, DWORD\* pErrorCode)

#### DESCRIPTION

VCS\_GetDriverInfo returns the name and version from the «EPOS Command Library».

#### PARAMETERS

MaxStrNameSize	WORD	Reserved memory size for the name
MaxStrVersionSize	WORD	Reserved memory size for the version

#### RETURN PARAMETERS

pLibraryName	char*	Name from the library
pLibraryVersion	char*	Version from the library
pErrorCode	DWORD*	Error information on the executed function

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

### 3.2.3 VCS\_GetVersion

**FUNCTION**

```
BOOL VCS_GetVersion(HANDLE KeyHandle, WORD Nodeld, WORD* pHardwareVersion, WORD*  
pSoftwareVersion, WORD* pApplicationNumber, WORD* pApplicationVersion, DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_GetVersion returns the firmware version.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

**RETURN PARAMETERS**

pHardwareVersion	WORD*	Hardware version
pSoftwareVersion	WORD*	Software version
pApplicationNumber	WORD*	Application number
pApplicationVersion	WORD*	Application version
pErrorCode	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

## 3.3 Advanced Functions

### 3.3.1 VCS\_GetDeviceNameSelection

#### FUNCTION

```
BOOL VCS_GetDeviceNameSelection(BOOL StartOfSelection, char* pDeviceNameSel, WORD MaxStrSize, BOOL* pEndOfSelection, DWORD* pErrorCode)
```

#### DESCRIPTION

VCS\_GetDeviceNameSelection returns all available device names.

#### PARAMETERS

StartOfSelection	BOOL	True: Get first selection string False: Get next selection string
MaxStrSize	WORD	Reserved memory size for the device name

#### RETURN PARAMETERS

pDeviceNameSel	char*	Device name
pEndOfSelection	BOOL*	True: No more selection string available False: More string available
pErrorCode	DWORD*	Error information on the executed function

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

#### PROGRAMMING EXAMPLE

```
const WORD maxStrSize = 100;
char* deviceNameSel[maxStrSize];
BOOL endOfSelection = FALSE;
DWORD errorCode = 0;

//get first device name
if(VCS_GetDeviceNameSelection(TRUE, deviceNameSel, maxStrSize, &endOfSelection, &errorCode))
{
    //get next device name (as long as endOfSelection == FALSE)
    while(!endOfSelection)
    {
        VCS_GetDeviceNameSelection(FALSE, deviceNameSel, maxStrSize, &endOfSelection, &errorCode);
    }
}
```

Figure 3-10 VCS\_GetDeviceNameSelection (programming example)

### **3.3.2 VCS\_GetProtocolStackNameSelection**

## FUNCTION

```
BOOL VCS_GetProtocolStackNameSelection(char* DeviceName, BOOL StartOfSelection, char* pProtocolStackNameSel, WORD MaxStrSize, BOOL* pEndOfSelection, DWORD* pErrorCode)
```

## **DESCRIPTION**

`VCS_GetProtocolStackNameSelection` returns all available protocol stack names.

## PARAMETERS

DeviceName	char*	Device name
StartOfSelection	BOOL	True: Get first selection string False: Get next selection string
MaxStrSize	WORD	Reserved memory size for the name

## RETURN PARAMETERS

pProtocolStackNameSel	char*	Pointer to available protocol stack name
pEndOfSelection	BOOL*	True: No more string available False: More string available
pErrorCode	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

## PROGRAMMING EXAMPLE

```
const WORD maxStrSize = 100;
char* deviceName = "EPOS2";
char* protocolStackNameSel[maxStrSize];
BOOL endOfSelection = FALSE;
DWORD errorCode = 0;

//get first protocol stack name
if(VCS_GetProtocolStackNameSelection(deviceName,
    TRUE, protocolStackNameSel, maxStrSize, &endOfSelection, &errorCode))
{
    //get next protocol stack name (as long as endOfSelection == FALSE)
    while(!endOfSelection)
    {
        VCS_GetProtocolStackNameSelection(deviceName,
            FALSE, protocolStackNameSel, maxStrSize, &endOfSelection, &errorCode);
    }
}
```

Figure 3-11 VCS\_GetProtocolStackNameSelection (programming example)

### 3.3.3 VCS\_GetInterfaceNameSelection

#### FUNCTION

```
BOOL VCS_GetInterfaceNameSelection(char* DeviceName, char* ProtocolStackName, BOOL StartOfSelection, char* pInterfaceNameSel, WORD MaxStrSize, BOOL* pEndOfSelection, DWORD* pErrorCode)
```

#### DESCRIPTION

VCS\_GetInterfaceNameSelection returns all available interface names.

#### PARAMETERS

DeviceName	char*	Device name
ProtocolStackName	char*	Protocol stack name
StartOfSelection	BOOL	True: Get first selection string False: Get next selection string
MaxStrSize	WORD	Reserved memory size for the interface name

#### RETURN PARAMETERS

pInterfaceNameSel	char*	Name of interface
pEndOfSelection	BOOL*	True: No more string available False: More string available
pErrorCode	DWORD*	Error information on the executed function

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

#### PROGRAMMING EXAMPLE

```
const WORD maxStrSize = 100;
char* deviceName = "EPOS2";
char* protocolStackName = "MAXON SERIAL V2";
char* interfaceNameSel[maxStrSize];
BOOL endOfSelection = FALSE;
DWORD errorCode = 0;

//get first interface name
if(VCS_GetInterfaceNameSelection(deviceName, protocolStackName,
                                 TRUE, interfaceNameSel, maxStrSize, &endOfSelection, &errorCode))
{
    //get next interface name (as long as endOfSelection == FALSE)
    while(!endOfSelection)
    {
        VCS_GetInterfaceNameSelection(deviceName, protocolStackName,
                                      FALSE, interfaceNameSel, maxStrSize, &endOfSelection, &errorCode);
    }
}
```

Figure 3-12 VCS\_GetInterfaceNameSelection (programming example)

**3.3.4 VCS\_GetPortNameSelection****FUNCTION**

```
BOOL VCS_GetPortNameSelection(char* DeviceName, char* ProtocolStackName, char*
InterfaceName, BOOL StartOfSelection, char* pPortSel, WORD MaxStrSize, BOOL* pEndOfSelection,
DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_GetPortNameSelection returns all available port names.

**PARAMETERS**

DeviceName	char*	Device name
ProtocolStackName	char*	Protocol stack name
InterfaceName	char*	Interface name
StartOfSelection	BOOL	True: Get first selection string False: Get next selection string
MaxStrSize	WORD	Reserved memory size for the port name

**RETURN PARAMETERS**

pPortSel	char*	Pointer to port name
pEndOfSelection	BOOL*	True: No more string available False: More string available
pErrorCode	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise "0"
---------------------	------	--------------------------------------

**PROGRAMMING EXAMPLE**

```
const WORD maxStrSize = 100;
char* deviceName = "EPOS2";
char* protocolStackName = "MAXON SERIAL V2";
char* interfaceName = "USB";
char* portSel[maxStrSize];
BOOL endOfSelection = FALSE;
DWORD errorCode = 0;

//get first port name
if(VCS_GetPortNameSelection(deviceName, protocolStackName, interfaceName,
                           TRUE, portSel, maxStrSize, &endOfSelection, &errorCode))
{
    //get next port name (as long as endOfSelection == FALSE)
    while(!endOfSelection)
    {
        VCS_GetPortNameSelection(deviceName, protocolStackName, interfaceName,
                               FALSE, portSel, maxStrSize, &endOfSelection, &errorCode);
    }
}
```

Figure 3-13 VCS\_GetPortNameSelection (programming example)

### 3.3.5 VCS\_ResetPortNameSelection

#### FUNCTION

```
BOOL VCS_ResetPortNameSelection(char* DeviceName, char* ProtocolStackName, char*  
InterfaceName, DWORD* pErrorCode)
```

#### DESCRIPTION

VCS\_ResetPortNameSelection reinitializes the port enumeration.

#### PARAMETERS

DeviceName	char*	Device name
ProtocolStackName	char*	Protocol stack name
InterfaceName	char*	Interface name

#### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

**3.3.6 VCS\_GetBaudRateSelection****FUNCTION**

```
BOOL VCS_GetBaudrateSelection(char* DeviceName, char* ProtocolStackName, char*
InterfaceName, char* PortName, BOOL StartOfSelection, DWORD* pBaudrateSel, BOOL*
pEndOfSelection, DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_GetBaudrateSelection returns all available baud rates for the connected port.

**PARAMETERS**

DeviceName	char*	Device name
ProtocolStackName	char*	Protocol stack name
InterfaceName	char*	Interface name
PortName	char*	Port name
StartOfSelection	BOOL	True: Get first selection value False: Get next selection value

**RETURN PARAMETERS**

pBaudrateSel	DWORD*	Pointer to baud rate [bit/s]
pEndOfSelection	BOOL*	True: No more value available False: More value available
pErrorCode	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise "0"
---------------------	------	--------------------------------------

**PROGRAMMING EXAMPLE**

```
char* deviceName = "EPOS4";
char* protocolStackName = "MAXON SERIAL V2";
char* interfaceName = "RS232";
char* portName = "COM1";
DWORD baudrateSel;
BOOL endOfSelection = FALSE;
DWORD errorCode = 0;

//get first baudrate
if(VCS_GetBaudrateSelection(deviceName, protocolStackName, interfaceName, portName,
                           TRUE, &baudrateSel, &endOfSelection, &errorCode))
{
    //get next baudrate (as long as endOfSelection == FALSE)
    while(!endOfSelection)
    {
        VCS_GetBaudrateSelection(deviceName, protocolStackName, interfaceName, portName,
                               FALSE, &baudrateSel, &endOfSelection, &errorCode);
    }
}
```

Figure 3-14 VCS\_GetBaudrateSelection (programming example)

### 3.3.7 VCS\_GetKeyHandle

#### FUNCTION

```
BOOL VCS_GetKeyHandle(char* DeviceName, char* ProtocolStackName, char* InterfaceName, char* PortName, HANDLE* pKeyHandle, DWORD* pErrorCode)
```

#### DESCRIPTION

VCS\_GetKeyHandle returns the key handle from the opened interface.

#### PARAMETERS

DeviceName	char*	Device name
ProtocolStackName	char*	Protocol stack name
InterfaceName	char*	Interface name
PortName	char*	Port name

#### RETURN PARAMETERS

pKeyHandle	HANDLE*	Handle for port access, if parameters are correct; otherwise 0
pErrorCode	DWORD*	Error information on the executed function

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

### 3.3.8 VCS\_GetDeviceName

#### FUNCTION

```
BOOL VCS_GetDeviceName(HANDLE KeyHandle, char* pDeviceName, WORD MaxStrSize, DWORD* pErrorCode)
```

#### DESCRIPTION

VCS\_GetDeviceName returns the device name to corresponding handle.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
MaxStrSize	WORD	Reserved memory size for the device name

#### RETURN PARAMETERS

pDeviceName	char*	Device name
pErrorCode	DWORD*	Error information on the executed function

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

### 3.3.9 VCS\_GetProtocolStackName

**FUNCTION**

```
BOOL VCS_GetProtocolStackName(HANDLE KeyHandle, char* pProtocolStackName, WORD
MaxStrSize, DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_GetProtocolStackName returns the protocol stack name to corresponding handle.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
MaxStrSize	WORD	Reserved memory size for the protocol stack name

**RETURN PARAMETERS**

pProtocolStackName	char*	Pointer to the protocol stack name
pErrorCode	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

### 3.3.10 VCS\_GetInterfaceName

**FUNCTION**

```
BOOL VCS_GetInterfaceName(HANDLE KeyHandle, char* plInterfaceName, WORD MaxStrSize,
DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_GetInterfaceName returns the interface name to corresponding handle.

**PARAMETERS**

KeyHandle	char*	Handle for port access
MaxStrSize	DWORD*	Reserved memory size for the interface name

**RETURN PARAMETERS**

plInterfaceName	char*	Name of interface
pErrorCode	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

### 3.3.11 VCS\_GetPortName

#### FUNCTION

```
BOOL VCS_GetPortName(HANDLE KeyHandle, char* pPortName, WORD MaxStrSize, DWORD*  
pErrorCode)
```

#### DESCRIPTION

VCS\_GetPortName returns the port name to corresponding handle.

#### PARAMETERS

KeyHandle	char*	Handle for port access
MaxStrSize	DWORD*	Reserved memory size for the port name

#### RETURN PARAMETERS

pPortName	char*	Port name
pErrorCode	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

## 4 Configuration Functions

For detailed information on the objects →separate document «Firmware Specification».



### **Availability of functions**

The availability of certain functions depends on the used hardware. For an overview →“Appendix A — Hardware vs. Functions” on page 11-157.

### 4.1 General

#### 4.1.1 VCS\_ImportParameter

##### FUNCTION

```
BOOL VCS_ImportParameter(HANDLE KeyHandle, WORD Nodeld, char* pParameterFileName,
BOOL ShowDlg, BOOL ShowMsg, DWORD* pErrorCode)
```

##### DESCRIPTION

VCS\_ImportParameter writes parameters from a file to the device. Not available with Linux.

##### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
pParameterFileName	char*	Full path of parameter file for import
ShowDlg	BOOL	Dialog is shown
ShowMsg	BOOL	Message box are activated

##### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

##### PROGRAMMING EXAMPLE

```
HANDLE keyHandle = 0;
WORD nodeId = 1;
char* parameterFileName = "C:\\\\Files\\\\Parameters.dcf";
BOOL showDlg = TRUE;
BOOL showMsg = FALSE;
DWORD errorCode = 0;
BOOL result = FALSE;

//...
result = VCS_ImportParameter(keyHandle, nodeId, parameterFileName, showDlg, showMsg, &errorCode);
//...
```

Figure 4-15 VCS\_ImportParameter (programming example)

#### 4.1.2 VCS\_ExportParameter

## FUNCTION

```
BOOL VCS_ExportParameter(HANDLE KeyHandle, WORD NodeId, char* pParameterFileName, char* pFirmwareFileName, char* pUserID, char* pComment, BOOL ShowDlg, BOOL ShowMsg, DWORD* pErrorCode)
```

## **DESCRIPTION**

VCS ExportParameter reads all device parameters and writes them to the file. Not available with Linux.

## PARAMETERS

KeyHandle	HANDLE	Handle for port access
NodeId	WORD	Node ID of the addressed device
pParameterFileName	char*	Full path of parameter file for export
pFirmwareFileName	char*	Full path of firmware file of connected device
pUserID	char*	User name
pComment	char*	Comment
ShowDlg	BOOL	Dialog is shown
ShowMsg	BOOL	Message box are activated

#### RETURN PARAMETERS

pErrorCode DWORD\* Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

## PROGRAMMING EXAMPLE

```
HANDLE keyHandle = 0;
WORD nodeId = 1;
char* parameterFileName = "C:\\\\Files\\\\Parameters.dcf";
char* firmwareFileName = "C:\\\\Files\\\\Epos_2126h_6220h_0000h_0000h.bin";
char* userId = "Hans Muster";
char* comment = "Parameter Backup";
BOOL showDlg = TRUE;
BOOL showMsg = FALSE;
DWORD errorCode = 0;
BOOL result = FALSE;

//...
result = VCS_ExportParameter(keyHandle, nodeId, parameterFileName, firmwareFileName,
                                userId, comment, showDlg, showMsg, &errorCode);
//...
```

Figure 4-16 VCS ExportParameter (programming example)

**4.1.3 VCS\_SetObject****FUNCTION**

```
BOOL VCS_SetObject(HANDLE KeyHandle, WORD Nodeld, WORD ObjectIndex, BYTE
ObjectSubIndex, void* pData, DWORD NbOfBytesToWrite, DWORD* pNbOfBytesWritten, DWORD*
pErrorCode)
```

**DESCRIPTION**

VCS\_SetObject writes an object value at the given index and subindex.

For information on object index, object subindex, and object length →separate document «Firmware Specification».

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
ObjectIndex	WORD	Object index
ObjectSubIndex	BYTE	Object subindex
pData	void*	Object data
NbOfBytesToWrite	DWORD	Object length to write (number of bytes)

**RETURN PARAMETERS**

pNbOfBytesWritten	DWORD*	Object length written (number of bytes)
pErrorCode	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

**4.1.4 VCS\_GetObject****FUNCTION**

```
BOOL VCS_GetObject(HANDLE KeyHandle, WORD Nodeld, WORD ObjectIndex, BYTE
ObjectSubIndex, void* pData, DWORD NbOfBytesToRead, DWORD* pNbOfBytesRead, DWORD*
pErrorCode)
```

**DESCRIPTION**

VCS\_GetObject reads an object value at the given index and subindex.

For information on object index, object subindex, and object length →separate document «Firmware Specification».

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
ObjectIndex	WORD	Object index
ObjectSubIndex	BYTE	Object subindex
NbOfBytesToRead	DWORD	Object length to read (number of bytes)

**RETURN PARAMETERS**

pData	void*	Object data
pNbOfBytesRead	DWORD*	Object length read (number of bytes)
pErrorCode	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

## 4.1.5 VCS\_Restore

### FUNCTION

BOOL VCS\_Restore(HANDLE KeyHandle, WORD NodId, DWORD\* pErrorCode)

### DESCRIPTION

VCS\_Restore restores all default parameters.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device

### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

## 4.1.6 VCS\_Store

### FUNCTION

BOOL VCS\_Store(HANDLE KeyHandle, WORD NodId, DWORD\* pErrorCode)

### DESCRIPTION

VCS\_Store stores all parameters.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device

### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

**4.1.7 VCS\_UpdateFirmware****FUNCTION**

```
BOOL VCS_UpdateFirmware (HANDLE KeyHandle, WORD NodId, char *pBinaryFile,
BOOL ShowDlg, BOOL ShowHistory, BOOL ShowMsg, DWORD *pErrorCode)
```

**DESCRIPTION**

VCS\_UpdateFirmware is used to update the binary code for the controller firmware. Not available with Linux.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Identification ID of the addressed device
pBinaryFile	char*	Full path of firmware file
ShowDlg	BOOL	Progress dialog is shown
ShowHistory	BOOL	History list is shown in the progress dialog
ShowMsg	BOOL	Message boxes are shown during download (for example if an error occurs)

**RETURN PARAMETERS**

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise "0"
---------------------	------	--------------------------------------

**PROGRAMMING EXAMPLE**

```
HANDLE keyHandle = 0;
WORD nodeId = 1;
char* binaryFileName = "C:\\\\Files\\\\Epos_2126h_6220h_0000h_0000h.bin";
BOOL showDlg = TRUE;
BOOL showHistory = TRUE;
BOOL showMsg = FALSE;
DWORD errorCode = 0;
BOOL result = FALSE;

//...
result = VCS_UpdateFirmware(keyHandle, nodeId, binaryFileName,
                           showDlg, showHistory, showMsg, &errorCode);
//...
```

Figure 4-17 VCS\_UpdateFirmware (programming example)

## 4.2 Advanced Functions

### 4.2.1 Motor

#### 4.2.1.1 VCS\_SetMotorType

##### FUNCTION

BOOL VCS\_SetMotorType(HANDLE KeyHandle, WORD Nodeld, WORD MotorType, DWORD\* pErrorCode)

##### DESCRIPTION

VCS\_SetMotorType writes the motor type.

##### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
MotorType	WORD	Type of motor (→ Table 4-6)

##### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

Description	Value	Name
brushed DC motor	1	MT_DC_MOTOR
EC motor sinus commutated	10	MT_EC_SINUS_COMMUTATED_MOTOR
EC motor block commutated	11	MT_EC_BLOCK_COMMUTATED_MOTOR

Table 4-6 Motor types

#### 4.2.1.2 VCS\_SetDcMotorParameter

##### FUNCTION

BOOL VCS\_SetDcMotorParameter(HANDLE KeyHandle, WORD Nodeld, WORD NominalCurrent, WORD MaxOutputCurrent, WORD ThermalTimeConstant, DWORD\* pErrorCode)

##### DESCRIPTION

VCS\_SetDcMotorParameter writes all DC motor parameters.

##### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
NominalCurrent	WORD	Maximal continuous current
MaxOutputCurrent	WORD	Maximal peak current
ThermalTimeConstant	WORD	Thermal time constant winding

##### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

**4.2.1.3 VCS\_SetEcMotorParameter****FUNCTION**

`BOOL VCS_SetEcMotorParameter(HANDLE KeyHandle, WORD Nodeld, WORD NominalCurrent, WORD MaxOutputCurrent, WORD ThermalTimeConstant, BYTE NbOfPolePairs, DWORD* pErrorCode)`

**DESCRIPTION**

VCS\_SetEcMotorParameter writes all EC motor parameters.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
NominalCurrent	WORD	Maximal continuous current
MaxOutputCurrent	WORD	Maximal peak current
ThermalTimeConstant	WORD	Thermal time constant winding
NbOfPolePairs	BYTE	Number of pole pairs

**RETURN PARAMETERS**

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

**4.2.1.4 VCS\_GetMotorType****FUNCTION**

`BOOL VCS_GetMotorType(HANDLE KeyHandle, WORD Nodeld, WORD* pMotorType, DWORD* pErrorCode)`

**DESCRIPTION**

VCS\_GetMotorType reads the motor type.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

**RETURN PARAMETERS**

pMotorType	WORD*	Type of motor (→ Table 4-6)
pErrorCode	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

## 4.2.1.5 VCS\_GetDcMotorParameter

### FUNCTION

```
BOOL VCS_GetDcMotorParameter(HANDLE KeyHandle, WORD Nodeld, WORD* pNominalCurrent,  
WORD* pMaxOutputCurrent, WORD* pThermalTimeConstant, DWORD* pErrorCode)
```

### DESCRIPTION

VCS\_GetDcMotorParameter reads all DC motor parameters.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

### RETURN PARAMETERS

pNominalCurrent	WORD*	Maximal continuous current
pMaxOutputCurrent	WORD*	Maximal peak current
pThermalTimeConstant	WORD*	Thermal time constant winding
pErrorCode	DWORD*	Error information on the executed function

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

## 4.2.1.6 VCS\_GetEcMotorParameter

### FUNCTION

```
BOOL VCS_GetEcMotorParameter(HANDLE KeyHandle, WORD Nodeld, WORD* pNominalCurrent,  
WORD* pMaxOutputCurrent, WORD* pThermalTimeConstant, BYTE* pNbOfPolePairs, DWORD*  
pErrorCode)
```

### DESCRIPTION

VCS\_GetEcMotorParameter reads all EC motor parameters.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

### RETURN PARAMETERS

pNominalCurrent	WORD*	Maximal continuous current
pMaxOutputCurrent	WORD*	Maximal peak current
pThermalTimeConstant	WORD*	Thermal time constant winding
pNbOfPolePairs	BYTE*	Number of pole pairs
pErrorCode	DWORD*	Error information on the executed function

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

## 4.2.2 Sensor

## 4.2.2.1 VCS\_SetSensorType

**FUNCTION**

```
BOOL VCS_SetSensorType(HANDLE KeyHandle, WORD NodId, WORD SensorType, DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_SetSensorType writes the sensor type.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device
SensorType	WORD	Position Sensor Type (→ Table 4-7)

**RETURN PARAMETERS**

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

Description	Value	Name
Unknown / No sensor	0	ST_UNKNOWN
Incremental encoder 1 with index (3-channel)	1	ST_INC_ENCODER_3CHANNEL
Incremental encoder 1 without index (2-channel)	2	ST_INC_ENCODER_2CHANNEL
Hall Sensors	3	ST_HALL_SENSORS
SSI encoder binary coded	4	ST_SSI_ABS_ENCODER_BINARY
SSI encoder Grey coded	5	ST_SSI_ABS_ENCODER_GREY

Table 4-7 Position sensor types

## 4.2.2.2 VCS\_SetIncEncoderParameter

### FUNCTION

```
BOOL VCS_SetIncEncoderParameter(HANDLE KeyHandle, WORD Nodeld, DWORD  
EncoderResolution, BOOL InvertedPolarity, DWORD* pErrorCode)
```

### DESCRIPTION

VCS\_SetIncEncoderParameter writes the incremental encoder parameters.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
EncoderResolution	DWORD	Encoder pulse number [pulse per turn]
InvertedPolarity	BOOL	Position sensor polarity

### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise "0"
---------------------	------	--------------------------------------

## 4.2.2.3 VCS\_SetHallSensorParameter

### FUNCTION

```
BOOL VCS_SetHallSensorParameter(HANDLE KeyHandle, WORD Nodeld, BOOL InvertedPolarity,  
DWORD* pErrorCode)
```

### DESCRIPTION

VCS\_SetHallSensorParameter writes the Hall sensor parameter.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
InvertedPolarity	BOOL	Position sensor polarity

### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise "0"
---------------------	------	--------------------------------------

**4.2.2.4 VCS\_SetSsiAbsEncoderParameterEx****FUNCTION**

`BOOL VCS_SetSsiAbsEncoderParameterEx(HANDLE KeyHandle, WORD Nodeld, WORD DataRate, WORD NbOfMultiTurnDataBits, WORD NbOfSingleTurnDataBits, WORD NbOfSpecialDataBits, BOOL InvertedPolarity, WORD Timeout, WORD PowerupTime, DWORD* pErrorCode)`

**DESCRIPTION**

`VCS_SetSsiAbsEncoderParameterEx` writes all parameters for EPOS4 SSI absolute encoder.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
DataRate	WORD	SSI encoder data rate
NbOfMultiTurnDataBits	WORD	Number of bits multi turn
NbOfSingleTurnDataBits	WORD	Number of bits single turn
NbOfSpecialDataBits	WORD	Number of bits special data
InvertedPolarity	BOOL	Position sensor polarity
Timeout	WORD	Timeout time
PowerupTime	WORD	Power up time

**RETURN PARAMETERS**

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise "0"
---------------------	------	--------------------------------------

**4.2.2.5 VCS\_SetSsiAbsEncoderParameter****FUNCTION**

`BOOL VCS_SetSsiAbsEncoderParameter(HANDLE KeyHandle, WORD Nodeld, WORD DataRate, WORD NbOfMultiTurnDataBits, WORD NbOfSingleTurnDataBits, BOOL InvertedPolarity, DWORD* pErrorCode)`

**DESCRIPTION**

`VCS_SetSsiAbsEncoderParameter` writes all parameters for SSI absolute encoder.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
DataRate	WORD	SSI encoder data rate
NbOfMultiTurnDataBits	WORD	Number of bits multi turn
NbOfSingleTurnDataBits	WORD	Number of bits single turn
InvertedPolarity	BOOL	Position sensor polarity

**RETURN PARAMETERS**

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise "0"
---------------------	------	--------------------------------------

## 4.2.2.6 VCS\_GetSensorType

### FUNCTION

```
BOOL VCS_GetSensorType(HANDLE KeyHandle, WORD NodId, WORD* pSensorType, DWORD* pErrorCode)
```

### DESCRIPTION

VCS\_GetSensorType reads the sensor type.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device

### RETURN PARAMETERS

pSensorType	WORD*	Position sensor type (→ Table 4-7)
pErrorCode	DWORD*	Error information on the executed function

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

## 4.2.2.7 VCS\_GetIncEncoderParameter

### FUNCTION

```
BOOL VCS_GetIncEncoderParameter(HANDLE KeyHandle, WORD NodId, DWORD* pEncoderResolution, BOOL* plnvertedPolarity, DWORD* pErrorCode)
```

### DESCRIPTION

VCS\_GetIncEncoderParameter reads the incremental encoder parameters.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device

### RETURN PARAMETERS

pEncoderResolution	DWORD*	Encoder pulse number [pulse per turn]
plnvertedPolarity	BOOL*	Position sensor polarity
pErrorCode	DWORD*	Error information on the executed function

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

**4.2.2.8 VCS\_GetHallSensorParameter****FUNCTION**

```
BOOL VCS_GetHallSensorParameter(HANDLE KeyHandle, WORD NodId, BOOL* plnvertedPolarity,
DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_GetHallSensorParameter reads the Hall sensor parameters.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device

**RETURN PARAMETERS**

plnvertedPolarity	BOOL*	Position sensor polarity
pErrorCode	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

**4.2.2.9 VCS\_GetSsiAbsEncoderParameter****FUNCTION**

```
BOOL VCS_GetSsiAbsEncoderParameter(HANDLE KeyHandle, WORD NodId, WORD* pDataRate,
WORD* pNbOfMultiTurnDataBits, WORD* pNbOfSingleTurnDataBits, BOOL* plnvertedPolarity,
DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_GetSsiAbsEncoderParameter reads all parameters from SSI absolute encoder.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device

**RETURN PARAMETERS**

pDataRate	WORD*	SSI encoder data rate
pNbOfMultiTurnDataBits	WORD*	Number of bits multi turn
pNbOfSingleTurnDataBits	WORD*	Number of bits single turn
plnvertedPolarity	BOOL*	Position sensor polarity
pErrorCode	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

## 4.2.2.10 VCS\_GetSsiAbsEncoderParameterEx

### FUNCTION

```
BOOL VCS_GetSsiAbsEncoderParameterEx(HANDLE KeyHandle, WORD NodId, WORD* pDataRate, WORD* pNbOfMultiTurnDataBits, WORD* pNbOfSingleTurnDataBits, WORD* pNbOfSpecialDataBits, BOOL* pInvertedPolarity, WORD* pTimeout, WORD* pPowerupTime, DWORD* pErrorCode)
```

### DESCRIPTION

VCS\_GetSsiAbsEncoderParameterEx reads all parameters from EPOS4 SSI absolute encoder.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device

### RETURN PARAMETERS

pDataRate	WORD*	SSI encoder data rate
pNbOfMultiTurnDataBits	WORD*	Number of bits multi turn
pNbOfSingleTurnDataBits	WORD*	Number of bits single turn
pNbOfSpecialDataBits	WORD*	Number of bits special data
pInvertedPolarity	BOOL*	Position sensor polarity
pTimeout	WORD*	Timeout time
pPowerupTime	WORD*	Power up time
pErrorCode	DWORD*	Error information on the executed function

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

## 4.2.3 Safety

## 4.2.3.1 VCS\_SetMaxFollowingError

## FUNCTION

BOOL VCS\_SetMaxFollowingError(HANDLE KeyHandle, WORD Nodeld, DWORD MaxFollowingError, DWORD\* pErrorCode)

## DESCRIPTION

VCS\_SetMaxFollowingError writes the maximal allowed following error parameter.

## PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
MaxFollowingError	DWORD	Maximal allowed difference of position actual value to position demand value

## RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

## 4.2.3.2 VCS\_GetMaxFollowingError

## FUNCTION

BOOL VCS\_GetMaxFollowingError(HANDLE KeyHandle, WORD Nodeld, DWORD\* pMaxFollowingError, DWORD\* pErrorCode)

## DESCRIPTION

VCS\_GetMaxFollowingError reads the maximal allowed following error parameter.

## PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

## RETURN PARAMETERS

pMaxFollowingError	DWORD*	Maximal allowed difference of position actual value to position demand value
pErrorCode	DWORD*	Error information on the executed function

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

### 4.2.3.3 VCS\_SetMaxProfileVelocity

#### FUNCTION

```
BOOL VCS_SetMaxProfileVelocity(HANDLE KeyHandle, WORD Nodeld, DWORD MaxProfileVelocity,  
DWORD* pErrorCode)
```

#### DESCRIPTION

VCS\_SetMaxProfileVelocity writes the maximal allowed velocity.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
MaxProfileVelocity	DWORD	Used as velocity limit in a position (or velocity) move

#### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

### 4.2.3.4 VCS\_GetMaxProfileVelocity

#### FUNCTION

```
BOOL VCS_GetMaxProfileVelocity(HANDLE KeyHandle, WORD Nodeld, DWORD*  
pMaxProfileVelocity, DWORD* pErrorCode)
```

#### DESCRIPTION

VCS\_GetMaxProfileVelocity reads the maximal allowed velocity.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

#### RETURN PARAMETERS

pMaxProfileVelocity	DWORD*	Used as velocity limit in a position (or velocity) move
pErrorCode	DWORD*	Error information on the executed function

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

**4.2.3.5 VCS\_SetMaxAcceleration****FUNCTION**

```
BOOL VCS_SetMaxAcceleration(HANDLE KeyHandle, WORD Nodeld, DWORD MaxAcceleration,  
DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_SetMaxAcceleration writes the maximal allowed acceleration/deceleration.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
MaxAcceleration	DWORD	Limiter of the other acceleration/ deceleration objects

**RETURN PARAMETERS**

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

**4.2.3.6 VCS\_GetMaxAcceleration****FUNCTION**

```
BOOL VCS_GetMaxAcceleration(HANDLE KeyHandle, WORD Nodeld, DWORD* pMaxAcceleration,  
DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_GetMaxAcceleration reads the maximal allowed acceleration/deceleration.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

**RETURN PARAMETERS**

pMaxAcceleration	DWORD*	Limiter of the other acceleration/deceleration objects
pErrorCode	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

## 4.2.4 Position Regulator

### 4.2.4.1 VCS\_SetPositionRegulatorGain

#### FUNCTION

BOOL VCS\_SetPositionRegulatorGain(HANDLE KeyHandle, WORD Nodeld, WORD P, WORD I, WORD D, DWORD\* pErrorCode)

#### DESCRIPTION

VCS\_SetPositionRegulatorGain writes all position regulator gains. Determine the optimal parameters using “Regulation Tuning” in «EPOS Studio».

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
P	WORD	Position regulator P-Gain
I	WORD	Position regulator I-Gain
D	WORD	Position regulator D-Gain

#### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

### 4.2.4.2 VCS\_SetPositionRegulatorFeedForward

#### FUNCTION

BOOL VCS\_SetPositionRegulatorFeedForward(HANDLE KeyHandle, WORD Nodeld, WORD VelocityFeedForward, WORD AccelerationFeedForward, DWORD\* pErrorCode)

#### DESCRIPTION

VCS\_SetPositionRegulatorFeedForward writes parameters for position regulation with feed forward.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
VelocityFeedForward	WORD	Velocity feed forward factor
AccelerationFeedForward	WORD	Acceleration feed forward factor

#### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

**4.2.4.3 VCS\_GetPositionRegulatorGain****FUNCTION**

`BOOL VCS_GetPositionRegulatorGain(HANDLE KeyHandle, WORD NodId, WORD* pP, WORD* pl, WORD* pD, DWORD* pErrorCode)`

**DESCRIPTION**

VCS\_GetPositionRegulatorGain reads all position regulator gains.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device

**RETURN PARAMETERS**

pP	WORD*	Position regulator P-Gain
pl	WORD*	Position regulator I-Gain
pD	WORD*	Position regulator D-Gain
pErrorCode	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

**4.2.4.4 VCSGetPositionRegulatorFeedForward****FUNCTION**

`BOOL VCSGetPositionRegulatorFeedForward(HANDLE KeyHandle, WORD NodId, WORD* pVelocityFeedForward, WORD* pAccelerationFeedForward, DWORD* pErrorCode)`

**DESCRIPTION**

VCSGetPositionRegulatorFeedForward reads parameters for position regulation feed forward.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device

**RETURN PARAMETERS**

pVelocityFeedForward	WORD*	Velocity feed forward factor
pAccelerationFeedFor-	WORD*	Acceleration feed forward factor
pErrorCode	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

## 4.2.5 Velocity Regulator

### 4.2.5.1 VCS\_SetVelocityRegulatorGain

#### FUNCTION

BOOL VCS\_SetVelocityRegulatorGain(HANDLE KeyHandle, WORD Nodeld, WORD P, WORD I, DWORD\* pErrorCode)

#### DESCRIPTION

VCS\_SetVelocityRegulatorGain writes all velocity regulator gains. Determine the optimal parameters using “Regulation Tuning” in «EPOS Studio».

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
P	WORD	Velocity regulator P-Gain
I	WORD	Velocity regulator I-Gain

#### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

### 4.2.5.2 VCS\_SetVelocityRegulatorFeedForward

#### FUNCTION

BOOL VCS\_SetVelocityRegulatorFeedForward(HANDLE KeyHandle, WORD Nodeld, WORD VelocityFeedForward, WORD AccelerationFeedForward, DWORD\* pErrorCode)

#### DESCRIPTION

VCS\_SetVelocityRegulatorFeedForward writes parameters for velocity regulation with feed forward.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
VelocityFeedForward	WORD	Velocity feed forward factor
AccelerationFeedForward	WORD	Acceleration feed forward factor

#### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

**4.2.5.3 VCS\_GetVelocityRegulatorGain****FUNCTION**

```
BOOL VCS_GetVelocityRegulatorGain(HANDLE KeyHandle, WORD NodId, WORD* pP, WORD* pl,
DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_GetVelocityRegulatorGain reads all velocity regulator gains.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device

**RETURN PARAMETERS**

pP	WORD*	Velocity regulator P-Gain
pl	WORD*	Velocity regulator I-Gain
pErrorCode	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise "0"
---------------------	------	--------------------------------------

**4.2.5.4 VCS\_GetVelocityRegulatorFeedForward****FUNCTION**

```
BOOL VCS_GetVelocityRegulatorFeedForward(HANDLE KeyHandle, WORD NodId, WORD* pVelocityFeedForward, WORD* pAccelerationFeedForward, DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_GetVelocityRegulatorFeedForward reads parameters for velocity regulation feed forward.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device

**RETURN PARAMETERS**

pVelocityFeedForward	WORD*	Velocity feed forward factor
pAccelerationFeedFor-	WORD*	Acceleration feed forward factor
ward	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise "0"
---------------------	------	--------------------------------------

## 4.2.6 Current Regulator

### 4.2.6.1 VCS\_SetCurrentRegulatorGain

#### FUNCTION

BOOL VCS\_SetCurrentRegulatorGain(HANDLE KeyHandle, WORD Nodeld, WORD P, WORD I, DWORD\* pErrorCode)

#### DESCRIPTION

VCS\_SetCurrentRegulatorGain writes all current regulator gains. Determine the optimal parameters using “Regulation Tuning” in «EPOS Studio».

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
P	WORD	Current regulator P-Gain
I	WORD	Current regulator I-Gain

#### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

### 4.2.6.2 VCS\_GetCurrentRegulatorGain

#### FUNCTION

BOOL VCS\_GetCurrentRegulatorGain(HANDLE KeyHandle, WORD Nodeld, WORD\* pP, WORD\* pl, DWORD\* pErrorCode)

#### DESCRIPTION

VCS\_GetCurrentRegulatorGain enables reading all current regulator gains.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

#### RETURN PARAMETERS

pP	WORD*	Current regulator P-Gain
pl	WORD*	Current regulator I-Gain
pErrorCode	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

## 4.2.7 Inputs/Outputs

## 4.2.7.1 VCS\_DigitalInputConfiguration

## FUNCTION

BOOL VCS\_DigitalInputConfiguration(HANDLE KeyHandle, WORD Nodeld, WORD DigitalInputNb,  
WORD Configuration, BOOL Mask, BOOL Polarity, BOOL ExecutionMask, DWORD\* pErrorCode)

## DESCRIPTION

VCS\_DigitalInputConfiguration sets the parameter for one digital input.

## PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
DigitalInputNb	WORD	Number of digital input (object subindex)
Configuration	WORD	Configures the functionality assigned to the digital input (bit number) (→Table 4-8)
Mask	BOOL	1: Functionality state will be displayed 0: not displayed (not supported for EPOS4)
Polarity	BOOL	1: Low active 0: High active
ExecutionMask	BOOL	1: Set the error routine Only for positive and negative switch

## RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

Description	Value	Name
None	255	DIC_NO_FUNCTIONALITY
General purpose A	15	DIC_GENERAL_PURPOSE_A
General purpose B	14	DIC_GENERAL_PURPOSE_B
General purpose C	13	DIC_GENERAL_PURPOSE_C
General purpose D	12	DIC_GENERAL_PURPOSE_D
General purpose E	11	DIC_GENERAL_PURPOSE_E
General purpose F	10	DIC_GENERAL_PURPOSE_F
General purpose G	9	DIC_GENERAL_PURPOSE_G
General purpose H	8	DIC_GENERAL_PURPOSE_H
General purpose I	7	DIC_GENERAL_PURPOSE_I
General purpose J	6	DIC_GENERAL_PURPOSE_J
Quick stop	5	DIC_QUICK_STOP
Device enable	4	DIC_DRIVE_ENABLE
Position marker	3	DIC_POSITION_MARKER
Home switch	2	DIC_HOME_SWITCH
Positive limit switch	1	DIC_POSITIVE_LIMIT_SWITCH
Negative limit switch	0	DIC_NEGATIVE_LIMIT_SWITCH

Table 4-8 Digital input configuration

## 4.2.7.2 VCS\_DigitalOutputConfiguration

### FUNCTION

BOOL VCS\_DigitalOutputConfiguration(HANDLE KeyHandle, WORD Nodeld, WORD DigitalOutputNb,  
WORD Configuration, BOOL State, BOOL Mask, BOOL Polarity, DWORD\* pErrorCode)

### DESCRIPTION

VCS\_DigitalOutputConfiguration sets parameter for one digital output.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
DigitalOutputNb	WORD	Number of digital output (object subindex)
Configuration	WORD	Configures the functionality assigned to the digital output (bit number) (→ Table 4-9)
State	BOOL	State of digital output
Mask	BOOL	1: Functionality state will be set 0: not set (not supported for EPOS4)
Polarity	BOOL	1: Low active 0: High active

### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

Description	Value	Name
None	255	DOC_NO_FUNCTIONALITY
General purpose A	15	DIC_GENERAL_PURPOSE_A
General purpose B	14	DIC_GENERAL_PURPOSE_B
General purpose C	13	DIC_GENERAL_PURPOSE_C
General purpose D	12	DIC_GENERAL_PURPOSE_D
General purpose E	11	DIC_GENERAL_PURPOSE_E
Position compare	1	DOC_POSITION_COMPARE
Ready / Fault	0	DOC_READY_FAULT

Table 4-9 Digital output configuration

**4.2.7.3 VCS\_AnalogInputConfiguration****FUNCTION**

**BOOL VCS\_AnalogInputConfiguration(HANDLE KeyHandle, WORD NodId, WORD AnalogInputNb,  
WORD Configuration, BOOL ExecutionMask, DWORD\* pErrorCode)**

**DESCRIPTION**

VCS\_AnalogInputConfiguration sets the configuration parameter for one analog input.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device
AnalogInputNb	WORD	Number of analog input (object subindex)
Configuration	WORD	Configures the functionality assigned to the analog input (bit number) (→Table 4-10)
ExecutionMask	BOOL	1: Register will be modified

**RETURN PARAMETERS**

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

Description	Value	Name
Analog current set point	0	AIC_ANALOG_CURRENT_SETPOINT
Analog position set point	2	AIC_ANALOG_POSITION_SETPOINT
Analog velocity set point	1	AIC_ANALOG_VELOCITY_SETPOINT
General purpose A	15	AIC_GENERAL_PURPOSE_A
General purpose B	14	AIC_GENERAL_PURPOSE_B

Table 4-10     Analog input configuration

## 4.2.8 Units

### 4.2.8.1 VCS\_SetVelocityUnits

#### FUNCTION

```
BOOL VCS_SetVelocityUnits(HANDLE KeyHandle, WORD Nodeld, BYTE VelDimension, char VelNotation, DWORD* pErrorCode)
```

#### DESCRIPTION

VCS\_SetVelocityUnits writes velocity unit parameters.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
VelDimension	BYTE	Velocity dimension index VD_RPM = 0xA4
VelNotation	char	Velocity notation index (→Table 4-11)

#### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

Description	Value	Name
Standard	0	VN_STANDARD
Deci ( $10^{-1}$ )	-1	VN_DECI
Centi ( $10^{-2}$ )	-2	VN_CENTI
Milli ( $10^{-3}$ )	-3	VN_MILLI

Table 4-11 Velocity notation index

### 4.2.8.2 VCS\_GetVelocityUnits

#### FUNCTION

```
BOOL VCS_GetVelocityUnits(HANDLE KeyHandle, WORD Nodeld, BYTE* pVelDimension, char* pVelNotation, DWORD* pErrorCode)
```

#### DESCRIPTION

VCS\_GetVelocityUnits reads velocity unit parameters.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

#### RETURN PARAMETERS

pVelDimension	BYTE*	Velocity dimension index VD_RPM = 0xA4
pVelNotation	char*	Velocity notation index (→Table 4-11)
pErrorCode	DWORD*	Error information on the executed function

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

## 5 Operation Functions



### Availability of functions

The availability of certain functions depends on the used hardware. For an overview →“Appendix A — Hardware vs. Functions” on page 11-157.

### 5.1 Operation Mode

#### 5.1.1 VCS\_SetOperationMode

##### FUNCTION

```
BOOL VCS_SetOperationMode(HANDLE KeyHandle, WORD Nodeld, __int8 Mode, DWORD* pErrorCode)
```

##### DESCRIPTION

VCS\_SetOperationMode sets the operation mode.

##### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
Mode	__int8	Operation mode (→Table 5-12)

##### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

Description	Value	Name
Position Profile Mode	1	OMD_PROFILE_POSITION_MODE
Position Velocity Mode	3	OMD_PROFILE_VELOCITY_MODE
Homing Mode	6	OMD_HOMING_MODE
Interpolated Position Mode	7	OMD_INTERPOLATED_POSITION_MODE
Position Mode	-1	OMD_POSITION_MODE
Velocity Mode	-2	OMD_VELOCITY_MODE
Current Mode	-3	OMD_CURRENT_MODE
Master Encoder Mode	-5	OMD_MASTER_ENCODER_MODE
Step Direction Mode	-6	OMD_STEP_DIRECTION_MODE

Table 5-12 Operation modes

## 5.1.2 VCS\_GetOperationMode

### FUNCTION

```
BOOL VCS_GetOperationMode(HANDLE KeyHandle, WORD Nodeld, __int8* pMode, DWORD*  
pErrorCode)
```

### DESCRIPTION

VCS\_GetOperationMode returns the activated operation mode.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

### RETURN PARAMETERS

pMode	__int8*	Operation mode (→Table 5-12)
pErrorCode	DWORD*	Error information on the executed function

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

## 5.2 State Machine

For detailed information on the state machine →separate document «Firmware Specification».

### 5.2.1 VCS\_ResetDevice

#### FUNCTION

BOOL VCS\_ResetDevice(HANDLE KeyHandle, WORD Nodeld, DWORD\* pErrorCode)

#### DESCRIPTION

VCS\_ResetDevice is used to send the NMT service “Reset Node”. Command is without acknowledge.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

#### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

### 5.2.2 VCS\_SetState

#### FUNCTION

BOOL VCS\_SetState(HANDLE KeyHandle, WORD Nodeld, WORD State, DWORD\* pErrorCode)

#### DESCRIPTION

VCS\_SetState reads the actual state machine state.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
State	WORD	Value of state machine (→Table 5-13)

#### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

Description	Value	Name
Get/Set Disable State	0x0000	ST_DISABLED
Get/Set Enable State	0x0001	ST_ENABLED
Get/Set Quickstop State	0x0002	ST_QUICKSTOP
Get Fault State	0x0003	ST_FAULT

Table 5-13 State modes

## 5.2.3 VCS\_SetEnableState

### FUNCTION

BOOL VCS\_SetEnableState(HANDLE KeyHandle, WORD NodId, DWORD\* pErrorCode)

### DESCRIPTION

VCS\_SetEnableState changes the device state to “enable”.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device

### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

## 5.2.4 VCS\_SetDisableState

### FUNCTION

BOOL VCS\_SetDisableState(HANDLE KeyHandle, WORD NodId, DWORD\* pErrorCode)

### DESCRIPTION

VCS\_SetDisableState changes the device state to “disable”.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device

### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

## 5.2.5 VCS\_SetQuickStopState

### FUNCTION

BOOL VCS\_SetQuickStopState(HANDLE KeyHandle, WORD NodId, DWORD\* pErrorCode)

### DESCRIPTION

VCS\_SetQuickStopState changes the device state to “quick stop”.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device

### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

**5.2.6 VCS\_ClearFault****FUNCTION**

BOOL VCS\_ClearFault(HANDLE KeyHandle, WORD NodId, DWORD\* pErrorCode)

**DESCRIPTION**

VCS\_ClearFault changes the device state from “fault” to “disable”.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device

**RETURN PARAMETERS**

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

**5.2.7 VCS\_GetState****FUNCTION**

BOOL VCS\_GetState(HANDLE KeyHandle, WORD NodId, WORD\* pState, DWORD\* pErrorCode)

**DESCRIPTION**

VCS\_GetState reads the new state of the state machine.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device

**RETURN PARAMETERS**

pState	WORD*	Statusword value (→Table 5-13)
pErrorCode	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

## 5.2.8 VCS\_GetEnableState

### FUNCTION

```
BOOL VCS_GetEnableState(HANDLE KeyHandle, WORD NodId, BOOL* plsEnabled, DWORD* pErrorCode)
```

### DESCRIPTION

VCS\_GetEnableState checks if the device is enabled.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device

### RETURN PARAMETERS

plsEnabled	BOOL*	1: Device enabled 0: Device not enabled
pErrorCode	DWORD*	Error information on the executed function

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

## 5.2.9 VCS\_GetDisableState

### FUNCTION

```
BOOL VCS_GetDisableState(HANDLE KeyHandle, WORD NodId, BOOL* plsDisabled, DWORD* pErrorCode)
```

### DESCRIPTION

VCS\_GetDisableState checks if the device is disabled.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device

### RETURN PARAMETERS

plsDisabled	BOOL*	1: Device disabled 0: Device not disabled
pErrorCode	DWORD*	Error information on the executed function

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

**5.2.10 VCS\_GetQuickStopState****FUNCTION**

BOOL VCS\_GetQuickStopState(HANDLE KeyHandle, WORD Nodeld, BOOL\* pIsQuickStopped, DWORD\* pErrorCode)

**DESCRIPTION**

VCS\_GetQuickStopState returns the device state quick stop.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

**RETURN PARAMETERS**

pIsQuickStopped	BOOL*	1: Device is in quick stop state 0: Device is not in quick stop state
pErrorCode	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

**5.2.11 VCS\_GetFaultState****FUNCTION**

BOOL VCS\_GetFaultState(HANDLE KeyHandle, WORD Nodeld, BOOL\* pIsInFault, DWORD\* pErrorCode)

**DESCRIPTION**

VCS\_GetFaultState returns the device state fault. Get error information if the device is in fault state (→“Error Handling” on page 5-66).

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

**RETURN PARAMETERS**

pIsInFault	BOOL*	1: Device is in fault state 0: Device is not in fault state
pErrorCode	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

## 5.3 Error Handling

### 5.3.1 VCS\_GetNbOfDeviceError

#### FUNCTION

```
BOOL VCS_GetNbOfDeviceError(HANDLE KeyHandle, WORD Nodeld, BYTE* pNbDeviceError,  
DWORD* pErrorCode)
```

#### DESCRIPTION

VCS\_GetNbOfDeviceError returns the number of actual errors that are recorded.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

#### RETURN PARAMETERS

pNbDeviceError	BYTE*	Number of occurred device errors
pErrorCode	DWORD*	Error information on the executed function

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

#### PROGRAMMING EXAMPLE

```
HANDLE keyHandle = 0;  
WORD nodeId = 1;  
DWORD errorCode = 0;  
BOOL result = FALSE;  
  
//...  
result = VCS_GetNbOfDeviceError(keyHandle, nodeId, &nbOfDeviceError, &errorCode);  
//...
```

Figure 5-18 VCS\_GetNbOfDeviceError (programming example)

**5.3.2 VCS\_GetDeviceErrorCode****FUNCTION**

```
BOOL VCS_GetDeviceErrorCode(HANDLE KeyHandle, WORD Nodeld, BYTE ErrorNumber, DWORD* pDeviceErrorCode, DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_GetDeviceErrorCode returns the error code of the selected error number.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
ErrorNumber	BYTE	Number (object subindex) of device error ( $\geq 1$ )

**RETURN PARAMETERS**

pDeviceErrorCode	DWORD*	Actual error code from error history
pErrorCode	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise "0"
---------------------	------	--------------------------------------

**PROGRAMMING EXAMPLE**

```
HANDLE keyHandle = 0;
WORD nodeId = 1;
BYTE nbOfDeviceError;
DWORD deviceErrorCode = 0;
DWORD errorCode = 0;

//...
if(VCS_GetNbOfDeviceError(keyHandle, nodeId, &nbOfDeviceError, &errorCode)
{
    for(BYTE errorNumber = 1, errorNumber <= nbOfDeviceError; errorNumber++)
    {
        if(!VCS_GetDeviceErrorCode(keyHandle, nodeId, errorNumber, &deviceErrorCode, &errorCode)
        {
            break;
        }
    }
}
//...
```

Figure 5-19 VCS\_GetDeviceErrorCode (programming example)

## 5.4 Motion Info

### 5.4.1 VCS\_GetMovementState

#### FUNCTION

```
BOOL VCS_GetMovementState(HANDLE KeyHandle, WORD Nodeld, BOOL* pTargetReached,  
DWORD* pErrorCode)
```

#### DESCRIPTION

VCS\_GetMovementState checks if the drive has reached target.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

#### RETURN PARAMETERS

pTargetReached	BOOL*	Drive has reached the target. Function reads actual state of bit 10 from the statusword.
pErrorCode	DWORD*	Error information on the executed function

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

### 5.4.2 VCSGetPositionIs

#### FUNCTION

```
BOOL VCSGetPositionIs(HANDLE KeyHandle, WORD Nodeld, long* pPositionIs, DWORD*  
pErrorCode)
```

#### DESCRIPTION

VCSGetPositionIs returns the position actual value.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

#### RETURN PARAMETERS

pPositionIs	long*	Position actual value
pErrorCode	DWORD*	Error information on the executed function

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

**5.4.3 VCS\_GetVelocityIs****FUNCTION**

```
BOOL VCS_GetVelocityIs(HANDLE KeyHandle, WORD NodId, long* pVelocityIs, DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_GetVelocityIs reads the velocity actual value.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device

**RETURN PARAMETERS**

pVelocityIs	long*	Velocity actual value
pErrorCode	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise "0"
---------------------	------	--------------------------------------

**5.4.4 VCS\_GetVelocityIsAveraged****FUNCTION**

```
BOOL VCS_GetVelocityIsAveraged(HANDLE KeyHandle, WORD NodId, long* pVelocityIsAveraged, DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_GetVelocityIsAveraged reads the velocity actual averaged value.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device

**RETURN PARAMETERS**

pVelocityIsAveraged	long*	Velocity actual value averaged
pErrorCode	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise "0"
---------------------	------	--------------------------------------

## 5.4.5 VCS\_GetCurrentIs

### FUNCTION

```
BOOL VCS_GetCurrentIs(HANDLE KeyHandle, WORD Nodeld, short* pCurrentIs, DWORD* pErrorCode)
```

### DESCRIPTION

VCS\_GetCurrentIs returns the current actual value.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

### RETURN PARAMETERS

pCurrentIs	short*	Current actual value
pErrorCode	DWORD*	Error information on the executed function

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

## 5.4.6 VCS\_GetCurrentIsAveraged

### FUNCTION

```
BOOL VCS_GetCurrentIsAveraged(HANDLE KeyHandle, WORD Nodeld, short* pCurrentIsAveraged, DWORD* pErrorCode)
```

### DESCRIPTION

VCS\_GetCurrentIsAveraged returns the current actual averaged value.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

### RETURN PARAMETERS

pCurrentIsAveraged	short*	Current actual value averaged
pErrorCode	DWORD*	Error information on the executed function

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

**5.4.7 VCS\_WaitForTargetReached****FUNCTION**

```
BOOL VCS_WaitForTargetReached(HANDLE KeyHandle, WORD NodeId, DWORD Timeout,  
DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_WaitForTargetReached waits until the state is changed to target reached or until the time is up.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
NodeId	WORD	Node ID of the addressed device
Timeout	DWORD	Max. wait time [ms] until target reached

**RETURN PARAMETERS**

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise "0"
---------------------	------	--------------------------------------

## 5.5 Profile Position Mode (PPM)

### 5.5.1 VCS\_ActivateProfilePositionMode

#### FUNCTION

BOOL VCS\_ActivateProfilePositionMode(HANDLE KeyHandle, WORD Nodeld, DWORD\* pErrorCode)

#### DESCRIPTION

VCS\_ActivateProfilePositionMode changes the operational mode to “profile position mode”.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

#### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

### 5.5.2 VCS\_SetPositionProfile

#### FUNCTION

BOOL VCS\_SetPositionProfile(HANDLE KeyHandle, WORD Nodeld, DWORD ProfileVelocity, DWORD ProfileAcceleration, DWORD ProfileDeceleration, DWORD\* pErrorCode)

#### DESCRIPTION

VCS\_SetPositionProfile sets the position profile parameters.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
ProfileVelocity	DWORD	Position profile velocity
ProfileAcceleration	DWORD	Position profile acceleration
ProfileDeceleration	DWORD	Position profile deceleration

#### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

**5.5.3 VCS\_GetPositionProfile****FUNCTION**

BOOL VCS\_GetPositionProfile(HANDLE KeyHandle, WORD Nodeld, DWORD\* pProfileVelocity,  
DWORD\* pProfileAcceleration, DWORD\* pProfileDeceleration, DWORD\* pErrorCode)

**DESCRIPTION**

VCS\_GetPositionProfile returns the position profile parameters.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

**RETURN PARAMETERS**

pProfileVelocity	DWORD*	Position profile velocity
pProfileAcceleration	DWORD*	Position profile acceleration
pProfileDeceleration	DWORD*	Position profile deceleration
pErrorCode	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise "0"
---------------------	------	--------------------------------------

**5.5.4 VCS\_MoveToPosition****FUNCTION**

BOOL VCS\_MoveToPosition(HANDLE KeyHandle, WORD Nodeld, long TargetPosition, BOOL Absolute, BOOL Immediately, DWORD\* pErrorCode)

**DESCRIPTION**

VCS\_MoveToPosition starts movement with position profile to target position.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
TargetPosition	long	Target position
Absolute	BOOL	TRUE starts an absolute FALSE a relative movement
Immediately	BOOL	TRUE starts immediately FALSE waits to end of last positioning

**RETURN PARAMETERS**

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise "0"
---------------------	------	--------------------------------------

## 5.5.5 VCS\_GetTargetPosition

### FUNCTION

```
BOOL VCS_GetTargetPosition(HANDLE KeyHandle, WORD NodId, long* pTargetPosition, DWORD* pErrorCode)
```

### DESCRIPTION

VCS\_GetTargetPosition returns the profile position mode target value.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device

### RETURN PARAMETERS

pTargetPosition	long*	Target position
pErrorCode	DWORD*	Error information on the executed function

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

## 5.5.6 VCS\_HaltPositionMovement

### FUNCTION

```
BOOL VCS_HaltPositionMovement(HANDLE KeyHandle, WORD NodId, DWORD* pErrorCode)
```

### DESCRIPTION

VCS\_HaltPositionMovement stops the movement with profile deceleration.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device

### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

**5.5.7 Advanced Functions****5.5.7.1 VCS\_EnablePositionWindow****FUNCTION**

```
BOOL VCS_EnablePositionWindow(HANDLE KeyHandle, WORD Nodeld, DWORD PositionWindow,  
WORD PositionWindowTime, DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_EnablePositionWindow activates the position window.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
PositionWindow	DWORD	Position window value
PositionWindowTime	WORD	Position window time value

**RETURN PARAMETERS**

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise "0"
---------------------	------	--------------------------------------

**5.5.7.2 VCS\_DisablePositionWindow****FUNCTION**

```
BOOL VCS_DisablePositionWindow(HANDLE KeyHandle, WORD Nodeld, DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_DisablePositionWindow deactivates the position window.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

**RETURN PARAMETERS**

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise "0"
---------------------	------	--------------------------------------

## 5.6 Profile Velocity Mode (PVM)

### 5.6.1 VCS\_ActivateProfileVelocityMode

#### FUNCTION

BOOL VCS\_ActivateProfileVelocityMode(HANDLE KeyHandle, WORD Nodeld, DWORD\* pErrorCode)

#### DESCRIPTION

VCS\_ActivateProfileVelocityMode changes the operational mode to “profile velocity mode”.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

#### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

### 5.6.2 VCS\_SetVelocityProfile

#### FUNCTION

BOOL VCS\_SetVelocityProfile(HANDLE KeyHandle, WORD Nodeld, DWORD ProfileAcceleration,  
DWORD ProfileDeceleration, DWORD\* pErrorCode)

#### DESCRIPTION

VCS\_SetVelocityProfile sets the velocity profile parameters.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
ProfileAcceleration	DWORD	Velocity profile acceleration
ProfileDeceleration	DWORD	Velocity profile deceleration

#### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

**5.6.3 VCS\_GetVelocityProfile****FUNCTION**

BOOL VCS\_GetVelocityProfile(HANDLE KeyHandle, WORD Nodeld, DWORD\* pProfileAcceleration, DWORD\* pProfileDeceleration, DWORD\* pErrorCode)

**DESCRIPTION**

VCS\_GetVelocityProfile returns the velocity profile parameters.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

**RETURN PARAMETERS**

pProfileAcceleration	DWORD*	Velocity profile acceleration
pProfileDeceleration	DWORD*	Velocity profile deceleration
pErrorCode	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise "0"
---------------------	------	--------------------------------------

**5.6.4 VCS\_MoveWithVelocity****FUNCTION**

BOOL VCS\_MoveWithVelocity(HANDLE KeyHandle, WORD Nodeld, long TargetVelocity, DWORD\* pErrorCode)

**DESCRIPTION**

VCS\_MoveWithVelocity starts the movement with velocity profile to target velocity.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
TargetVelocity	long	Target velocity

**RETURN PARAMETERS**

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise "0"
---------------------	------	--------------------------------------

## 5.6.5 VCS\_GetTargetVelocity

### FUNCTION

```
BOOL VCS_GetTargetVelocity(HANDLE KeyHandle, WORD Nodeld, long* pTargetVelocity, DWORD* pErrorCode)
```

### DESCRIPTION

VCS\_GetTargetVelocity returns the profile velocity mode target value.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

### RETURN PARAMETERS

pTargetVelocity	long*	Target velocity
pErrorCode	DWORD*	Error information on the executed function

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

## 5.6.6 VCS\_HaltVelocityMovement

### FUNCTION

```
BOOL VCS_HaltVelocityMovement(HANDLE KeyHandle, WORD Nodeld, DWORD* pErrorCode)
```

### DESCRIPTION

VCS\_HaltVelocityMovement stops the movement with profile deceleration.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

## 5.6.7 Advanced Functions

## 5.6.7.1 VCS\_EnableVelocityWindow

## FUNCTION

```
BOOL VCS_EnableVelocityWindow(HANDLE KeyHandle, WORD Nodeld, DWORD VelocityWindow,
WORD VelocityWindowTime, DWORD* pErrorCode)
```

## DESCRIPTION

VCS\_EnableVelocityWindow activates the velocity window.

## PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
VelocityWindow	DWORD	Velocity window value
VelocityWindowTime	WORD	Velocity window time value

## RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

## 5.6.7.2 VCS\_DisableVelocityWindow

## FUNCTION

```
BOOL VCS_DisableVelocityWindow(HANDLE KeyHandle, WORD Nodeld, DWORD* pErrorCode)
```

## DESCRIPTION

VCS\_DisableVelocityWindow deactivates the velocity window.

## PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

## RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

## 5.7 Homing Mode (HM)

### 5.7.1 VCS\_ActivateHomingMode

#### FUNCTION

BOOL VCS\_ActivateHomingMode(HANDLE KeyHandle, WORD Nodeld, DWORD\* pErrorCode)

#### DESCRIPTION

VCS\_ActivateHomingMode changes the operational mode to “homing mode”.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

#### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

### 5.7.2 VCS\_SetHomingParameter

#### FUNCTION

BOOL VCS\_SetHomingParameter(HANDLE KeyHandle, WORD Nodeld, DWORD HomingAcceleration, DWORD SpeedSwitch, DWORD SpeedIndex, long HomeOffset, WORD CurrentThreshold, long HomePosition, DWORD\* pErrorCode)

#### DESCRIPTION

VCS\_SetHomingParameter writes all homing parameters. The parameter units depend on (position, velocity, acceleration) notation index.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
HomingAcceleration	DWORD	Acceleration for homing profile
SpeedSwitch	DWORD	Speed during search for switch
SpeedIndex	DWORD	Speed during search for index signal
HomeOffset	long	Home offset after homing
CurrentThreshold	DWORD	Current threshold for homing methods -1, -2, -3, and -4
HomePosition	long	Used to assign the present position as homing position

#### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

**5.7.3 VCS\_GetHomingParameter****FUNCTION**

```
BOOL VCS_GetHomingParameter(HANDLE KeyHandle, WORD Nodeld, DWORD*  
pHomingAcceleration, DWORD* pSpeedSwitch, DWORD* pSpeedIndex, long* pHomelOffset, WORD*  
pCurrentThreshold, long* pHomelPosition, DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_GetHomingParameter reads all homing parameters. The parameter units depend on (position, velocity, acceleration) notation index.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

**RETURN PARAMETERS**

pHomingAcceleration	DWORD*	Acceleration for homing profile
pSpeedSwitch	DWORD*	Speed during search for switch
pSpeedIndex	DWORD*	Speed during search for index signal
pHomelOffset	long*	Home offset after homing
pCurrentThreshold	DWORD*	Current threshold for homing methods -1, -2, -3, and -4
pHomelPosition	long*	Home position value
pErrorCode	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise "0"
---------------------	------	--------------------------------------

**5.7.4 VCS\_FindHome****FUNCTION**

```
BOOL VCS_FindHome(HANDLE KeyHandle, WORD Nodeld, __int8 HomingMethod, DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_FindHome and HomingMethod permit to find the system home (for example, a home switch).

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
HomingMethod	__int8	Homing method (→Table 5-14)

**RETURN PARAMETERS**

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

**HOMING METHODS**

Description	Method	Name
Actual Position	35	HM_ACTUAL_POSITION
Index Positive Speed	34	HM_INDEX_POSITIVE_SPEED
Index Negative Speed	33	HM_INDEX_NEGATIVE_SPEED
Home Switch Negative Speed	27	HM_HOME_SWITCH_NEGATIVE_SPEED
Home Switch Positive Speed	23	HM_HOME_SWITCH_POSITIVE_SPEED
Positive Limit Switch	18	HM_POSITIVE_LIMIT_SWITCH
Negative Limit Switch	17	HM_NEGATIVE_LIMIT_SWITCH
Home Switch Negative Speed & Index	11	HM_HOME_SWITCH_NEGATIVE_SPEED_AND_INDEX
Home Switch Positive Speed & Index	7	HM_HOME_SWITCH_POSITIVE_SPEED_AND_INDEX
Positive Limit Switch & Index	2	HM_POSITIVE_LIMIT_SWITCH_AND_INDEX
Negative Limit Switch & Index	1	HM_NEGATIVE_LIMIT_SWITCH_AND_INDEX
No homing operation required	0	–
Current Threshold Positive Speed & Index	-1	HM_CURRENT_THRESHOLD_NEGATIVE_SPEED_AND_INDEX
Current Threshold Negative Speed & Index	-2	HM_CURRENT_THRESHOLD_NEGATIVE_SPEED_AND_INDEX
Current Threshold Positive Speed	-3	HM_CURRENT_THRESHOLD_POSITIVE_SPEED
Current Threshold Negative Speed	-4	HM_CURRENT_THRESHOLD_NEGATIVE_SPEED

Table 5-14 Homing methods

**5.7.5 VCS\_StopHoming****FUNCTION**

BOOL VCS\_StopHoming(HANDLE KeyHandle, WORD Nodeld, DWORD\* pErrorCode)

**DESCRIPTION**

VCS\_StopHoming interrupts homing.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

**RETURN PARAMETERS**

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise "0"
---------------------	------	--------------------------------------

**5.7.6 VCS\_DefinePosition****FUNCTION**

BOOL VCS\_DefinePosition(HANDLE KeyHandle, WORD Nodeld, long HomePosition, DWORD\* pErrorCode)

**DESCRIPTION**

VCS\_DefinePosition uses homing method 35 (Actual Position) to set a new home position.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
HomePosition	long	Used to assign the present position as homing position

**RETURN PARAMETERS**

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise "0"
---------------------	------	--------------------------------------

## 5.7.7 VCS\_GetHomingState

### FUNCTION

```
BOOL VCS_GetHomingState(HANDLE KeyHandle, WORD Nodeld, BOOL* pHomingAttained, BOOL* pHomingError, DWORD* pErrorCode)
```

### DESCRIPTION

VCS\_GetHomingState returns the states if the homing position is attained and if an homing error has occurred.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

### RETURN PARAMETERS

pHomingAttained	BOOL*	0: Homing mode not yet completed 1: Homing mode successfully terminated
pHomingError	BOOL*	0: No homing error 1: Homing error occurred
pErrorCode	DWORD*	Error information on the executed function

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

## 5.7.8 VCS\_WaitForHomingAttained

### FUNCTION

```
BOOL VCS_WaitForHomingAttained(HANDLE KeyHandle, WORD Nodeld, DWORD Timeout,  
DWORD* pErrorCode)
```

### DESCRIPTION

VCS\_WaitForHomingAttained waits until the homing mode is successfully terminated or until the time has elapsed.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
Timeout	DWORD	Max. wait time [ms] until target reached

### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

## 5.8 Interpolated Position Mode (IPM)

### 5.8.1 VCS\_ActivateInterpolatedPositionMode

#### FUNCTION

BOOL VCS\_ActivateInterpolatedPositionMode(HANDLE KeyHandle, WORD Nodeld, DWORD\* pErrorCode)

#### DESCRIPTION

VCS\_ActivateInterpolatedPositionMode changes the operational mode to “interpolated position mode”.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

#### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

### 5.8.2 VCS\_SetIpmBufferParameter

#### FUNCTION

BOOL VCS\_SetIpmBufferParameter(HANDLE KeyHandle, WORD Nodeld, WORD UnderflowWarningLimit, WORD OverflowWarningLimit, DWORD\* pErrorCode)

#### DESCRIPTION

VCS\_SetIpmBufferParameter sets warning borders of the data input.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
UnderflowWarningLimit	WORD	Gives lower signalization level of the data input FIFO
OverflowWarningLimit	WORD	Gives the higher signalization level of the data input FIFO

#### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

## 5.8.3 VCS\_GetIpmBufferParameter

### FUNCTION

```
BOOL VCS_GetIpmBufferParameter(HANDLE KeyHandle, WORD Nodeld, WORD*
pUnderflowWarningLimit, WORD* pOverflowWarningLimit, DWORD* pMaxBufferSize, DWORD* pErrorcode)
```

### DESCRIPTION

VCS\_GetIpmBufferParameter reads warning borders and the max. buffer size of the data input.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

### RETURN PARAMETERS

pUnderflowWarningLimit	WORD*	Gives lower signalization level of the data input FIFO
pOverflowWarningLimit	WORD*	Gives the higher signalization level of the data input FIFO
pMaxBufferSize	DWORD*	Provides the maximal buffer size
pErrorCode	DWORD*	Error information on the executed function

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

## 5.8.4 VCS\_ClearIpmBuffer

### FUNCTION

```
BOOL VCS_ClearIpmBuffer(HANDLE KeyHandle, WORD Nodeld, DWORD* pErrorCode)
```

### DESCRIPTION

VCS\_ClearIpmBuffer clears the input buffer and enables access to the input buffer for drive functions.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

**5.8.5 VCS\_GetFreelpmBufferSize****FUNCTION**

`BOOL VCS_GetFreelpmBufferSize(HANDLE KeyHandle, WORD NodId, DWORD* pBufferSize, DWORD* pErrorCode)`

**DESCRIPTION**

`VCS_GetFreelpmBufferSize` reads the available buffer size.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device

**RETURN PARAMETERS**

pBufferSize	DWORD*	Actual free buffer size
pErrorCode	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

**5.8.6 VCS\_AddPvtValueToIpmbuffer****FUNCTION**

`BOOL VCS_AddPvtValueToIpmbuffer(HANDLE KeyHandle, WORD NodId, long Position, long Velocity, BYTE Time, DWORD* pErrorCode)`

**DESCRIPTION**

`VCS_AddPvtValueToIpmbuffer` adds a new PVT reference point to the device.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device
Position	long	Position of the reference point
Velocity	long	Velocity of the reference point
Time	BYTE	Time of the reference point

**RETURN PARAMETERS**

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

## 5.8.7 VCS\_StartIpmpTrajectory

### FUNCTION

BOOL VCS\_StartIpmpTrajectory(HANDLE KeyHandle, WORD Nodeld, DWORD\* pErrorCode)

### DESCRIPTION

VCS\_StartIpmpTrajectory starts the IPM trajectory.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

## 5.8.8 VCS\_StopIpmpTrajectory

### FUNCTION

BOOL VCS\_StopIpmpTrajectory(HANDLE KeyHandle, WORD Nodeld, DWORD\* pErrorCode)

### DESCRIPTION

VCS\_StopIpmpTrajectory stops the IPM trajectory.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

**5.8.9 VCS\_GetIpmsStatus****FUNCTION**

```
BOOL VCS_GetIpmsStatus(HANDLE KeyHandle, WORD Nodeld, BOOL* pTrajectoryRunning, BOOL*
plUnderflowWarning, BOOL* plOverflowWarning, BOOL* plVelocityWarning, BOOL*
plAccelerationWarning, BOOL* plUnderflowError, BOOL* plOverflowError, BOOL*
plVelocityError, BOOL* plAccelerationError, DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_GetIpmsStatus returns different warning and error states.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

**RETURN PARAMETERS**

pTrajectoryRunning	BOOL*	State if IPM active
plUnderflowWarning	BOOL*	State if buffer underflow level is reached
plOverflowWarning	BOOL*	State if buffer overflow level is reached
plVelocityWarning	BOOL*	State if IPM velocity greater than profile velocity
plAccelerationWarning	BOOL*	State if IPM acceleration greater than profile acceleration
plUnderflowError	BOOL*	State of underflow error
plOverflowError	BOOL*	State of overflow error
plVelocityError	BOOL*	State if IPM velocity greater than max. profile velocity
plAccelerationError	BOOL*	State if IPM acceleration greater than max. profile acceleration
pErrorCode	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise "0"
---------------------	------	--------------------------------------

## 5.9 Position Mode (PM)

### 5.9.1 VCS\_ActivatePositionMode

#### FUNCTION

BOOL VCS\_ActivatePositionMode(HANDLE KeyHandle, WORD Nodeld, DWORD\* pErrorCode)

#### DESCRIPTION

VCS\_ActivatePositionMode changes the operational mode to “position mode”.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

#### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

### 5.9.2 VCS\_SetPositionMust

#### FUNCTION

BOOL VCS\_SetPositionMust(HANDLE KeyHandle, WORD Nodeld, long PositionMust, DWORD\* pErrorCode)

#### DESCRIPTION

VCS\_SetPositionMust sets the position mode setting value.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
PositionMust	long	Position mode setting value

#### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

**5.9.3 VCS\_GetPositionMust****FUNCTION**

```
BOOL VCS_GetPositionMust(HANDLE KeyHandle, WORD Nodeld, long* pPositionMust, DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_GetPositionMust reads the position mode setting value.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

**RETURN PARAMETERS**

pPositionMust	long*	Position mode setting value
pErrorCode	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise "0"
---------------------	------	--------------------------------------

**5.9.4 Advanced Functions****5.9.4.1 VCS\_ActivateAnalogPositionSetpoint****FUNCTION**

```
BOOL VCS_ActivateAnalogPositionSetpoint(HANDLE KeyHandle, WORD Nodeld, WORD
AnalogInputNumber, float Scaling, long Offset, DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_ActivateAnalogPositionSetpoint configures the selected analog input for analog position setpoint.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
AnalogInputNumber	WORD	Number of the used analog input
Scaling	float	Scaling factor for analog position setpoint functionality
Offset	long	Offset for analog position setpoint functionality

**RETURN PARAMETERS**

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise "0"
---------------------	------	--------------------------------------

## 5.9.4.2 VCS\_DeactivateAnalogPositionSetpoint

### FUNCTION

```
BOOL VCS_DeactivateAnalogPositionSetpoint(HANDLE KeyHandle, WORD NodId, WORD  
AnalogInputNumber, DWORD* pErrorCode)
```

### DESCRIPTION

VCS\_DeactivateAnalogPositionSetpoint disables the selected analog input for analog position setpoint.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device
AnalogInputNumber	WORD	Number of the used analog input

### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

## 5.9.4.3 VCS\_EnableAnalogPositionSetpoint

### FUNCTION

```
BOOL VCS_EnableAnalogPositionSetpoint(HANDLE KeyHandle, WORD NodId, DWORD* pEr-  
rorCode)
```

### DESCRIPTION

VCS\_EnableAnalogPositionSetpoint enables the execution mask for analog position setpoint.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device

### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

**5.9.4.4 VCS\_DisableAnalogPositionSetpoint****FUNCTION**

```
BOOL VCS_DisableAnalogPositionSetpoint(HANDLE KeyHandle, WORD Nodeld, DWORD*  
pErrorCode)
```

**DESCRIPTION**

VCS\_DisableAnalogPositionSetpoint disables the execution mask for analog position setpoint.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

**RETURN PARAMETERS**

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise "0"
---------------------	------	--------------------------------------

## 5.10 Velocity Mode (VM)

### 5.10.1 VCS\_ActivateVelocityMode

#### FUNCTION

BOOL VCS\_ActivateVelocityMode(HANDLE KeyHandle, WORD Nodeld, DWORD\* pErrorCode)

#### DESCRIPTION

VCS\_ActivateVelocityMode changes the operational mode to “velocity mode”.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

#### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

### 5.10.2 VCS\_SetVelocityMust

#### FUNCTION

BOOL VCS\_SetVelocityMust(HANDLE KeyHandle, WORD Nodeld, long VelocityMust, DWORD\* pErrorCode)

#### DESCRIPTION

VCS\_SetVelocityMust sets the velocity mode setting value.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
VelocityMust	long	Velocity mode setting value

#### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

**5.10.3 VCS\_GetVelocityMust****FUNCTION**

```
BOOL VCS_GetVelocityMust(HANDLE KeyHandle, WORD Nodeld, long* pVelocityMust, DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_GetVelocityMust returns the velocity mode setting value.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

**RETURN PARAMETERS**

pVelocityMust	long*	Velocity mode setting value
pErrorCode	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

**5.10.4 Advanced Functions****5.10.4.1 VCS\_ActivateAnalogVelocitySetpoint****FUNCTION**

```
BOOL VCS_ActivateAnalogVelocitySetpoint(HANDLE KeyHandle, WORD Nodeld, WORD
AnalogInputNumber, float Scaling, long Offset, DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_ActivateAnalogVelocitySetpoint configures the selected analog input for analog velocity setpoint.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
AnalogInputNumber	WORD	Number of the used analog input
Scaling	float	Scaling factor for analog velocity setpoint functionality
Offset	long	Offset for analog velocity setpoint functionality

**RETURN PARAMETERS**

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

## 5.10.4.2 VCS\_DeactivateAnalogVelocitySetpoint

### FUNCTION

```
BOOL VCS_DeactivateAnalogVelocitySetpoint(HANDLE KeyHandle, WORD NodId, WORD  
AnalogInputNumber, DWORD* pErrorCode)
```

### DESCRIPTION

VCS\_DeactivateAnalogVelocitySetpoint disables the selected analog input for analog velocity setpoint.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device
AnalogInputNumber	WORD	Number of the used analog input

### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

## 5.10.4.3 VCS\_EnableAnalogVelocitySetpoint

### FUNCTION

```
BOOL VCS_EnableAnalogVelocitySetpoint(HANDLE KeyHandle, WORD NodId, DWORD*  
pErrorCode)
```

### DESCRIPTION

VCS\_EnableAnalogVelocitySetpoint enables the execution mask for analog velocity setpoint.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device

### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

**5.10.4.4 VCS\_DisableAnalogVelocitySetpoint****FUNCTION**

```
BOOL VCS_DisableAnalogVelocitySetpoint(HANDLE KeyHandle, WORD Nodeld, DWORD*  
pErrorCode)
```

**DESCRIPTION**

VCS\_DisableAnalogVelocitySetpoint disables the execution mask for analog velocity setpoint.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

**RETURN PARAMETERS**

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

## 5.11 Current Mode (CM)

### 5.11.1 VCS\_ActivateCurrentMode

#### FUNCTION

BOOL VCS\_ActivateCurrentMode(HANDLE KeyHandle, WORD Nodeld, DWORD\* pErrorCode)

#### DESCRIPTION

VCS\_ActivateCurrentMode changes the operational mode to “current mode”.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

#### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

### 5.11.2 VCS\_GetCurrentMust

#### FUNCTION

BOOL VCS\_GetCurrentMust(HANDLE KeyHandle, WORD Nodeld, short\* pCurrentMust, DWORD\* pErrorCode)

#### DESCRIPTION

VCS\_GetCurrentMust reads the current mode setting value.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

#### RETURN PARAMETERS

pCurrentMust	short*	Current mode setting value
pErrorCode	DWORD*	Error information on the executed function

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

**5.11.3 VCS\_SetCurrentMust****FUNCTION**

BOOL VCS\_SetCurrentMust(HANDLE KeyHandle, WORD Nodeld, short CurrentMust, DWORD\* pErrorCode)

**DESCRIPTION**

VCS\_SetCurrentMust writes current mode setting value.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
CurrentMust	short	Current mode setting value

**RETURN PARAMETERS**

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

**5.11.4 Advanced Functions****5.11.4.1 VCS\_ActivateAnalogCurrentSetpoint****FUNCTION**

BOOL VCS\_ActivateAnalogCurrentSetpoint(HANDLE KeyHandle, WORD Nodeld, WORD AnalogInputNumber, float Scaling, short Offset, DWORD\* pErrorCode)

**DESCRIPTION**

VCS\_ActivateAnalogCurrentSetpoint configures the selected analog input for analog current setpoint.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
AnalogInputNumber	WORD	Number of the used analog input
Scaling	float	Scaling factor for analog current setpoint functionality
Offset	short	Offset for analog current setpoint functionality

**RETURN PARAMETERS**

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

## 5.11.4.2 VCS\_DeactivateAnalogCurrentSetpoint

### FUNCTION

BOOL VCS\_DeactivateAnalogCurrentSetpoint(HANDLE KeyHandle, WORD Nodeld, WORD AnalogInputNumber, DWORD\* pErrorCode)

### DESCRIPTION

VCS\_DeactivateAnalogCurrentSetpoint disables the selected analog input for analog current setpoint.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
AnalogInputNumber	WORD	Number of the used analog input

### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

## 5.11.4.3 VCS\_EnableAnalogCurrentSetpoint

### FUNCTION

BOOL VCS\_EnableAnalogCurrentSetpoint(HANDLE KeyHandle, WORD Nodeld, DWORD\* pErrorCode)

### DESCRIPTION

VCS\_EnableAnalogCurrentSetpoint enables the execution mask for analog current setpoint.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

**5.11.4.4 VCS\_DisableAnalogCurrentSetpoint****FUNCTION**

```
BOOL VCS_DisableAnalogCurrentSetpoint(HANDLE KeyHandle, WORD Nodeld, DWORD*  
pErrorCode)
```

**DESCRIPTION**

VCS\_DisableAnalogCurrentSetpoint disables the execution mask for analog current setpoint.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

**RETURN PARAMETERS**

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise "0"
---------------------	------	--------------------------------------

## 5.12 Master Encoder Mode (MEM)

### 5.12.1 VCS\_ActivateMasterEncoderMode

**FUNCTION**

```
BOOL VCS_ActivateMasterEncoderMode(HANDLE KeyHandle, WORD Nodeld, DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_ActivateMasterEncoderMode changes the operational mode to “master encoder mode”.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

**RETURN PARAMETERS**

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

### 5.12.2 VCS\_SetMasterEncoderParameter

**FUNCTION**

```
BOOL VCS_SetMasterEncoderParameter(HANDLE KeyHandle, WORD Nodeld, WORD ScalingNumerator, WORD ScalingDenominator, BYTE Polarity, DWORD MaxVelocity, DWORD MaxAcceleration, DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_SetMasterEncoderParameter writes all parameters for master encoder mode.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
ScalingNumerator	WORD	Scaling numerator for position calculation
ScalingDenominator	WORD	Scaling denominator for position calculation
Polarity	BYTE	Polarity of the direction input. 0: Positive 1: Negative
MaxVelocity	DWORD	Maximal allowed speed during a profiled move
MaxAcceleration	DWORD	Defines the maximal allowed acceleration

**RETURN PARAMETERS**

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

**5.12.3 VCS\_GetMasterEncoderParameter****FUNCTION**

```
BOOL VCS_GetMasterEncoderParameter(HANDLE KeyHandle, WORD Nodeld, WORD*  
pScalingNumerator, WORD* pScalingDenominator, BYTE* pPolarity, DWORD* pMaxVelocity,  
DWORD* pMaxAcceleration, DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_GetMasterEncoderParameter reads all parameters for master encoder mode.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

**RETURN PARAMETERS**

pScalingNumerator	WORD*	Scaling numerator for position calculation
pScalingDenominator	WORD*	Scaling denominator for position calculation
pPolarity	BYTE*	Polarity of the direction input. 0: Positive 1: Negative
pMaxVelocity	DWORD*	Maximal allowed speed during a profiled move
pMaxAcceleration	DWORD*	Defines the maximal allowed acceleration
pErrorCode	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise "0"
---------------------	------	--------------------------------------

## 5.13 Step Direction Mode (SDM)

### 5.13.1 VCS\_ActivateStepDirectionMode

#### FUNCTION

BOOL VCS\_ActivateStepDirectionMode(HANDLE KeyHandle, WORD Nodeld, DWORD\* pErrorCode)

#### DESCRIPTION

VCS\_ActivateStepDirectionMode changes the operational mode to “step direction mode”.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

#### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

### 5.13.2 VCS\_SetStepDirectionParameter

#### FUNCTION

BOOL VCS\_SetStepDirectionParameter(HANDLE KeyHandle, WORD Nodeld, WORD ScalingNumerator, WORD ScalingDenominator, BYTE Polarity, DWORD MaxVelocity, DWORD MaxAcceleration, DWORD\* pErrorCode)

#### DESCRIPTION

VCS\_SetStepDirectionParameter writes all parameters for step direction mode.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
ScalingNumerator	WORD	Scaling numerator for position calculation
ScalingDenominator	WORD	Scaling denominator for position calculation
Polarity	BYTE	Polarity of the direction input. 0: Positive 1: Negative
MaxVelocity	DWORD	Maximal allowed speed during a profiled move
MaxAcceleration	DWORD	Defines the maximal allowed acceleration

#### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

**5.13.3 VCS\_GetStepDirectionParameter****FUNCTION**

```
BOOL VCS_GetStepDirectionParameter(HANDLE KeyHandle, WORD NodId, WORD*
pScalingNumerator, WORD* pScalingDenominator, BYTE* pPolarity, DWORD* pMaxVelocity,
DWORD* pMaxAcceleration, DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_GetStepDirectionParameter reads all parameters for step direction mode.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device

**RETURN PARAMETERS**

pScalingNumerator	WORD*	Scaling numerator for position calculation
pScalingDenominator	WORD*	Scaling denominator for position calculation
pPolarity	BYTE*	Polarity of the direction input. 0: Positive 1: Negative
pMaxVelocity	DWORD*	Maximal allowed speed during a profiled move
pMaxAcceleration	DWORD*	Defines the maximal allowed acceleration
pErrorCode	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

## 5.14 Inputs & Outputs

For details →separate document «Firmware Specification».

### 5.14.1 VCS\_GetAllDigitalInputs

#### FUNCTION

```
BOOL VCS_GetAllDigitalInputs(HANDLE KeyHandle, WORD Nodeld, WORD* pInputs, DWORD* pErrorCode)
```

#### DESCRIPTION

VCS\_GetAllDigitalInputs returns state of all digital inputs.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

#### RETURN PARAMETERS

pInputs	WORD*	Displays the state of the digital input functionalities. Activated if a bit is read as "1". →Figure 5-20 for "tInputs" structure
pErrorCode	DWORD*	Error information on the executed function

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

```
typedef struct
{
    WORD    DI_NEGATIVE_LIMIT_SWITCH    : 1;      //Bit0
    WORD    DI_POSITIVE_LIMIT_SWITCH   : 1;      //Bit1
    WORD    DI_HOME_SWITCH            : 1;      //Bit2
    WORD    DI_POSITION_MARKER        : 1;      //Bit3
    WORD    DI_DRIVE_ENABLE           : 1;      //Bit4
    WORD    DI_QUICK_STOP             : 1;      //Bit5
    WORD    DI_TOUCH_PROBE1          : 1;      //Bit6
    WORD    DI_NOT_USED               : 1;      //Bit7
    WORD    DI_GENERAL_PURPOSE_H     : 1;      //Bit8
    WORD    DI_GENERAL_PURPOSE_G     : 1;      //Bit9
    WORD    DI_GENERAL_PURPOSE_F     : 1;      //Bit10
    WORD   DI_GENERAL_PURPOSE_E      : 1;      //Bit11
    WORD   DI_GENERAL_PURPOSE_D      : 1;      //Bit12
    WORD   DI_GENERAL_PURPOSE_C      : 1;      //Bit13
    WORD   DI_GENERAL_PURPOSE_B      : 1;      //Bit14
    WORD   DI_GENERAL_PURPOSE_A      : 1;      //Bit15
} tInputs;
```

Figure 5-20 VCS\_GetAllDigitalInputs (tInputs)

**5.14.2 VCS\_GetAllDigitalOutputs****FUNCTION**

```
BOOL VCS_GetAllDigitalOutputs(HANDLE KeyHandle, WORD Nodeld, WORD* pOutputs, DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_GetAllDigitalOutputs returns state of all digital outputs.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

**RETURN PARAMETERS**

pOutputs	WORD*	State of all digital outputs. Activated if a bit is read as "1". →Figure 5-21 for "tOutputs" structure
pErrorCode	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise "0"
---------------------	------	--------------------------------------

```
typedef struct
{
    WORD    DO_READY_FAULT           : 1;      //Bit0
    WORD    DO_POSITION_COMPARE     : 1;      //Bit1
    WORD    DO_HOLDING_BRAKE        : 1;      //Bit2
    WORD    DO_NOT_USED1            : 1;      //Bit3
    WORD    DO_NOT_USED2            : 1;      //Bit4
    WORD    DO_NOT_USED3            : 1;      //Bit5
    WORD    DO_NOT_USED4            : 1;      //Bit6
    WORD    DO_SET_BRAKE           : 1;      //Bit7
    WORD    DO_GENERAL_PURPOSE_H   : 1;      //Bit8
    WORD    DO_GENERAL_PURPOSE_G   : 1;      //Bit9
    WORD    DO_GENERAL_PURPOSE_F   : 1;      //Bit10
    WORD   DO_GENERAL_PURPOSE_E    : 1;      //Bit11
    WORD   DO_GENERAL_PURPOSE_D    : 1;      //Bit12
    WORD   DO_GENERAL_PURPOSE_C    : 1;      //Bit13
    WORD   DO_GENERAL_PURPOSE_B    : 1;      //Bit14
    WORD   DO_GENERAL_PURPOSE_A    : 1;      //Bit15
} tOutputs;
```

Figure 5-21 VCS\_GetAllDigitalOutputs (tOutputs)

### 5.14.3 VCS\_SetAllDigitalOutputs

#### FUNCTION

```
BOOL VCS_SetAllDigitalOutputs(HANDLE KeyHandle, WORD Nodeld, WORD Outputs, DWORD* pErrorCode)
```

#### DESCRIPTION

VCS\_SetAllDigitalOutputs sets the state of all digital outputs.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
Outputs	WORD	State of all digital outputs. Activated if a bit is written as "1". →Figure 5-22 for "tOutputs" structure

#### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

```
typedef struct
{
    WORD    DO_READY_FAULT           : 1;      //Bit0 (ReadOnly)
    WORD    DO_POSITION_COMPARE     : 1;      //Bit1 (ReadOnly)
    WORD    DO_HOLDING_BRAKE        : 1;      //Bit2 (ReadOnly)
    WORD    DO_NOT_USED1            : 1;      //Bit3
    WORD    DO_NOT_USED2            : 1;      //Bit4
    WORD    DO_NOT_USED3            : 1;      //Bit5
    WORD    DO_NOT_USED4            : 1;      //Bit6
    WORD    DO_SET_BRAKE           : 1;      //Bit7
    WORD    DO_GENERAL_PURPOSE_H   : 1;      //Bit8
    WORD    DO_GENERAL_PURPOSE_G   : 1;      //Bit9
    WORD    DO_GENERAL_PURPOSE_F   : 1;      //Bit10
    WORD   DO_GENERAL_PURPOSE_E    : 1;      //Bit11
    WORD   DO_GENERAL_PURPOSE_D    : 1;      //Bit12
    WORD   DO_GENERAL_PURPOSE_C    : 1;      //Bit13
    WORD   DO_GENERAL_PURPOSE_B    : 1;      //Bit14
    WORD   DO_GENERAL_PURPOSE_A    : 1;      //Bit15
} tOutputs;
```

Figure 5-22 VCS\_SetAllDigitalOutputs (tOutputs)

**5.14.4 VCS\_GetAnalogInput****FUNCTION**

```
BOOL VCS_GetAnalogInput(HANDLE KeyHandle, WORD NodId, WORD InputNumber, WORD*
pAnalogValue, DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_GetAnalogInput returns the value from an analog input.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device
InputNumber	WORD	Analog input number

**RETURN PARAMETERS**

pAnalogValue	WORD*	Analog value from input
pErrorCode	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise "0"
---------------------	------	--------------------------------------

**5.14.5 VCS\_SetAnalogOutput****FUNCTION**

```
BOOL VCS_SetAnalogOutput(HANDLE KeyHandle, WORD NodId, WORD OutputNumber, WORD
AnalogValue, DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_SetAnalogOutput sets the voltage level of an analog output.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device
OutputNumber	WORD	Analog output number
AnalogValue	WORD	Analog value for output

**RETURN PARAMETERS**

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise "0"
---------------------	------	--------------------------------------

## 5.14.6 Position Compare

### 5.14.6.1 VCS\_SetPositionCompareParameter

#### FUNCTION

BOOL VCS\_SetPositionCompareParameter(HANDLE KeyHandle, WORD Nodeld, BYTE OperationalMode, BYTE IntervalMode, BYTE DirectionDependency, WORD IntervalWidth, WORD IntervalRepetitions, WORD PulseWidth, DWORD\* pErrorCode)

#### DESCRIPTION

VCS\_SetPositionCompareParameter writes all parameters for position compare.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
OperationalMode	BYTE	Used operational mode in position sequence mode (→Table 5-15)
IntervalMode	BYTE	Used interval mode in position sequence mode (→Table 5-16)
DirectionDependency	BYTE	Used direction dependency in position sequence mode (→Table 5-17)
IntervalWidth	WORD	Holds the width of the position intervals
IntervalRepetitions	WORD	Allows to configure the number of position intervals to be considered by position compare
PulseWidth	WORD	Configures the pulse width of the trigger output

#### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

#### OPERATIONAL MODE

Description	Value	Name
Single position mode	0	PCO_SINGLE_POSITION_MODE
Position sequence mode	1	PCO_POSITION_SEQUENCE_MODE

Table 5-15 Position compare – Operational modes

**INTERVAL MODE**

Description	Value	Name
Interval positions are set in negative direction relative to the position compare reference position	0	PCI_NEGATIVE_DIR_TO_REFPOS
Interval positions are set in positive direction relative to the position compare reference position	1	PCI_POSITIVE_DIR_TO_REFPOS
Interval positions are set in positive and negative direction relative to the position compare reference position	2	PCI_BOTH_DIR_TO_REFPOS

Table 5-16 Position compare – Interval modes

**DIRECTION DEPENDENCY**

Description	Value	Name
Positions are compared only if actual motor direction is negative	0	PCD_MOTOR_DIRECTION_NEGATIVE
Positions are compared only if actual motor direction is positive	1	PCD_MOTOR_DIRECTION_POSITIVE
Positions are compared regardless of the actual motor direction	2	PCD_MOTOR_DIRECTION_BOTH

Table 5-17 Position compare – Direction dependency

## 5.14.6.2 VCS\_GetPositionCompareParameter

### FUNCTION

```
BOOL VCS_GetPositionCompareParameter(HANDLE KeyHandle, WORD NodId, BYTE* pOperationalMode, BYTE* pIntervalMode, BYTE* pDirectionDependency, WORD* pIntervalWidth, WORD* pIntervalRepetitions, WORD* pPulseWidth, DWORD* pErrorCode)
```

### DESCRIPTION

VCS\_GetPositionCompareParameter reads all parameters for position compare.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device

### RETURN PARAMETERS

pOperationalMode	BYTE*	Used operational mode in position sequence mode (→Table 5-15)
pIntervalMode	BYTE*	Used interval mode in position sequence mode (→Table 5-16)
pDirectionDependency	BYTE*	Used direction dependency in position sequence mode (→Table 5-17)
pIntervalWidth	WORD*	Holds the width of the position intervals
pIntervalRepetitions	WORD*	Allows to configure the number of position intervals to be considered by position compare
pPulseWidth	WORD*	Configures the pulse width of the trigger output
pErrorCode	DWORD*	Error information on the executed function

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

## 5.14.6.3 VCS\_ActivatePositionCompare

### FUNCTION

```
BOOL VCS_ActivatePositionCompare(HANDLE KeyHandle, WORD NodId, WORD DigitalOutputNumber, BOOL Polarity, DWORD* pErrorCode)
```

### DESCRIPTION

VCS\_ActivatePositionCompare enables the output to position compare method.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device
DigitalOutputNumber	WORD	Selected digital output for position compare
Polarity	BOOL	Polarity of the selected output

### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

**5.14.6.4 VCS\_DeactivatePositionCompare****FUNCTION**

```
BOOL VCS_DeactivatePositionCompare(HANDLE KeyHandle, WORD NodId, WORD
DigitalOutputNumber, DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_DeactivatePositionCompare disables the output to position compare method.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device
DigitalOutputNumber	WORD	Selected digital output for position compare

**RETURN PARAMETERS**

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise "0"
---------------------	------	--------------------------------------

**5.14.6.5 VCS\_EnablePositionCompare****FUNCTION**

```
BOOL VCS_EnablePositionCompare(HANDLE KeyHandle, WORD NodId, DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_EnablePositionCompare enables the output mask for position compare method.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device

**RETURN PARAMETERS**

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise "0"
---------------------	------	--------------------------------------

## 5.14.6.6 VCS\_DisablePositionCompare

### FUNCTION

BOOL VCS\_DisablePositionCompare(HANDLE KeyHandle, WORD Nodeld, DWORD\* pErrorCode)

### DESCRIPTION

VCS\_DisablePositionCompare disables the output mask from position compare method.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

## 5.14.6.7 VCS\_SetPositionCompareReferencePosition

### FUNCTION

BOOL VCS\_SetPositionCompareReferencePosition(HANDLE KeyHandle, WORD Nodeld, long ReferencePosition, DWORD\* pErrorCode)

### DESCRIPTION

VCS\_SetPositionCompareReferencePosition writes the reference position for position compare method.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
ReferencePosition	long	Holds the position that is compared with the position actual value

### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

**5.14.7 Position Marker****5.14.7.1 VCS\_SetPositionMarkerParameter****FUNCTION**

```
BOOL VCS_SetPositionMarkerParameter(HANDLE KeyHandle, WORD Nodeld, BYTE
PositionMarkerEdgeType, BYTE PositionMarkerMode, DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_SetPositionMarkerParameter writes all parameters for position marker method.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
PositionMarkerEdgeType	BYTE	Defines the type of edge of the position to be captured (→Table 5-18)
PositionMarkerMode	BYTE	Defines the position marker capturing mode (→Table 5-19)

**RETURN PARAMETERS**

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

**POSITIONMARKEREDGE TYPE**

Description	Value	Name
Both edges	0	PET_BOTH_EDGES
Rising edge	1	PET_RISING_EDGE
Falling edge	2	PET_FALLING_EDGE

Table 5-18 Position marker edge types

**POSITIONMARKER MODE**

Description	Value	Name
Continuous	0	PM_CONTINUOUS
Single	1	PM_SINGLE
Multiple	2	PM_MULTIPLE

Table 5-19 Position marker modes

## 5.14.7.2 VCS\_GetPositionMarkerParameter

### FUNCTION

```
BOOL VCS_GetPositionMarkerParameter(HANDLE KeyHandle, WORD Nodeld, BYTE*  
pPositionMarkerEdgeType, BYTE* pPositionMarkerMode, DWORD* pErrorCode)
```

### DESCRIPTION

VCS\_GetPositionMarkerParameter reads all parameters for position marker method.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

### RETURN PARAMETERS

pPositionMarkerEdge Type	BYTE*	Defines the type of edge of the position to be captured (→Table 5-18)
pPositionMarkerMode	BYTE*	Defines the position marker capturing mode (→Table 5-19)
pErrorCode	DWORD*	Error information on the executed function

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

## 5.14.7.3 VCS\_ActivatePositionMarker

### FUNCTION

```
BOOL VCS_ActivatePositionMarker(HANDLE KeyHandle, WORD Nodeld, WORD DigitalInputNumber,  
BOOL Polarity, DWORD* pErrorCode)
```

### DESCRIPTION

VCS\_ActivatePositionMarker enables the digital input to position marker method.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
DigitalInputNumber	WORD	Selected digital input for position marker
Polarity	BOOL	Polarity of the selected input

### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

**5.14.7.4 VCS\_DeactivatePositionMarker****FUNCTION**

```
BOOL VCS_DeactivatePositionMarker(HANDLE KeyHandle, WORD Nodeld, WORD
DigitalInputNumber, DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_DeactivatePositionMarker disables the digital input to position marker method.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
DigitalInputNumber	WORD	Selected digital input for position marker

**RETURN PARAMETERS**

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

**5.14.7.5 VCS\_ReadPositionMarkerCounter****FUNCTION**

```
BOOL VCS_ReadPositionMarkerCounter(HANDLE KeyHandle, WORD Nodeld, WORD* pCount,
DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_ReadPositionMarkerCounter returns the number of the detected edges.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

**RETURN PARAMETERS**

pCount	WORD*	Counts the number of detected edges
pErrorCode	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

## 5.14.7.6 VCS\_ReadPositionMarkerCapturedPosition

### FUNCTION

```
BOOL VCS_ReadPositionMarkerCapturedPosition(HANDLE KeyHandle, WORD NodId, WORD CounterIndex, long* pCapturedPosition, DWORD* pErrorCode)
```

### DESCRIPTION

VCS\_ReadPositionMarkerCapturedPosition returns the last captured position or the position from the position marker history.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device
CounterIndex	WORD	0: Read position marker captured position
		1: Read position marker history
		2: Read position marker history

### RETURN PARAMETERS

pCapturedPosition	long*	Contains the captured position or the position marker history
pErrorCode	DWORD*	Error information on the executed function

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

## 5.14.7.7 VCS\_ResetPositionMarkerCounter

### FUNCTION

```
BOOL VCS_ResetPositionMarkerCounter(HANDLE KeyHandle, WORD NodId, DWORD* pErrorCode)
```

### DESCRIPTION

VCS\_ResetPositionMarkerCounter clears the counter and the captured positions by writing zero to object position marker counter (0x2074-04).

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device

### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

## 6 Data Recording Functions



### Availability of functions

The availability of certain functions depends on the used hardware. For an overview → “Appendix A — Hardware vs. Functions” on page 11-157.

Data recording functions are not available with Linux.

### 6.1 Operation Mode

#### 6.1.1 VCS\_SetRecorderParameter

##### FUNCTION

BOOL VCS\_SetRecorderParameter(HANDLE KeyHandle, WORD NodId, WORD SamplingPeriod,  
WORD NbOfPrecedingSamples, DWORD\* pErrorCode)

##### DESCRIPTION

VCS\_SetRecorderParameter writes parameters for data recorder.

##### PARAMETERS

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device
SamplingPeriod	WORD	Sampling Period as a multiple of the current regulator cycle (n-times 0.1 ms)
NbOfPrecedingSamples	WORD	Number of preceding samples (data history)

##### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

#### 6.1.2 VCS\_GetRecorderParameter

##### FUNCTION

BOOL VCS\_GetRecorderParameter(HANDLE KeyHandle, WORD NodId, WORD\* pSamplingPeriod,  
WORD\* pNbOfPrecedingSamples, DWORD\* pErrorCode)

##### DESCRIPTION

VCS\_GetRecorderParameter reads parameters for data recorder.

##### PARAMETERS

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device

##### RETURN PARAMETERS

pSamplingPeriod	WORD*	Sampling Period as a multiple of the current regulator cycle (n-times 0.1 ms)
pNbOfPrecedingSamples	WORD*	Number of preceding samples (data history)
pErrorCode	DWORD*	Error information on the executed function

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

### 6.1.3 VCS\_EnableTrigger

#### FUNCTION

```
BOOL VCS_EnableTrigger(HANDLE KeyHandle, WORD Nodeld, BYTE TriggerType, DWORD* pErrorCode)
```

#### DESCRIPTION

VCS\_EnableTrigger connects the trigger(s) for data recording.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
TriggerType	BYTE	Configuration of Auto Trigger functions. Activated if a bit is written as "1" (→Table 6-20). Activation of more than one trigger at the same time is possible.

#### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

Description	Value	Name
Trigger movement start	1	DR_MOVEMENT_START_TRIGGER
Error trigger	2	DR_ERROR_TRIGGER
Digital input trigger	4	DR_DIGITAL_INPUT_TRIGGER
Trigger movement end	8	DR_MOVEMENT_END_TRIGGER

Table 6-20 Data recorder trigger types

### 6.1.4 VCS\_DisableAllTriggers

#### FUNCTION

```
BOOL VCS_DisableAllTriggers(HANDLE KeyHandle, WORD Nodeld, DWORD* pErrorCode)
```

#### DESCRIPTION

VCS\_DisableAllTriggers sets data recorder configuration for triggers to zero.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

#### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

**6.1.5 VCS\_ActivateChannel****FUNCTION**

`BOOL VCS_ActivateChannel(HANDLE KeyHandle, WORD Nodeld, BYTE ChannelNumber, WORD ObjectIndex, BYTE ObjectSubIndex, BYTE ObjectSize, DWORD* pErrorCode)`

**DESCRIPTION**

VCS\_ActivateChannel connects object for data recording.

Start with channel 1 (one)! Then, for every activated channel, the number of sampling variables will be incremented.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
ChannelNumber	BYTE	Channel number [1...4]
ObjectIndex	WORD	Object index for data recording
ObjectSubIndex	BYTE	Object subindex for data recording
ObjectSize	BYTE	Object size in bytes for data recording

**RETURN PARAMETERS**

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

**6.1.6 VCS\_DeactivateAllChannels****FUNCTION**

`BOOL VCS_DeactivateAllChannels(HANDLE KeyHandle, WORD Nodeld, DWORD* pErrorCode)`

**DESCRIPTION**

VCS\_DeactivateAllChannels zeros all data recording objects.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

**RETURN PARAMETERS**

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

## 6.2 Data Recorder Status

### 6.2.1 VCS\_StartRecorder

#### FUNCTION

BOOL VCS\_StartRecorder(HANDLE KeyHandle, WORD Nodeld, DWORD\* pErrorCode)

#### DESCRIPTION

VCS\_StartRecorder starts data recording. Not available with Linux.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

#### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise "0"
---------------------	------	--------------------------------------

### 6.2.2 VCS\_StopRecorder

#### FUNCTION

BOOL VCS\_StopRecorder(HANDLE KeyHandle, WORD Nodeld, DWORD\* pErrorCode)

#### DESCRIPTION

VCS\_StopRecorder stops data recording. Not available with Linux.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

#### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise "0"
---------------------	------	--------------------------------------

**6.2.3 VCS\_ForceTrigger****FUNCTION**

```
BOOL VCS_ForceTrigger(HANDLE KeyHandle, WORD NodId, DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_ForceTrigger forces the data recording triggers. Not available with Linux.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device

**RETURN PARAMETERS**

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise "0"
---------------------	------	--------------------------------------

**6.2.4 VCS\_IsRecorderRunning****FUNCTION**

```
BOOL VCS_IsRecorderRunning(HANDLE KeyHandle, WORD NodId, BOOL* pRunning, DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_IsRecorderRunning returns the data recorder status "running". Not available with Linux.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
NodId	WORD	Node ID of the addressed device

**RETURN PARAMETERS**

pRunning	BOOL	1: Data recorder running 0: Data recorder stopped
pErrorCode	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise "0"
---------------------	------	--------------------------------------

## 6.2.5 VCS\_IsRecorderTriggered

### FUNCTION

```
BOOL VCS_IsRecorderTriggered(HANDLE KeyHandle, WORD Nodeld, BOOL* pTriggered, DWORD*  
pErrorCode)
```

### DESCRIPTION

VCS\_IsRecorderTriggered returns data recorder status “triggered”. Not available with Linux.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

### RETURN PARAMETERS

pTriggered	BOOL*	1: Data recorder triggered 0: Data recorder not triggered
pErrorCode	DWORD*	Error information on the executed function

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

## 6.3 Data Recorder Data

### 6.3.1 VCS\_ReadChannelVectorSize

**FUNCTION**

```
BOOL VCS_ReadChannelVectorSize(HANDLE KeyHandle, WORD Nodeld, DWORD* pVectorSize,
                               DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_ReadChannelVectorSize returns the maximal number of samples per variable. It is dynamically calculated by the data recorder. Not available with Linux.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

**RETURN PARAMETERS**

pVectorSize	DWORD*	Maximal number of samples per variable
pErrorCode	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

### 6.3.2 VCS\_ReadVCS\_ChannelDataVector

**FUNCTION**

```
BOOL VCS_ReadChannelDataVector(HANDLE KeyHandle, WORD Nodeld, BYTE ChannelNumber,
                               BYTE* pDataVector, DWORD VectorSize, DWORD* pErrorCode)
```

**DESCRIPTION**

VCS\_ReadChannelDataVector returns the data points of a selected channel. Not available with Linux.

**PARAMETERS**

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
ChannelNumber	BYTE	Selected channel
VectorSize	DWORD	Size of data points

**RETURN PARAMETERS**

pDataVector	BYTE*	Data points of selected channel
pErrorCode	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

### 6.3.3 VCS\_ShowChannelDataDlg

#### FUNCTION

BOOL VCS\_ShowChannelDataDlg(HANDLE KeyHandle, WORD Nodeld, DWORD\* pErrorCode)

#### DESCRIPTION

VCS\_ShowChannelDataDlg opens the dialog to show the data channel(s). Not available with Linux.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device

#### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

### 6.3.4 VCS\_ExportChannelDataToFile

#### FUNCTION

BOOL VCS\_ExportChannelDataToFile(HANDLE KeyHandle, WORD Nodeld, char\* FileName, DWORD\* pErrorCode)

#### DESCRIPTION

VCS\_ExportChannelDataToFile saves the data point in a file. Not available with Linux.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
FileName	char*	Path and file name to save data points (*.csv, *.txt, *.rda)

#### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

## 6.4 Advanced Functions

### 6.4.1 VCS\_ReadDataBuffer

#### FUNCTION

```
BOOL VCS_ReadDataBuffer(HANDLE KeyHandle, WORD Nodeld, BYTE* pDataBuffer, DWORD
BufferSizeToRead, DWORD* pBufferSizeRead, WORD* pVectorStartOffset, WORD*
pMaxNbOfSamples, WORD* pNbOfRecordedSamples, DWORD* pErrorCode)
```

#### DESCRIPTION

VCS\_ReadDataBuffer returns the buffer data points.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
BufferSizeToRead	DWORD	Buffer size

#### RETURN PARAMETERS

pDataBuffer	BYTE*	Data points
pBufferSizeRead	DWORD*	Size of read data buffer
pVectorStartOffset	WORD*	Offset to the start of the recorded data vector within the ring buffer
pMaxNbOfSamples	WORD*	Maximal number of samples per variable
pNbOfRecordedSamples	WORD*	Number of recorded samples
pErrorCode	DWORD*	Error information on the executed function

Return Value	BOOL	Nonzero if successful; otherwise "0"
--------------	------	--------------------------------------

## 6.4.2 VCS\_ExtractChannelDataVector

### FUNCTION

```
BOOL VCS_ExtractChannelDataVector(HANDLE KeyHandle, WORD Nodeld, BYTE
ChannelNumber, BYTE* pDataBuffer, DWORD BufferSize, BYTE* pDataVector, DWORD VectorSize,
WORD VectorStartOffset, WORD MaxNbOfSamples, WORD NbOfRecordedSamples, DWORD*
pErrorCode)
```

### DESCRIPTION

VCS\_ExtractChannelDataVector returns the vector of a data channel.

### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	Node ID of the addressed device
ChannelNumber	BYTE	Selected channel
pDataBuffer	BYTE*	Data points
BufferSize	DWORD	Buffer size
VectorSize	DWORD	Vector size
VectorStartOffset	WORD	Offset to the start of the recorded data vector within the ring buffer
MaxNbOfSamples	WORD	Maximal number of samples per variable
NbOfRecordedSamples	WORD	Number of recorded samples

### RETURN PARAMETERS

pDataVector	BYTE*	Data points of the channel
pErrorCode	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise “0”
---------------------	------	--------------------------------------

## 7 Low Layer Functions



### Availability of functions

The availability of certain functions depends on the used hardware. For an overview → “Appendix A — Hardware vs. Functions” on page 11-157.

## 7.1 CAN Layer

### 7.1.1 VCS\_SendCANFrame

#### FUNCTION

`BOOL VCS_SendCANFrame(HANDLE KeyHandle, WORD CobID, WORD Length, void* pData, DWORD* pErrorCode)`

#### DESCRIPTION

`VCS_SendCANFrame` sends a general CAN frame to the CAN bus.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
CobID	WORD	CAN frame 11-bit identifier
Length	WORD	CAN frame data length
pData	void*	CAN frame data

#### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

### 7.1.2 VCS\_ReadCANFrame

#### FUNCTION

`BOOL VCS_ReadCANFrame(HANDLE KeyHandle, WORD CobID, WORD Length, void* pData, DWORD Timeout , DWORD* p ErrorCode)`

#### DESCRIPTION

`VCS_ReadCANFrame` reads a general CAN frame from the CAN bus.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
CobID	WORD	CAN frame 11-bit identifier
Length	WORD	CAN frame data length
Timeout	WORD	Maximum waiting period

#### RETURN PARAMETERS

pData	void*	CAN frame data
pErrorCode	DWORD*	Error information on the executed function

Return Value	BOOL	Nonzero if successful; otherwise “0”
--------------	------	--------------------------------------

### 7.1.3 VCS\_RequestCANFrame

#### FUNCTION

```
BOOL VCS_RequestCANFrame(HANDLE KeyHandle, WORD CobID, WORD Length, void* pData,
DWORD* pErrorCode)
```

#### DESCRIPTION

VCS\_RequestCANFrame requests a general CAN frame from the CAN bus using Remote Transmit Request (RTR).

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
CobID	WORD	CAN frame 11-bit identifier
Length	WORD	CAN frame data length

#### RETURN PARAMETERS

pData	void*	CAN frame data
pErrorCode	DWORD*	Error information on the executed function

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise "0"
---------------------	------	--------------------------------------

### 7.1.4 VCS\_SendNMTService

#### FUNCTION

```
BOOL VCS_SendNMTService(HANDLE KeyHandle, WORD Nodeld, WORD CommandSpecifier,
DWORD* pErrorCode)
```

#### DESCRIPTION

VCS\_SendNMTService is used to send a NMT protocol from a master to one slave/all slaves in a network. Command is without acknowledge.

#### PARAMETERS

KeyHandle	HANDLE	Handle for port access
Nodeld	WORD	1...127: NMT slave with given Node ID 0: All NMT slaves
CommandSpecifier	WORD	NMT service (→Table 7-21)

#### RETURN PARAMETERS

pErrorCode	DWORD*	Error information on the executed function
------------	--------	--

<b>Return Value</b>	BOOL	Nonzero if successful; otherwise "0"
---------------------	------	--------------------------------------

Description	Value	Name
Start remote node	1	NCS_START_REMOTE_NODE
Stop remote node	2	NCS_STOP_REMOTE_NODE
Enter pre-operational	128	NCS_ENTER_PRE_OPERATIONAL
Reset node	129	NCS_RESET_NODE
Reset communication	130	NCS_RESET_COMMUNICATION

Table 7-21      Command specifier

## 8 Error Overview

### 8.1 Communication Errors

Abort Code	Name	Error Cause
0x0000 0000	No error	Communication was successful
0x0503 0000	Toggle error	Toggle bit not alternated
0x0504 0000	SDO timeout	SDO protocol timed out
0x0504 0001	Client/server specifier error	Client/server command specifier not valid or unknown
0x0504 0002	Invalid block size	Invalid block size (block mode only)
0x0504 0003	Invalid sequence	Invalid sequence number (block mode only)
0x0504 0004	CRC error	CRC error (block mode only)
0x0504 0005	Out of memory error	Out of memory
0x0601 0000	Access error	Unsupported access to an object (e.g. write command to a read-only object)
0x0601 0001	Write only	Read command to a write only object
0x0601 0002	Read only	Write command to a read only object
0x0602 0000	Object does not exist	Last read or write command had a wrong object index or subindex
0x0604 0041	PDO mapping error	Object cannot be mapped to PDO
0x0604 0042	PDO length error	Number and length of objects to be mapped would exceed PDO length
0x0604 0043	General parameter error	General parameter incompatibility
0x0604 0047	General internal Incompatibility error	General internal incompatibility in device
0x0606 0000	Hardware error	Access failed due to a hardware error
0x0607 0010	Service parameter error	Data type does not match, length or service parameter does not match
0x0607 0012	Service parameter too high	Data type does not match, length or service parameter too high
0x0607 0013	Service Parameter too low	Data type does not match, length or service parameter too low
0x0609 0011	Object subindex error	Last read or write command had a wrong subindex
0x0609 0030	Value range error	Value range of parameter exceeded
0x0609 0031	Value too high	Value of parameter written too high
0x0609 0032	Value too low	Value of parameter written too low
0x0609 0036	Maximum less minimum error	Maximum value is less than minimum value
0x0800 0000	General error	General error
0x0800 0020	Transfer or store error	Data cannot be transferred or stored
0x0800 0021	Local control error	Data cannot be transferred or stored to application because of local control
0x0800 0022	Wrong device state	Data cannot be transferred or stored to application because of present device state
0x0F00 FFB9	CAN ID error	Wrong CAN ID
0x0F00 FFBC	Service mode error	Device is not in service mode
0x0F00 FFBE	Password error	Password is wrong
0x0F00 FFBF	Illegal command	RS232 command is illegal (does not exist)
0x0F00 FFC0	Wrong NMT state	Device is in wrong NMT state

Table 8-22 Communication errors

## 8.2 Library Errors

### 8.2.1 General Errors

Abort Code	Name	Error Cause
0x0000 0000	No error	Communication was successful
0x1000 0001	Internal error	Internal error
0x1000 0002	Null pointer	Null pointer passed to function
0x1000 0003	Handle not valid	Handle passed to function is not valid
0x1000 0004	Bad virtual device name	Virtual device name is not valid
0x1000 0005	Bad device name	Device name is not valid
0x1000 0006	Bad protocol stack name	Protocol stack name is not valid
0x1000 0007	Bad interface name	Interface name is not valid
0x1000 0008	Bad port name	Port is not valid
0x1000 0009	Library not loaded	Could not load external library
0x1000 000A	Command failed	Error while executing command
0x1000 000B	Timeout	Timeout occurred during execution
0x1000 000C	Bad parameter	Bad parameter passed to function
0x1000 000D	Command aborted by user	Command was aborted by user
0x1000 000E	Buffer too small	Buffer is too small
0x1000 000F	No communication found	No communication settings found
0x1000 0010	Function not supported	Function is not supported
0x1000 0011	Parameter already used	Parameter is already in use
0x1000 0013	Bad device handle	Bad device handle
0x1000 0014	Bad protocol stack handle	Bad protocol stack handle
0x1000 0015	Bad interface handle	Bad interface handle
0x1000 0016	Bad port handle	Bad port handle
0x1000 0017	Address parameters are not correct	Address parameters are not correct
0x1000 0020	Bad device state	Bad device state
0x1000 0021	Bad file content	Bad file content
0x1000 0022	Path does not exist	System cannot find specified path
0x1000 0024	Cross thread error	(.NET only) Open device and close device called from different threads
0x1000 0026	Gateway support error	Gateway is not supported
0x1000 0027	Serial number update error	Serial number update failed
0x1000 0028	Communication interface error	Communication interface is not supported
0x1000 0029	Firmware support error	Firmware version does not support functionality
0x1000 002A	Firmware file hardware error	Firmware file does not match hardware version
0x1000 002B	Firmware file error	Firmware file does not match or is corrupt

Table 8-23 General errors

### 8.2.2 Interface Layer Errors

Abort Code	Name	Error Cause
0x2000 0001	Opening interface error	Error while opening interface
0x2000 0002	Closing Interface error	Error while closing interface
0x2000 0003	Interface is not open	Interface is not open
0x2000 0004	Opening port error	Error while opening port
0x2000 0005	Closing port error	Error while closing port
0x2000 0006	Port is not open	Port is not open
0x2000 0007	Resetting port error	Error while resetting port
0x2000 0008	Configuring port settings error	Error while configuring port settings
0x2000 0009	Configuring port mode error	Error while configuring port mode

Table 8-24 Interface layer errors

#### 8.2.2.1 Interface Layer “RS232” Errors

Abort Code	Name	Error Cause
0x2100 0001	RS232 write data error	Error while writing RS232 data
0x2100 0002	RS232 read data error	Error while reading RS232 data

Table 8-25 Interface layer “RS232” errors

#### 8.2.2.2 Interface Layer “CAN” Errors

Abort Code	Name	Error Cause
0x2200 0001	CAN receive frame error	Error while receiving CAN frame
0x2200 0002	CAN transmit frame error	Error while transmitting CAN frame

Table 8-26 Interface layer “CAN” errors

#### 8.2.2.3 Interface Layer “USB” Errors

Abort Code	Name	Error Cause
0x2300 0001	USB write data error	Error while writing data
0x2300 0002	USB read data error	Error while reading data

Table 8-27 Interface layer “USB” errors

#### 8.2.2.4 Interface Layer “HID” Errors

Abort Code	Name	Error Cause
0x2400 0001	HID write data error	Error while writing USB data to HID device
0x2400 0002	HID read data error	Error while reading USB data from HID device

Table 8-28 Interface layer “HID” errors

## 8.2.3 Protocol Layer Errors

### 8.2.3.1 Protocol Layer “MAXON\_RS232” Errors

Abort Code	Name	Error Cause
0x3100 0001	Negative acknowledge received	Negative acknowledge received
0x3100 0002	Bad CRC received	Bad checksum received
0x3100 0003	Bad data received	Bad data size received

Table 8-29 Protocol layer “MAXON\_RS232” errors

### 8.2.3.2 Protocol Layer “CANopen” Errors

Abort Code	Name	Error Cause
0x3200 0001	SDO response not received	CAN frame of SDO protocol not received
0x3200 0002	Requested CAN frame not received	Requested CAN frame not received
0x3200 0003	CAN frame not received	CAN frame not received

Table 8-30 Protocol layer “CANopen” errors

### 8.2.3.3 Protocol Layer “Maxon Serial V2” Errors

Abort Code	Name	Error Cause
0x3400 0001	Stuffing error	Failure while stuffing data
0x3400 0002	Destuffing error	Failure while destuffing data
0x3400 0003	Bad CRC received	Bad CRC received
0x3400 0004	Bad data size received	Bad data size received
0x3400 0005	Bad data size written	Bad data size written
0x3400 0006	Serial data frame not written	Failure occurred while writing data
0x3400 0007	Serial data frame not received	Failure occurred while reading data

Table 8-31 Protocol layer “Maxon Serial V2” errors

### 8.2.3.4 Device Layer Errors

Abort Code	Name	Error Cause
0x5100 0001	Bad data size received	Object data size does not correspond to requested data size
0x5100 0007	Sensor configuration not supported	Sensor configuration cannot be written to controller
0x5100 0008	Sensor configuration unknown	Sensor configuration read from controller is not supported by library
0x5100 0009	Configuration not supported	Configuration is not supported
0x5100 000A	Digital input mask not supported	Digital input mask is not supported

Table 8-32 Device layer errors

## 9 Supported Operating Systems

Consider this chapter as a "How To" on the integration of the library into your programming environment.

The «EPOS Command Library» is an implementation of protocols to communicate between an EPOS Positioning Controller and a PC running a Windows or Linux 32-bit or 64-bit operating system. All EPOS commands (including generating/sending/receiving data frames) are implemented and they can be called directly from your own program.

Use the library as an easy and simple way to develop your own application. Do not bother about protocol details; the only thing you need to ensure are the correct communication port settings.

The chapter splits into descriptions for Windows (→as of page 9-136) and Linux (→as of page 9-148) operating systems and comprises the following sections:

- a) Overview
- b) Integration and programming environment-specific information on how to incorporate the library
- c) Programming and a programming environment-specific example on how to configure and establish communication

## 9.1 Windows

### 9.1.1 Overview

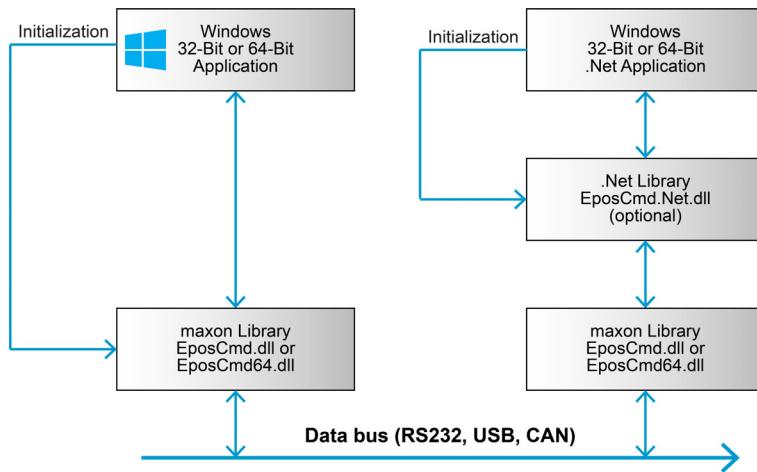


Figure 9-23 Windows – Library hierarchy

The Windows library supports communication interfaces and system architectures as shown in the following table:

Interface		Architecture	
		x86	x64
RS232		X	X
USB		X	X
CAN	IXXAT	X	X
	Kvaser	X	X
	NI	X	X
	Vector	X	X

Table 9-33 Supported platforms, architectures, and interfaces



#### CANopen Hardware

Use one of the listed CANopen interface cards (for details →page 2-10), for which respective motion control libraries are available. All other CANopen products may also be used, however, maxon motor does not provide respective libraries.

## 9.1.2 Integration into Programming Environment

The way to include the library functions in your own windows program depends on the compiler and the programming language you are using. Subsequently described are the procedures based on the most commonly used programming languages.

To include the library and to establish communication, proceed as follows:

- 1) Copy the library **EposCmd.dll** (for Windows 32-bit) or **EposCmd64.dll** for Windows 64-bit) to your working directory.
- 2) Use the function **VCS\_OpenDevice** to configure the library if the settings are known. You also may use the dialog **VCS\_OpenDeviceDig** to open a port.
- 3) Use the function **VCS\_SetProtocolStackSettings** to select baud rate and timeout.
- 4) Close all opened ports at the end of your program.
- 5) For detailed information on the initialization procedure → chapter “9.1.3 Programming” on page 9-145.

### 9.1.2.1 Borland C++ Builder

You will need to integrate the following files:

- **Definitions.h** – Constant definitions and declarations of library functions
- **EposCmd.dll** – Dynamic link library
- **EposCmd.lib** – Import library (OMF format)

Proceed as follows:

- 1) Copy the files to the working directory of your project.
- 2) Include the file “Definition.h” to your program code using the instruction “#include Definitions.h”.
- 3) Add the file “EposCmd.lib” to the project using menu **Project\Add to project**. Select the file and click **Open**.

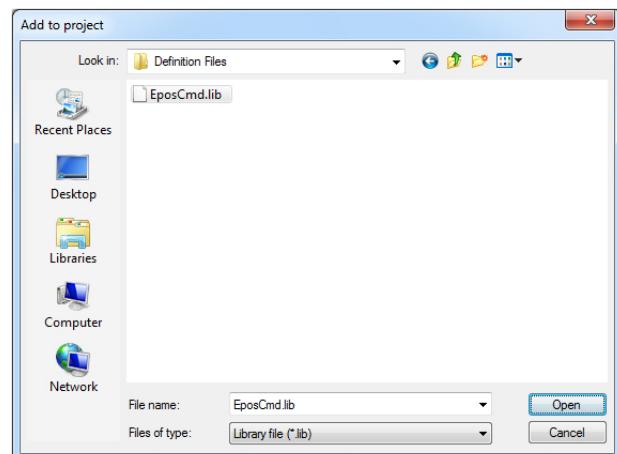


Figure 9-24 Borland C++Builder – Adding library

- 4) Now, you can execute all library functions in your own code.



#### Best Practice

Use the calling convention **\_\_stdcall**. It will manage how the parameters are put on the stack and how the stack will be cleaned once executed.

## 9.1.2.2 Borland Delphi

You will need to integrate the following files:

- **Definitions.pas** – Constant definitions and declarations of library functions
- **EposCmd.dll** – Dynamic link library

Proceed as follows:

- 1) Copy the files to the working directory of your project.
- 2) Write the instruction "Definitions" into the uses clause of your program header.
- 3) Now, you can execute all library functions in your own code.

## 9.1.2.3 Microsoft Visual Basic

### Remark

The «EPOS Command Library» was developed in programming language Microsoft Visual C++. Take note that data types in Microsoft Visual Basic and Microsoft Visual C++ differ. For more details consult the MSDN library, Visual Basic Concepts, ➔«Converting C Declarations to Visual Basic».

You will need to integrate the following files:

### 32-bit

- **Definitions.vb** – Constant definitions and declarations of library functions
- **EposCmd.dll** – Dynamic link library

### 64-bit

- **Definitions.vb** – Constant definitions and declarations of library functions
- **EposCmd64.dll** – Dynamic link library

Proceed as follows:

- 1) Copy the files to the working directory of your project.
- 2) Add the file "Definitions.vb" to the project using the project tree in "Solution Explorer". Click right on **Add**, select **Existing Item**, select the file, and click **Add**.

Continued on next page.

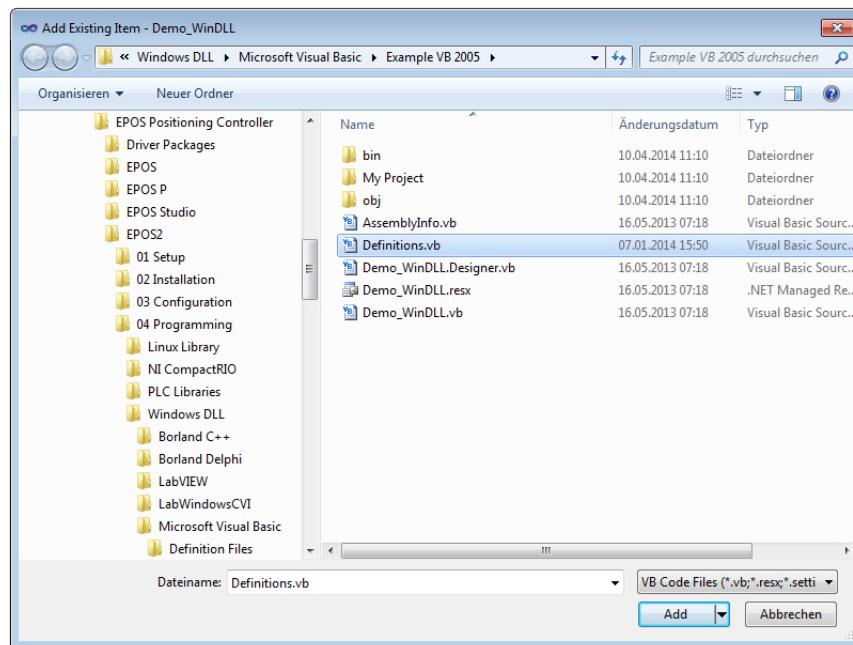


Figure 9-25 Visual Basic – Adding modules

- 3) Choose one of the two ways:
  - a) Copy the file "EposCmd.dll" (for Windows 32-bit) or "EposCmd64.dll" for Windows 64-bit) into the release directory.
  - b) Open menu **Properties**, switch to the **Compile** tab and type ".\\" into the **Build output path** edit line.

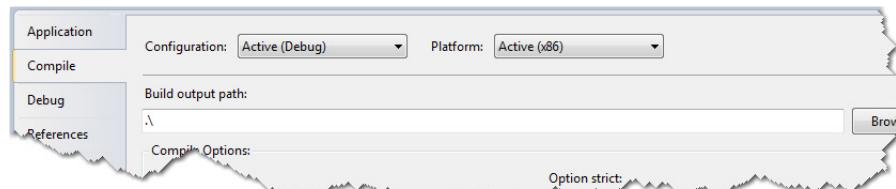


Figure 9-26 Visual Basic – Output path

- 4) Now, you can execute all library functions in your own code.

### 9.1.2.4 Microsoft Visual Basic .NET

You will need to integrate the following files:

- **EposCmd.Net.dll** – .Net assembly
- **EposCmd.dll/ EposCmd64.dll** – Dynamic link library

Proceed as follows:

- 1) Copy the files to the working directory of your project.
- 2) Add the .NET assembly "EposPCmd.Net.dll" to the project references using the project tree in "Solution Explorer". Click right on **Add**, select **Existing Item**, select the file, and click **Add**.

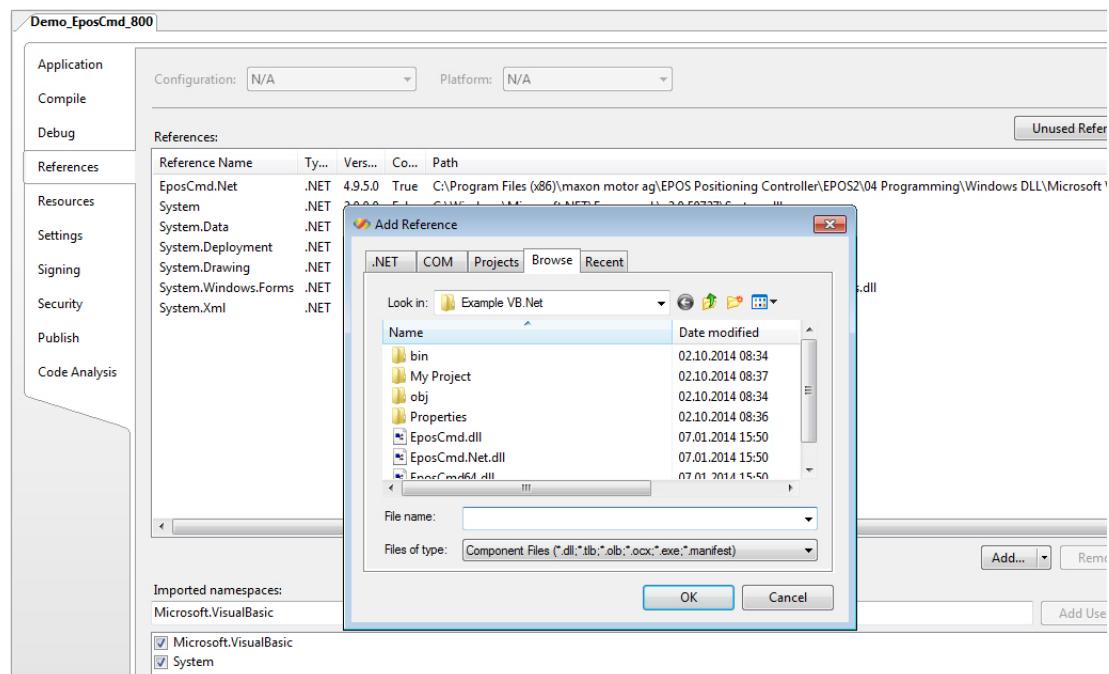


Figure 9-27 Visual Basic .NET – Adding modules

- 3) Choose one of the two ways:
  - a) Copy the file "EposCmd.dll" (for Windows 32-bit) or "EposCmd64.dll" (for Windows 64-bit) into the release directory.
  - b) Open menu **Properties**, switch to the **Compile** tab and type "\." into the **Build output path** edit line.

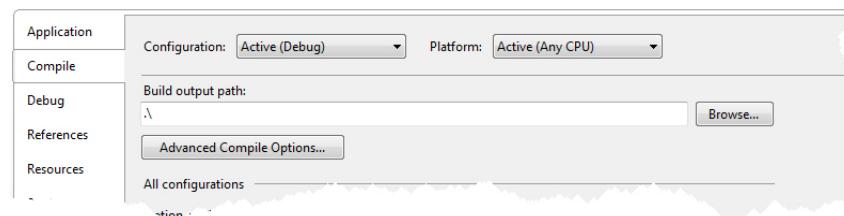


Figure 9-28 Visual Basic .NET – Output path

Continued on next page.

- 4) Now, you can execute all library functions in your own code.



**Remark**

For further details and parameter description of the EposCmd.Net wrapper → separate document «EposCmd.Net.chm».

### 9.1.2.5 Microsoft Visual C#

You will need to integrate the following files:

- **EposCmd.Net.dll** – .Net assembly
- **EposCmd.dll/ EposCmd64.dll** – Dynamic link library

Proceed as follows:

- 1) Copy the files to the working directory of your project.
- 2) Setup the using directory in your program code using the instruction “using EposCmd.Net;”.
- 3) Add the file “EposCmd.Net” to the project using the project tree in “Solution Explorer”. Click right on «References», select «Add Reference», select the file, and click «OK».

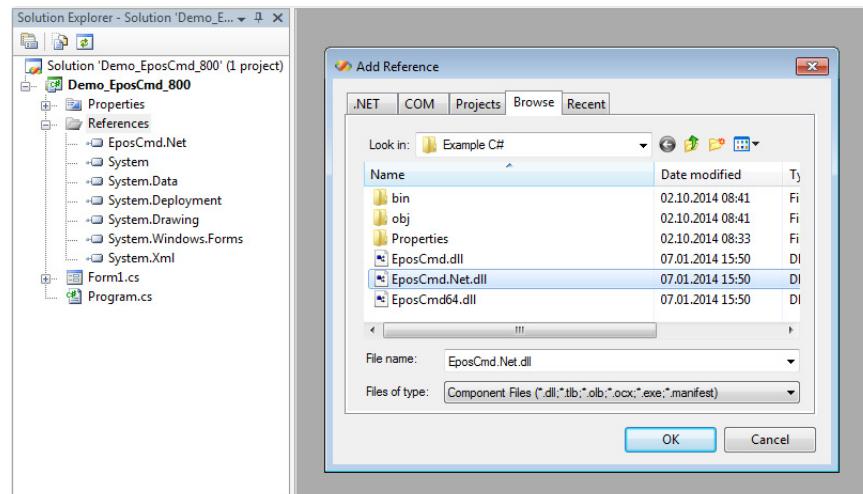


Figure 9-29 Visual C# – Project settings

- 4) Now, you can execute all library functions in your own code.



**Remark**

For further details and parameter description of the EposCmd.Net wrapper → separate document «EposCmd.Net.chm».

### 9.1.2.6 Microsoft Visual C++

You will need to integrate the following files:

#### 32-bit

- **Definitions.h** – Constant definitions and declarations of library functions
- **EposCmd.dll** – Dynamic link library
- **EposCmd.lib** – Import library (COFF format)

#### 64-bit

- **Definitions.h** – Constant definitions and declarations of library functions
- **EposCmd64.dll** – Dynamic link library
- **EposCmd64.lib** – Import library (COFF format)

Proceed as follows:

- 1) Copy the files to the working directory of your project.
- 2) Include the file "Definition.h" to your program code using the instruction "#include Definitions.h".
- 3) Add the library to your project using menu «Project\Properties». Select «Linker\Input» from the tree and type the file name "EposCmd.lib" (for Windows 32-bit) or "EposCmd64.lib" (for Windows 64-bit) into the «Additional Dependencies» edit line.

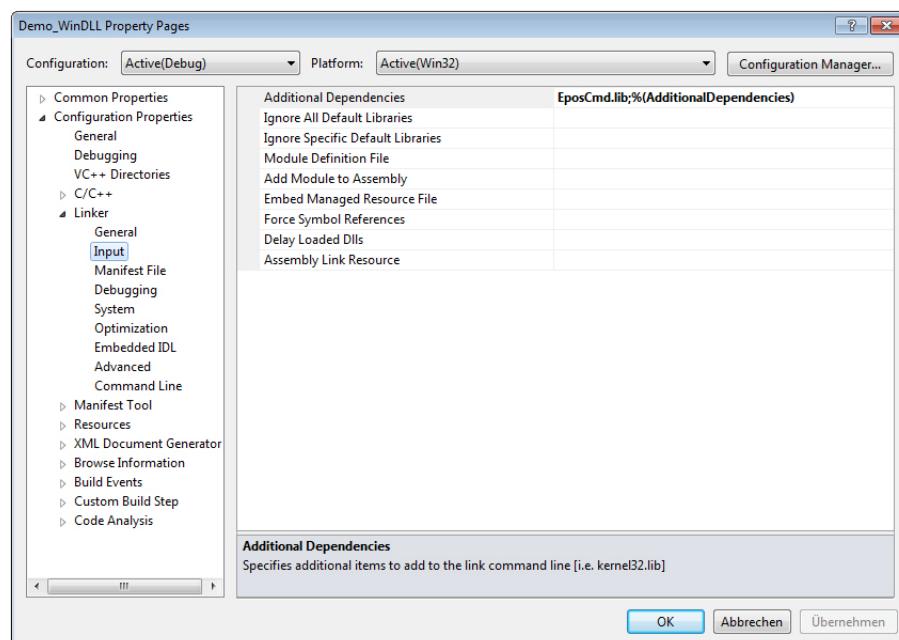


Figure 9-30 Visual C++ – Project settings

- 4) Now, you can execute all library functions in your own code.



#### Best Practice

Use the calling convention `__stdcall`. It will manage how the parameters are put on the stack and how the stack will be cleaned once executed.

### 9.1.2.7 National Instruments LabVIEW

For an easy start with LabVIEW programming, most of the function blocks are already configured in a LabVIEW project structure.

VIls are supported with LabVIEW 2010 and higher.

Proceed as follows:

Either start the LabVIEW project "maxon EPOS.lvproj" or add the complete folder "maxon EPOS" to your project.

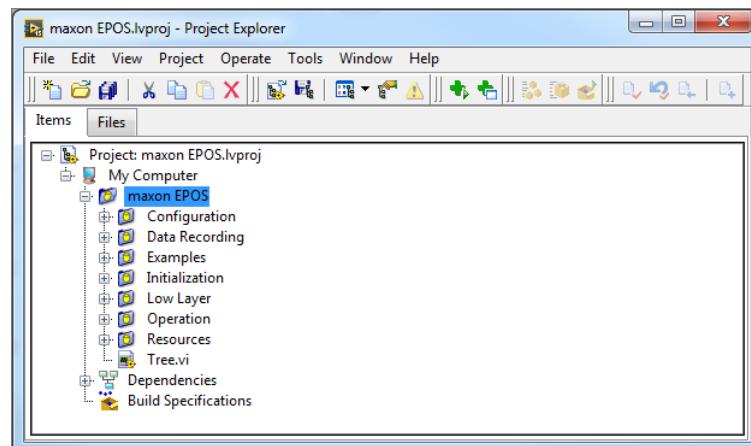


Figure 9-31 LabVIEW – Project Structure

## 9.1.2.8 National Instruments LabWindows

You will need to integrate the following files:

### 32-bit

- **Definitions.h** – Constant definitions and declarations of library functions
- **EposCmd.dll** – Dynamic link library
- **EposCmd.lib** – Import library

### 64-bit

- **Definitions.h** – Constant definitions and declarations of library functions
- **EposCmd64.dll** – Dynamic link library
- **EposCmd64.lib** – Import library



### Import Library (\*.lib)

The import library is dependent on compiler:

- For Borland compiler use the file from the directory "...\\borland".
- For Microsoft Visual C++ compiler use the file from the directory "...\\msvc".

Proceed as follows:

- 1) Copy the files to the working directory of your project.
- 2) Include the file "Definition.h" to your program code using the instruction "#include Definitions.h".
- 3) Add the files...
  - "Definitions.h", "EposCmd.dll", "EposCmd.lib" (for Windows 32-bit) or
  - "Definitions.h", "EposCmd64.dll", EposCmd64.lib (for Windows 64-bit)... to your project using menu **Edit\\Add to project**.  
Click **All Files...**, select the files, and click **Add**.

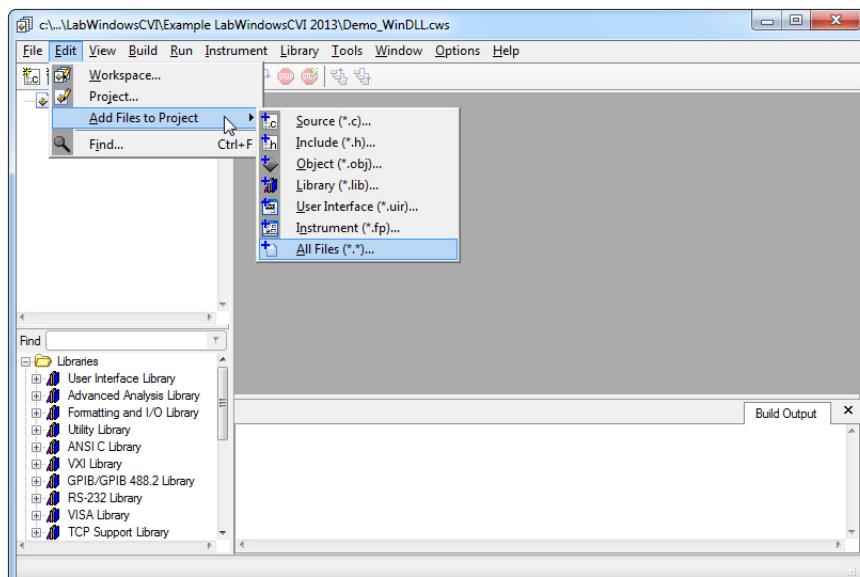


Figure 9-32 LabWindows – add files to project

- 4) Now, you can execute all library functions in your own code.



### Best Practice

Use the calling convention `__stdcall`. It will manage how the parameters are put on the stack and how the stack will be cleaned once executed.

### 9.1.3 Programming

For correct communication with the EPOS, you must execute an initialization function before the first communication command. The fundamental program flow is as follows:

#### INITIALIZATION

Execute the functions at the beginning of the program.

Function	Description
VCS_OpenDevice	Initialization of the port with the user data. Use the help functions for information on the interface settings.
VCS_OpenDeviceDlg	Initialization of the port. The dialog shows all available communication ports.
VCS_SetProtocolStackSettings	Initialization of the new baud rate and timeout
VCS_ClearFault	Deletes possibly existent errors/warnings

#### HELP

Use the functions if you do not exactly know how your interface is configured.

Function	Description
VCS_GetDeviceNameSelection	Returns available DeviceNames for function VCS_OpenDevice
VCS_GetProtocolStackNameSelection	Returns available ProtocolStackNames for function VCS_OpenDevice
VCS_GetInterfaceNameSelection	Returns available InterfaceNames for function VCS_OpenDevice
VCS_GetPortNameSelection	Returns available PortNames for function VCS_OpenDevice

#### COMMUNICATION WITH EPOS

Choose any of the EPOS commands.

Function	Description
VCS_OperationMode	Set the operation mode (Position Mode, Profile Position Mode, Current Mode, ...)
VCS_GetEncoderParameter	Read all encoder parameters
etc.	

#### CLOSING PROCEDURE

Release the port before closing the program.

Function	Description
VCS_CloseDevice	Release the opened port
VCS_CloseAllDevices	Release all opened ports

## 9.1.3.1 Examples



### Applicability

- For an universally valid example applicable for most programming environments → [Demo\\_WinDLL](#).
- For a National Instruments LabView-specific example → [LabVIEW](#).



### Best Practice

Prior starting one of the example programs, set the control parameters (e.g. motor, sensor, and regulator parameters). Use the «EPOS Studio» for configuration.

## DEMO\_WINDLL

The example “Demo\_WinDLL” is a dialog-based application. It demonstrates how to configure communication with the EPOS device.

- 1) A configuration dialog will open as you adjust your communication settings.
- 2) At the beginning, the EPOS is set into “Profile Position Mode”. Initialization is programmed in the member function **Create()** of the class **Demo\_WinDLL**. The opened port is released at the end in the function **Destroy()**.
- 3) You can execute the EPOS commands by clicking the buttons.
  - VCS\_SetEnableState
  - VCS\_SetDisableState
  - VCS\_MoveToPosition
  - VCS\_HaltPositionMovement

The function **VCS\_MoveToPosition** may be used as absolute or relative positioning. Click **Device Settings** to change your communication settings.

A timer triggers a periodical update of the state and actual position. The function **UpdateStatus()** will be executed every 100 ms. If an error occurs during the update of the state, the timer is stopped and an error report is displayed.

## LABVIEW

The maxon EPOS instrument driver contains the following example VIs:

### MOVEWITHVELOCITY

Example to perform a velocity movement showing how to...

- initialize and close an interface (e.g. USB)
- start a velocity movement with correct operation mode
- wait until the target velocity is reached (e.g. 5 seconds)

### MOVETORELATIVEPOSITION

Example to do a relative position step showing how to...

- initialize and close an interface (e.g. USB)
- start positioning with correct operation mode
- wait until the target position is reached

### DATARECORDER

Example to configure and use the data recording functions showing how to...

- initialize and close an interface (e.g. USB)
- configure the data recorder
- start relative positioning
- display the recorded data (position, velocity, current)

### GUI DEMO

Example on how to work with maxon EPOS VIs showing how to...

- initialize and close an interface (with a dialog)
- configure parameters and data
- enable/disable a device
- start/stop a relative movement
- configure profile and node settings
- use the data recorder
- update actual values

### MOVEWITHIPM

Example on how to do an IPM trajectory showing how to...

- initialize and close an interface (e.g. USB)
- configure interpolated position mode parameters
- start IPM trajectory
- add PVT reference points
- stop IPM trajectory

## 9.2 Linux

### 9.2.1 Overview

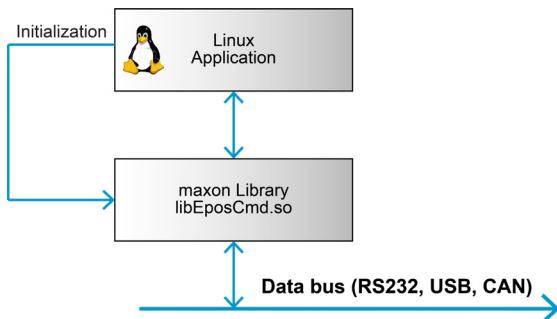


Figure 9-33 Linux – Library hierarchy

The Linux library supports communication interfaces and system architectures as shown in the following table:

Interface	Architecture		
	x86	x86_64	ARMv7/v8 32-bit
RS232	X	X	X
USB	X	X	X
CAN	IXXAT	X	X
	Kvaser	X	X
	PiCAN2 (MCP251x)	–	X

Table 9-34 Supported platforms, architectures, and interfaces



#### Tested Setups

- x86 / x86\_64: Tested on Ubuntu 12.04, 14.04 and 16.04 32/64-bit
- ARMv7/v8: Tested on Raspberry Pi 2/3, Raspbian Jessie, armhf
- ARMv7/v8 - IXXAT: Requires modification of the official IXXAT installation script (install USB only)

### 9.2.1.1    Tested CAN Interfaces and Drivers

Communication via CAN interfaces works through the SocketCAN driver and networking stack. Depending on the CAN interface model and brand you might need to install special drivers or upgrade the Linux kernel of your system.

The following CAN adapters and driver versions were successfully tested:

#### **IXXAT (IXXAT SocketCAN Driver 1.1.138)**

- IXXAT USB-to-CAN V2 Professional
- IXXAT USB-to-CAN V2 Compact

#### **Kvaser (SocketCAN kernel driver)**

- Kvaser Leaf Light v1
- Kvaser Leaf Light v2 (supported by Ubuntu 14.04 and newer)

#### **SK Pang (SocketCAN kernel driver)**

- PiCAN2 (based on MCP2511 CAN transceiver)

#### **Other CAN adapters**

Other CAN adapters might work with the library as well (SocketCAN interface driver required), but have not been tested.

## 9.2.2 Installation / Uninstallation

### 9.2.2.1 Unzipping the EPOS\_Linux\_Library

Unzip the EPOS\_Linux\_Library package:

```
$unzip EPOS_Linux_Library.zip -d .
```

**NOTE:** If the unzip program is not available, you can install it using the following command:

```
$sudo apt-get install unzip
```

### 9.2.2.2 Installing the EPOS Command Library

Go to the directory “EPOS\_Linux\_Library”:

```
$cd EPOS_Linux_Library
```

The install.sh script installs the EPOS Command Library and associated files to the directory “/opt/EposCmdLib\_<version>” and configures device access rights on the system:

```
$sudo bash ./install.sh
```

**NOTE:** install.sh script requires sudo (root privileges)

```
alg_sys@ubuntu:~/EPOS_Linux_Library$ ls
examples include install.sh lib msc
alg_sys@ubuntu:~/EPOS_Linux_Library$ sudo bash ./install.sh
-----
EPOS Command Library 6.3.0.6 installation started
-----
- Remove existing installation [OK]
- Install library into directory: /opt/EposCmdLib 6.3.0.6 [OK]
- Install examples into directory: /opt/EposCmdLib 6.3.0.6 [OK]
- Library system integration [OK]
- Configure device access rights [OK]
udev stop/waiting
udev start/running, process 55502
- Configure user access rights [OK]
-----
EPOS Command Library 6.3.0.6 installed
-----
```

Figure 9-34 EPOS Command Library installation

After successful installation, the EPOS Command Library is ready for use.

### 9.2.2.3 Uninstalling the EPOS Command Library

Go to the package directory:

```
$cd EPOS_Linux_Library
```

Execute the uninstall script:

```
$sudo bash ./install.sh -u
or
$sudo bash ./install.sh --uninstall
```

```
alg_sys@ubuntu:~/EPOS_Linux_Library$ sudo bash ./install.sh -u
-----
EPOS Command Library 6.3.0.6 deinstallation started
-----
- Reconfigure user access rights [OK]
- Reconfigure device access rights [OK]
udev stop/waiting
udev start/running, process 55551
- Remove library system integration [OK]
- Remove existing installation [OK]
-----
EPOS Command Library 6.3.0.6 uninstalled
-----
```

Figure 9-35 EPOS Command Library uninstallation

**NOTE:** The script will only uninstall the library version equal to the scripts package version.

### 9.2.3 Integration into Programming Environment

You will need to integrate the following files in your projects:

- **Definitions.h** – Constant definitions and declarations of library functions
- **libEposCmd.so.<major>.<minor>.<rev>.0** – EPOS Linux shared library

### 9.2.4 Programming

For details → Windows OS; chapter “9.1.3 Programming” on page 9-145.

The EPOS Linux library supports most of the EPOS commands. However, **not supported** are the following commands:

- DataRecorder commands
- Export/Import parameters commands
- GUI-related commands (such as VCS\_OpenDeviceDlg)

#### 9.2.4.1 Examples

##### HelloEposCmd

The demo program (source code) is available either in the package “EPOS\_Linux\_Library.zip” or after library installation in the directory “/opt/EposCmdLib\_<version>/examples/HelloEposCmd”.

##### HelloEposCmd build and execution

```
$cd /opt/EposCmdLib_<version>/examples/HelloEposCmd  
$make  
$./HelloEposCmd
```

**NOTE:** If the make program is not available, you can install it using the following command:

```
$sudo apt-get install build-essential
```

The main purpose of HelloEposCmd is to show the basic concept of how to use the EPOS Command Library in a custom C++ application:

- Open and close communication with the device
- Get and set communication parameters
- Selected mode demo: Profile Velocity Mode (PVM), Profile Position Mode (PPM)

The HelloEposCmd application contains useful command line parameters. Some of them can be used to identify the controller's communication interface parameters for use with the EPOS Command Library later on.

**-h:** print out the command line parameters overview

```
alg_sys@ubuntu:~/HelloEposCmd$ ./HelloEposCmd -h  
-----  
Epos Command Library Example Program, (c) maxonmotor ag 2014-2017  
-----  
Usage: HelloEposCmd  
      -h : this help  
      -n : node id (default 1)  
      -d : device name (EPOS2, EPOS4, default - EPOS4)  
      -s : protocol stack name (MAXON RS232, CANopen, MAXON SERIAL V2, default - MAXON SERIAL V2)  
      -i : interface name (RS232, USB, CAN_ixx_usb 0, CAN_kvaser_usb 0,... default - USB)  
      -p : port name (COM1, USB0, CAN0,... default - USB0)  
      -b : baudrate (115200, 1000000,... default - 1000000)  
      -l : list available interfaces (valid device name and protocol stack required)  
      -r : list supported protocols (valid device name required)  
      -v : display device version  
alg_sys@ubuntu:~/HelloEposCmd$
```

Figure 9-36 HelloEposCmd – Parameters list

Continued on next page.

-r: list available protocol stacks for a selected device

```
alg_sys@ubuntu:~/HelloEposCmd$ ./HelloEposCmd -r
-----
Epos Command Library Example Program, (c) maxonmotor ag 2014-2017
-----
default settings:
node id          = 1
device name      = 'EPOS4'
protocol stack name = 'MAXON SERIAL V2'
interface name    = 'USB'
port name         = 'USB0'
baudrate          = 1000000
-----
protocol stack name = MAXON SERIAL V2
protocol stack name = CANopen
```

Figure 9-37 HelloEposCmd – list available protocols

-l: list available interfaces and ports

```
alg_sys@ubuntu:~/HelloEposCmd$ ./HelloEposCmd -l -s 'CANopen'
-----
Epos Command Library Example Program, (c) maxonmotor ag 2014-2017
-----
default settings:
node id          = 1
device name      = 'EPOS4'
protocol stack name = 'CANopen'
interface name    = 'USB'
port name         = 'USB0'
baudrate          = 1000000
-----
interface = CAN_ixx_usb 0
            port = CAN0
            port = CAN1
```

Figure 9-38 HelloEposCmd – list available interfaces

-v: read device version information

```
alg_sys@ubuntu:~/HelloEposCmd$ ./HelloEposCmd -s 'CANopen' -i 'CAN_ixx_usb 0' -p 'CAN0' -v
-----
Epos Command Library Example Program, (c) maxonmotor ag 2014-2017
-----
default settings:
node id          = 1
device name      = 'EPOS4'
protocol stack name = 'CANopen'
interface name    = 'CAN_ixx_usb 0'
port name         = 'CAN0'
baudrate          = 1000000
-----
Open device...
EPOS4 Hardware Version    = 0x6552
    Software Version     = 0x0130
    Application Number   = 0xff00
    Application Version = 0x0050
Close device
```

Figure 9-39 HelloEposCmd – read device version

## 10 Version History

### 10.1 Windows Operating Systems

Date [D / M / Y]	Library Version	Documentation Edition	Description
06.08.2018	6.4.2.0	August 2018	Bugfix: VCS_UpdateFirmware - EPOS4 firmware update stability fixed
08.06.2018	6.4.1.0	May 2018	New: Support firmware update EPOS4 Bugfix: VCS_SetGatewaySettings - Resetting for EPOS2 fixed Bugfix: VCS_MoveToPosition - Reset 'TargetReached' bit after start
14.12.2017	6.3.1.0	November 2017	Bugfix: Duplicate issue "Error Cluster From Code.vi" in LabView Instrument Driver resolved Bugfix: USB port enumeration conflicts between EPOS2 and EPOS4 resolved
07.06.2017	6.2.1.0	May 2017	New: API for mixed gateway topologies EPOS, EPOS2, EPOS4 New: LabView Instrument Driver Update Bugfix: .Net Library: IPM mode starting fixed
20.01.2017	6.1.2.0	January 2017	Bugfix: EPOS2 USB communication with Windows 10 and USB 3.0 Bugfix: EPOS2 Interpolated Position Mode is not starting profile
25.10.2016	6.1.1.0	October 2016	New: EPOS4 RS232 communication New: EPOS4 SSI absolute encoder
04.07.2016	6.0.1.0	May 2016	Documentation update New: Implementation of EPOS4 New: Error codes added New: Appendix A featuring matrix on hardware and supported functions
24.10.2014	5.0.1.0	October 2014	Documentation update New: Support for Kvaser CAN interfaces New: Support for NI-XNET driver
17.12.2013	4.9.5.0	December 2013	Documentation update Bugfix: Function VCS_GetDriverInfo 64-bit variant DataRecorder: Check path (VCS_ExportChannelDataToFile)
22.03.2013	4.9.2.0	March 2013	Function VCS_ExportParamter: Parameters renamed
04.01.2013	4.9.1.0	December 2012	New functions: VCS_GetHomingState, VCS_WaitForHomingAttained, VCS_GetVelocityIsAveraged, VCS_GetCurrentsAveraged
10.10.2012	4.8.7.0	October 2012	Bugfix: Command Send NMT Service New functions: VCS_GetVelocityRegulatorFeedForward, VCS_SetVelocityRegulatorFeedForward
08.10.2012	4.8.6.0	October 2012	New: CANopen Vector Interface support for VN1600 series
10.04.2012	4.8.5.0	April 2012	Bugfix: Sporadic CAN failure with IXXAT VCI V3.3
02.02.2011	4.8.2.0	February 2011	Bugfix: NI-LIN device
28.01.2011	4.8.1.0	January 2011	New: Expand to 64-bit Windows OS and 32-bit Linux OS Bugfix: Segmented Write
28.10.2010	4.7.3.0	November 2010	Bugfix: VCS_CloseDevice, VCS_CloseAllDevices
11.10.2010	4.7.2.0	October 2010	Bugfix: Deadlock when closing application fixed Bugfix: Communication for IXXAT VCI V3.3 fixed
30.08.2009	4.7.1.0	August 2010	New parameters: DialogMode for Findxxx functions New: ProtocolStack Name "MAXON SERIAL V2" (Library is still compatible with old name "EPOS2_USB") Bugfix: VCS_WaitForTargetReached returns false, if timeout elapses
22.10.2009	4.6.1.3	October 2009	Bugfix: Multithreading
04.09.2009	4.6.0.0	September 2009	New: Support for EPOS2 functionality, data recorder, parameter export and import, VCS_ReadCANFrame

Continued on next page.

## Version History

Date [D / M / Y]	Library Version	Documentation Edition	Description
01.05.2008	4.5.0.0	April 2008	New: Functions for read device errors (Get Device Error), adaption for EPOS2
10.08.2007	4.4.0.0	August 2007	New: Support for IXXAT VCI V3
01.02.2007	4.3.0.0	January 2007	New: Support for National Instruments Interfaces
16.10.2006	4.2.1.0	October 2006	Bugfix: VCS_GetDriverInfo, VCS_SetHomingParameter
11.10.2006	4.2.0.0	October 2006	New function: VCS_GetErrorInfo(...)
12.04.2006	4.1.1.0	April 2006	Bugfix: VCS_SendCANFrame
12.04.2006	4.1.0.0	April 2006	New error codes
03.02.2006	4.0.0.0	February 2006	Additional information on error codes
01.10.2005	4.0.0.0	October 2005	Error correction documentation
01.03.2005	3.0.0.0	March 2005	Insert from Vector CAN cards details
16.07.2004	2.0.3.0	July 2004	Documentation update New: Additional information on error codes
06.04.2004	2.0.0.0	April 2004	New functions documented: VCS_CloseAllDevices(...), VCS_DigitalInputConfiguration(...), VCS_DigitalOutputConfiguration(...), VCS_GetAllDigitalInputs(...), VCS_GetAllDigitalOutputs(...), VCS_GetAnalogInput(...), VCS_SetAllDigitalOutputs(...), VCS_SendNMTService(...), VCS_OpenDeviceDlg(...) Changed functions: VCS_GetBaudrateSelection(...), VCS_FindHome(...), VCS_GetHomingParameter(...), VCS_SetHomingParameter(...), VCS_MoveToPosition(...), VCS_GetOperationMode(...), VCS_SetOperationMode(...), VCS_GetObject(...), VCS_SetObject(...) Deleted functions: VCS_GetProtocolStackMode(...), VCS_GetProtocolStackModeSelection(...)
05.01.2004	1.02	January 2004	Insert IXXAT details
01.12.2003	1.01	December 2003	Changed functions: VCS_GetBaudrateSelection(...), VCS_GetDeviceName(...), VCS_GetDeviceNameSelection(...), VCS_GetDriverInfo(...), VCS_GetInterfaceName(...), VCS_GetInterfaceNameSelection(...), VCS_GetPortName(...), VCS_GetPortNameSelection(...), VCS_GetProtocolStackModeSelection(...), VCS_GetProtocolStackName(...), VCS_GetProtocolStackNameSelection(...)
11.11.2003	1.00	November 2003	Initial release

Table 10-35 Version history – Windows OS

## 10.2 Linux Operating Systems

Date [D / M / Y]	Library Version	Documentation Edition	Description
08.06.2018	6.4.1.0	May 2018	New: API for mixed gateway topologies EPOS, EPOS2, EPOS4 Improved function not supported handling
14.12.2017	6.3.1.0	November 2017	New: Support CANopen communication interfaces New: EPOS Linux Library install script Bugfix: Intel Skylake architecture lock elision issue resolved Bugfix: USB port enumeration conflicts resolved
07.06.2017	6.2.1.0	May 2017	Bugfix: Missing makefile for example added Bugfix: Wrong datatype in Definitions.h fixed
20.01.2017	6.1.1.0	January 2017	Bugfix: Make file added for example "HelloEposCmd"
25.10.2016	6.1.1.0	October 2016	New: Implementation of EPOS4
10.10.2014	5.0.1.0	October 2014	New: x86_64, arm sf/hf support New functions: VCS_GetDriverInfo Bugfix: VCS_GetErrorInfo
26.04.2013	4.9.2.0	March 2013	New functions: VCS_GetHomingState, VCS_WaitForHomingAttained, VCS_GetVelocityIsAveraged, VCS_GetCurrentIsAveraged Bugfix: rs232 baudrate
27.07.2012	4.9.1.0	December 2013	New: kernel 2.6 support Bugfix: IPM mode Update: ftdi driver
14.03.2011	4.8.2.0	February 2011	Bugfix: USB interface
15.12.2010	4.8.1.0	January 2011	Initial release

Table 10-36 Version history – Linux OS

*••page intentionally left blank••*

## Appendix A — Hardware vs. Functions

In the following tables you can find an overview on the available software functions versus their availability in the respective hardware versions. The tables are compiled in groups for initialization, configuration, operation, data recording, and low layer functions and are sorted in alphabetical order.

A click on the function's designation leads you directly to the detailed functional description.

### INITIALIZATION FUNCTIONS

Designation	EPOS	EPOS2	EPOS4
VCS_CloseAllDevices	X	X	X
VCS_CloseAllSubDevices	X	X	X
VCS_CloseDevice	X	X	X
VCS_CloseSubDevice	X	X	X
VCS_FindDeviceCommunicationSettings	X	X	X
VCS_FindSubDeviceCommunicationSettings	X	X	X
VCS_GetBaudRateSelection	X	X	X
VCS_GetDeviceName	X	X	X
VCS_GetDeviceNameSelection	X	X	X
VCS_GetDriverInfo	X	X	X
VCS_GetErrorInfo	X	X	X
VCS_GetInterfaceName	X	X	X
VCS_GetInterfaceNameSelection	X	X	X
VCS.GetKeyHandle	X	X	X
VCS_GetPortName	X	X	X
VCS_GetPortNameSelection	X	X	X
VCS_GetProtocolStackName	X	X	X
VCS_GetProtocolStackNameSelection	X	X	X
VCS_GetProtocolStackSettings	X	X	X
VCS_GetVersion	X	X	X
VCS_OpenDevice	X	X	X
VCS_OpenDeviceDlg	X	X	X
VCS_OpenSubDevice	X	X	X
VCS_OpenSubDeviceDlg	X	X	X
VCS_ResetPortNameSelection		X	X
VCS_SetProtocolStackSettings	X	X	X

Table 11-37    Hardware and their supported functions – Initialization functions

## CONFIGURATION FUNCTIONS

Designation	EPOS	EPOS2	EPOS4
VCS_AnalogInputConfiguration		X	
VCS_DigitalInputConfiguration	X	X	X
VCS_DigitalOutputConfiguration	X	X	X
VCS_ExportParameter	X	X	X
VCS_GetCurrentRegulatorGain	X	X	
VCS_GetDcMotorParameter	X	X	X
VCS_GetEcMotorParameter	X	X	X
VCS_GetHallSensorParameter	X	X	X
VCS_GetIncEncoderParameter	X	X	X
VCS_GetMaxAcceleration		X	X
VCS_GetMaxFollowingError	X	X	X
VCS_GetMaxProfileVelocity	X	X	X
VCS_GetMotorType	X	X	X
VCS_GetObject	X	X	X
VCSGetPositionRegulatorFeedForward	X	X	
VCSGetPositionRegulatorGain	X	X	
VCS_GetSensorType	X	X	X
VCS_GetSsiAbsEncoderParameter		X	X
VCS_GetSsiAbsEncoderParameterEx			X
VCS_GetVelocityRegulatorFeedForward		X	
VCS_GetVelocityRegulatorGain	X	X	
VCS_GetVelocityUnits		X	X
VCS_ImportParameter	X	X	X
VCS_Restore	X	X	X
VCS_SetCurrentRegulatorGain	X	X	
VCS_SetDcMotorParameter	X	X	X
VCS_SetEcMotorParameter	X	X	X
VCS_SetHallSensorParameter	X	X	X
VCS_SetIncEncoderParameter	X	X	X
VCS_SetMaxAcceleration		X	X
VCS_SetMaxFollowingError	X	X	X
VCS_SetMaxProfileVelocity	X	X	X
VCS_SetMotorType	X	X	X
VCS_SetObject	X	X	X
VCS_SetPositionRegulatorFeedForward	X	X	
VCS_SetPositionRegulatorGain	X	X	
VCS_SetSensorType	X	X	X

Continued on next page.

Designation	EPOS	EPOS2	EPOS4
VCS_SetSsiAbsEncoderParameter		X	X
VCS_SetSsiAbsEncoderParameterEx			X
VCS_SetVelocityRegulatorFeedForward		X	
VCS_SetVelocityRegulatorGain	X	X	
VCS_SetVelocityUnits		X	X
VCS_Store	X	X	X
VCS_UpdateFirmware		X	X

Table 11-38 Hardware and their supported functions – Configuration functions

## OPERATION FUNCTIONS

Designation	EPOS	EPOS2	EPOS4
VCS_ActivateAnalogCurrentSetpoint		X	
VCS_ActivateAnalogPositionSetpoint		X	
VCS_ActivateAnalogVelocitySetpoint		X	
VCS_ActivateCurrentMode	X	X	X
VCS_ActivateHomingMode	X	X	X
VCS_ActivateInterpolatedPositionMode		X	
VCS_ActivateMasterEncoderMode	X	X	
VCS_ActivatePositionCompare		X	
VCS_ActivatePositionMarker	X	X	
VCS_ActivatePositionMode	X	X	
VCS_ActivateProfilePositionMode	X	X	X
VCS_ActivateProfileVelocityMode	X	X	X
VCS_ActivateStepDirectionMode	X	X	
VCS_ActivateVelocityMode	X	X	
VCS_AddPvtValueToIpmBuffer		X	
VCS_ClearFault	X	X	X
VCS_ClearIpmBuffer		X	
VCS_DeactivateAnalogCurrentSetpoint		X	
VCS_DeactivateAnalogPositionSetpoint		X	
VCS_DeactivateAnalogVelocitySetpoint		X	
VCS_DeactivatePositionCompare		X	
VCS_DeactivatePositionMarker	X	X	
VCS_DefinePosition	X	X	X
VCS_DisableAnalogCurrentSetpoint		X	
VCS_DisableAnalogPositionSetpoint		X	
VCS_DisableAnalogVelocitySetpoint		X	
VCS_DisablePositionCompare		X	

Continued on next page.

Designation	EPOS	EPOS2	EPOS4
VCS_DisablePositionWindow	X	X	
VCS_DisableVelocityWindow		X	
VCS_EnableAnalogCurrentSetpoint		X	
VCS_EnableAnalogPositionSetpoint		X	
VCS_EnableAnalogVelocitySetpoint		X	
VCS_EnablePositionCompare		X	
VCS_EnablePositionWindow	X	X	
VCS_EnableVelocityWindow		X	
VCS_FindHome	X	X	X
VCS_GetAllDigitalInputs	X	X	X
VCS_GetAllDigitalOutputs	X	X	X
VCS_GetAnalogInput	X	X	X
VCS_GetCurrentIs	X	X	X
VCS_GetCurrentIsAveraged	X	X	X
VCS_GetCurrentMust	X	X	X
VCS_GetDeviceErrorCode	X	X	X
VCS_GetDisableState	X	X	X
VCS_GetEnableState	X	X	X
VCS_GetFaultState	X	X	X
VCS_GetFreeIpmBufferSize		X	
VCS_GetHomingParameter	X	X	X
VCS_GetHomingState	X	X	X
VCS_GetIpmBufferParameter		X	
VCS_GetIpmStatus		X	
VCS_GetMasterEncoderParameter		X	
VCS_GetMovementState	X	X	X
VCS_GetNbOfDeviceError	X	X	X
VCS_GetOperationMode	X	X	X
VCSGetPositionCompareParameter		X	
VCSGetPositionIs	X	X	X
VCSGetPositionMarkerParameter	X	X	
VCSGetPositionMust	X	X	X
VCSGetPositionProfile	X	X	X
VCSGetQuickStopState	X	X	X
VCSGetState	X	X	X
VCSGetStepDirectionParameter		X	
VCSGetTargetPosition	X	X	X
VCSGetTargetVelocity	X	X	X
VCSGetVelocityIs	X	X	X

Continued on next page.

Designation	EPOS	EPOS2	EPOS4
VCS_GetVelocityIsAveraged	X	X	X
VCS_GetVelocityMust	X	X	
VCS_GetVelocityProfile	X	X	X
VCS_HaltPositionMovement	X	X	X
VCS_HaltVelocityMovement	X	X	X
VCS_MoveToPosition	X	X	X
VCS_MoveWithVelocity	X	X	X
VCS_ReadPositionMarkerCapturedPosition	X	X	
VCS_ReadPositionMarkerCounter	X	X	
VCS_ResetDevice	X	X	X
VCS_ResetPositionMarkerCounter	X	X	
VCS_SetAllDigitalOutputs	X	X	X
VCS_SetAnalogOutput	X	X	X
VCS_SetCurrentMust	X	X	X
VCS_SetDisableState	X	X	X
VCS_SetEnableState	X	X	X
VCS_SetHomingParameter	X	X	X
VCS_SetIpmBufferParameter		X	
VCS_SetMasterEncoderParameter		X	
VCS_SetOperationMode	X	X	X
VCS_SetPositionCompareParameter		X	
VCS_SetPositionCompareReferencePosition		X	
VCS_SetPositionMarkerParameter	X	X	
VCS_SetPositionMust	X	X	
VCS_SetPositionProfile	X	X	X
VCS_SetQuickStopState	X	X	X
VCS_SetState	X	X	X
VCS_SetStepDirectionParameter		X	
VCS_SetVelocityMust	X	X	
VCS_SetVelocityProfile	X	X	X
VCS_StartIpmTrajectory		X	
VCS_StopHoming	X	X	X
VCS_StopIpmTrajectory		X	
VCS_WaitForHomingAttained	X	X	X
VCS_WaitForTargetReached	X	X	X

Table 11-39 Hardware and their supported functions – Operation functions

## DATA RECORDING FUNCTIONS

Designation	EPOS	EPOS2	EPOS4
VCS_ActivateChannel	X	X	
VCS_DeactivateAllChannels	X	X	
VCS_DisableAllTriggers	X	X	
VCS_EnableTrigger	X	X	
VCS_ExportChannelDataToFile	X	X	
VCS_ExtractChannelDataVector	X	X	
VCS_ForceTrigger	X	X	
VCS_GetRecorderParameter	X	X	
VCS_IsRecorderRunning	X	X	
VCS_IsRecorderTriggered	X	X	
VCS_ReadChannelVectorSize	X	X	
VCS_ReadDataBuffer	X	X	
VCS_ReadVCS_ChannelDataVector	X	X	
VCS_SetRecorderParameter	X	X	
VCS_ShowChannelDataDlg	X	X	
VCS_StartRecorder	X	X	
VCS_StopRecorder	X	X	

Table 11-40 Hardware and their supported functions – Data recording functions

## LOW LAYER FUNCTIONS

Designation	EPOS	EPOS2	EPOS4
VCS_ReadCANFrame	X	X	
VCS_RequestCANFrame	X	X	
VCS_SendCANFrame	X	X	
VCS_SendNMTService	X	X	

Table 11-41 Hardware and their supported functions – Low layer functions

## Appendix B — Function Groups Overview

<b>3 Initialization Functions</b>	<b>13</b>
3.1 Communication . . . . .	13
3.1.1 VCS_OpenDevice . . . . .	13
3.1.2 VCS_OpenDeviceDlg . . . . .	14
3.1.3 VCS_SetProtocolStackSettings . . . . .	15
3.1.4 VCS_GetProtocolStackSettings . . . . .	15
3.1.5 VCS_FindDeviceCommunicationSettings . . . . .	16
3.1.6 VCS_CloseAllDevices . . . . .	16
3.1.7 VCS_CloseDevice . . . . .	17
3.1.8 VCS_OpenSubDevice . . . . .	18
3.1.9 VCS_OpenSubDeviceDlg . . . . .	19
3.1.10 VCS_SetGatewaySettings . . . . .	19
3.1.11 VCS_GetGatewaySettings . . . . .	20
3.1.12 VCS_FindSubDeviceCommunicationSettings . . . . .	20
3.1.13 VCS_CloseAllSubDevices . . . . .	21
3.1.14 VCS_CloseSubDevice . . . . .	21
3.2 Info . . . . .	22
3.2.1 VCS_GetErrorInfo . . . . .	22
3.2.2 VCS_GetDriverInfo . . . . .	22
3.2.3 VCS_GetVersion . . . . .	23
3.3 Advanced Functions . . . . .	24
3.3.1 VCS_GetDeviceNameSelection . . . . .	24
3.3.2 VCS_SetProtocolStackNameSelection . . . . .	25
3.3.3 VCS_SetInterfaceNameSelection . . . . .	26
3.3.4 VCS_SetPortNameSelection . . . . .	27
3.3.5 VCS_ResetPortNameSelection . . . . .	28
3.3.6 VCS_SetBaudRateSelection . . . . .	29
3.3.7 VCS_SetKeyHandle . . . . .	30
3.3.8 VCS_SetDeviceName . . . . .	30
3.3.9 VCS_SetProtocolStackName . . . . .	31
3.3.10 VCS_SetInterfaceName . . . . .	31
3.3.11 VCS_SetPortName . . . . .	32
<b>4 Configuration Functions</b>	<b>33</b>
4.1 General . . . . .	33
4.1.1 VCS_ImportParameter . . . . .	33
4.1.2 VCS_ExportParameter . . . . .	34
4.1.3 VCS_SetObject . . . . .	35
4.1.4 VCS_GetObject . . . . .	35
4.1.5 VCS_Restore . . . . .	36
4.1.6 VCS_Store . . . . .	36
4.1.7 VCS_UpdateFirmware . . . . .	37

4.2 Advanced Functions . . . . .	38
4.2.1 Motor . . . . .	38
4.2.1.1 VCS_SetMotorType . . . . .	38
4.2.1.2 VCS_SetDcMotorParameter . . . . .	38
4.2.1.3 VCS_SetEcMotorParameter . . . . .	39
4.2.1.4 VCS_GetMotorType . . . . .	39
4.2.1.5 VCS_GetDcMotorParameter . . . . .	40
4.2.1.6 VCS_GetEcMotorParameter . . . . .	40
4.2.2 Sensor . . . . .	41
4.2.2.1 VCS_SetSensorType . . . . .	41
4.2.2.2 VCS_SetIncEncoderParameter . . . . .	42
4.2.2.3 VCS_SetHallSensorParameter . . . . .	42
4.2.2.4 VCS_SetSsiAbsEncoderParameterEx . . . . .	43
4.2.2.5 VCS_SetSsiAbsEncoderParameter . . . . .	43
4.2.2.6 VCS_GetSensorType . . . . .	44
4.2.2.7 VCS_GetIncEncoderParameter . . . . .	44
4.2.2.8 VCS_GetHallSensorParameter . . . . .	45
4.2.2.9 VCS_GetSsiAbsEncoderParameter . . . . .	45
4.2.2.10 VCS_GetSsiAbsEncoderParameterEx . . . . .	46
4.2.3 Safety . . . . .	47
4.2.3.1 VCS_SetMaxFollowingError . . . . .	47
4.2.3.2 VCS_GetMaxFollowingError . . . . .	47
4.2.3.3 VCS_SetMaxProfileVelocity . . . . .	48
4.2.3.4 VCS_GetMaxProfileVelocity . . . . .	48
4.2.3.5 VCS_SetMaxAcceleration . . . . .	49
4.2.3.6 VCS_GetMaxAcceleration . . . . .	49
4.2.4 Position Regulator . . . . .	50
4.2.4.1 VCS_SetPositionRegulatorGain . . . . .	50
4.2.4.2 VCS_SetPositionRegulatorFeedForward . . . . .	50
4.2.4.3 VCSGetPositionRegulatorGain . . . . .	51
4.2.4.4 VCSGetPositionRegulatorFeedForward . . . . .	51
4.2.5 Velocity Regulator . . . . .	52
4.2.5.1 VCS_SetVelocityRegulatorGain . . . . .	52
4.2.5.2 VCS_SetVelocityRegulatorFeedForward . . . . .	52
4.2.5.3 VCS_GetVelocityRegulatorGain . . . . .	53
4.2.5.4 VCS_GetVelocityRegulatorFeedForward . . . . .	53
4.2.6 Current Regulator . . . . .	54
4.2.6.1 VCS_SetCurrentRegulatorGain . . . . .	54
4.2.6.2 VCS_GetCurrentRegulatorGain . . . . .	54
4.2.7 Inputs/Outputs . . . . .	55
4.2.7.1 VCS_DigitalInputConfiguration . . . . .	55
4.2.7.2 VCS_DigitalOutputConfiguration . . . . .	56
4.2.7.3 VCS_AnalogInputConfiguration . . . . .	57
4.2.8 Units . . . . .	58
4.2.8.1 VCS_SetVelocityUnits . . . . .	58
4.2.8.2 VCS_GetVelocityUnits . . . . .	58

<b>5 Operation Functions</b>	<b>59</b>
<b>5.1 Operation Mode . . . . .</b>	<b>59</b>
5.1.1     VCS_SetOperationMode .....	59
5.1.2     VCS_GetOperationMode .....	60
<b>5.2 State Machine . . . . .</b>	<b>61</b>
5.2.1     VCS_ResetDevice .....	61
5.2.2     VCS_SetState .....	61
5.2.3     VCS_SetEnableState.....	62
5.2.4     VCS_SetDisableState.....	62
5.2.5     VCS_SetQuickStopState .....	62
5.2.6     VCS_ClearFault .....	63
5.2.7     VCS_GetState .....	63
5.2.8     VCS_GetEnableState .....	64
5.2.9     VCS_GetDisableState .....	64
5.2.10    VCS_GetQuickStopState .....	65
5.2.11    VCS_GetFaultState .....	65
<b>5.3 Error Handling . . . . .</b>	<b>66</b>
5.3.1     VCS_GetNbOfDeviceError.....	66
5.3.2     VCS_GetDeviceErrorCode .....	67
<b>5.4 Motion Info . . . . .</b>	<b>68</b>
5.4.1     VCS_GetMovementState.....	68
5.4.2     VCSGetPositionIs .....	68
5.4.3     VCS_GetVelocityIs .....	69
5.4.4     VCS_GetVelocityIsAveraged .....	69
5.4.5     VCS_GetCurrentIs .....	70
5.4.6     VCS_GetCurrentIsAveraged.....	70
5.4.7     VCS_WaitForTargetReached .....	71
<b>5.5 Profile Position Mode (PPM) . . . . .</b>	<b>72</b>
5.5.1     VCS_ActivateProfilePositionMode .....	72
5.5.2     VCS_SetPositionProfile .....	72
5.5.3     VCSGetPositionProfile .....	73
5.5.4     VCS_MoveToPosition .....	73
5.5.5     VCS_GetTargetPosition.....	74
5.5.6     VCS_HaltPositionMovement.....	74
5.5.7     Advanced Functions .....	75
5.5.7.1    VCS_EnablePositionWindow .....	75
5.5.7.2    VCS_DisablePositionWindow .....	75
<b>5.6 Profile Velocity Mode (PVM) . . . . .</b>	<b>76</b>
5.6.1     VCS_ActivateProfileVelocityMode .....	76
5.6.2     VCS_SetVelocityProfile.....	76
5.6.3     VCS_GetVelocityProfile .....	77
5.6.4     VCS_MoveWithVelocity .....	77
5.6.5     VCS_GetTargetVelocity .....	78
5.6.6     VCS_HaltVelocityMovement.....	78
5.6.7     Advanced Functions .....	79
5.6.7.1    VCS_EnableVelocityWindow .....	79
5.6.7.2    VCS_DisableVelocityWindow .....	79

5.7 Homing Mode (HM) . . . . .	80
5.7.1 VCS_ActivateHomingMode.....	80
5.7.2 VCS_SetHomingParameter .....	80
5.7.3 VCS_GetHomingParameter.....	81
5.7.4 VCS_FindHome .....	82
5.7.5 VCS_StopHoming .....	83
5.7.6 VCS_DefinePosition.....	83
5.7.7 VCS_GetHomingState .....	84
5.7.8 VCS_WaitForHomingAttained.....	84
5.8 Interpolated Position Mode (IPM) . . . . .	85
5.8.1 VCS_ActivateInterpolatedPositionMode .....	85
5.8.2 VCS_SetIpmBufferParameter .....	85
5.8.3 VCS_GetIpmBufferParameter.....	86
5.8.4 VCS_ClearIpmBuffer.....	86
5.8.5 VCS_GetFreeIpmBufferSize .....	87
5.8.6 VCS_AddPvtValueToIpmBuffer .....	87
5.8.7 VCS_StartIpmTrajectory .....	88
5.8.8 VCS_StopIpmTrajectory .....	88
5.8.9 VCS_GetIpmStatus .....	89
5.9 Position Mode (PM) . . . . .	90
5.9.1 VCS_ActivatePositionMode .....	90
5.9.2 VCS_SetPositionMust.....	90
5.9.3 VCSGetPositionMust .....	91
5.9.4 Advanced Functions.....	91
5.9.4.1 VCS_ActivateAnalogPositionSetpoint.....	91
5.9.4.2 VCS_DeactivateAnalogPositionSetpoint.....	92
5.9.4.3 VCS_EnableAnalogPositionSetpoint .....	92
5.9.4.4 VCS_DisableAnalogPositionSetpoint.....	93
5.10 Velocity Mode (VM) . . . . .	94
5.10.1 VCS_ActivateVelocityMode .....	94
5.10.2 VCS_SetVelocityMust .....	94
5.10.3 VCS_GetVelocityMust.....	95
5.10.4 Advanced Functions.....	95
5.10.4.1 VCS_ActivateAnalogVelocitySetpoint.....	95
5.10.4.2 VCS_DeactivateAnalogVelocitySetpoint.....	96
5.10.4.3 VCS_EnableAnalogVelocitySetpoint .....	96
5.10.4.4 VCS_DisableAnalogVelocitySetpoint .....	97
5.11 Current Mode (CM) . . . . .	98
5.11.1 VCS_ActivateCurrentMode .....	98
5.11.2 VCS_GetCurrentMust .....	98
5.11.3 VCS_SetCurrentMust.....	99
5.11.4 Advanced Functions.....	99
5.11.4.1 VCS_ActivateAnalogCurrentSetpoint.....	99
5.11.4.2 VCS_DeactivateAnalogCurrentSetpoint .....	100
5.11.4.3 VCS_EnableAnalogCurrentSetpoint .....	100
5.11.4.4 VCS_DisableAnalogCurrentSetpoint .....	101
5.12 Master Encoder Mode (MEM) . . . . .	102
5.12.1 VCS_ActivateMasterEncoderMode.....	102
5.12.2 VCS_SetMasterEncoderParameter .....	102
5.12.3 VCS_GetMasterEncoderParameter .....	103

---

5.13 Step Direction Mode (SDM) . . . . .	104
5.13.1 VCS_ActivateStepDirectionMode . . . . .	104
5.13.2 VCS_SetStepDirectionParameter . . . . .	104
5.13.3 VCS_GetStepDirectionParameter . . . . .	105
5.14 Inputs & Outputs . . . . .	106
5.14.1 VCS_GetAllDigitalInputs . . . . .	106
5.14.2 VCS_GetAllDigitalOutputs . . . . .	107
5.14.3 VCS_SetAllDigitalOutputs . . . . .	108
5.14.4 VCS_GetAnalogInput . . . . .	109
5.14.5 VCS_SetAnalogOutput . . . . .	109
5.14.6 Position Compare . . . . .	110
5.14.6.1 VCS_SetPositionCompareParameter . . . . .	110
5.14.6.2 VCS_GetPositionCompareParameter . . . . .	112
5.14.6.3 VCS_ActivatePositionCompare . . . . .	112
5.14.6.4 VCS_DeactivatePositionCompare . . . . .	113
5.14.6.5 VCS_EnablePositionCompare . . . . .	113
5.14.6.6 VCS_DisablePositionCompare . . . . .	114
5.14.6.7 VCS_SetPositionCompareReferencePosition . . . . .	114
5.14.7 Position Marker . . . . .	115
5.14.7.1 VCS_SetPositionMarkerParameter . . . . .	115
5.14.7.2 VCSGetPositionMarkerParameter . . . . .	116
5.14.7.3 VCS_ActivatePositionMarker . . . . .	116
5.14.7.4 VCS_DeactivatePositionMarker . . . . .	117
5.14.7.5 VCS_ReadPositionMarkerCounter . . . . .	117
5.14.7.6 VCS_ReadPositionMarkerCapturedPosition . . . . .	118
5.14.7.7 VCS_ResetPositionMarkerCounter . . . . .	118
<b>6 Data Recording Functions</b>	<b>119</b>
6.1 Operation Mode . . . . .	119
6.1.1 VCS_SetRecorderParameter . . . . .	119
6.1.2 VCS_GetRecorderParameter . . . . .	119
6.1.3 VCS_EnableTrigger . . . . .	120
6.1.4 VCS_DisableAllTriggers . . . . .	120
6.1.5 VCS_ActivateChannel . . . . .	121
6.1.6 VCS_DeactivateAllChannels . . . . .	121
6.2 Data Recorder Status . . . . .	122
6.2.1 VCS_StartRecorder . . . . .	122
6.2.2 VCS_StopRecorder . . . . .	122
6.2.3 VCS_ForceTrigger . . . . .	123
6.2.4 VCS_IsRecorderRunning . . . . .	123
6.2.5 VCS_IsRecorderTriggered . . . . .	124
6.3 Data Recorder Data . . . . .	125
6.3.1 VCS_ReadChannelVectorSize . . . . .	125
6.3.2 VCS_ReadVCS_ChannelDataVector . . . . .	125
6.3.3 VCS_ShowChannelDataDlg . . . . .	126
6.3.4 VCS_ExportChannelDataToFile . . . . .	126
6.4 Advanced Functions . . . . .	127
6.4.1 VCS_ReadDataBuffer . . . . .	127
6.4.2 VCS_ExtractChannelDataVector . . . . .	128

---

---

<b>7</b>	<b>Low Layer Functions</b>	<b>129</b>
7.1	CAN Layer .....	129
7.1.1	VCS_SendCANFrame .....	129
7.1.2	VCS_ReadCANFrame .....	129
7.1.3	VCS_RequestCANFrame .....	130
7.1.4	VCS_SendNMTService.....	130

## LIST OF FIGURES

Figure 2-1	EPOS2 documentation structure .....	9
Figure 2-2	EPOS4 documentation structure .....	9
Figure 2-3	Windows / Linux – Communication structure (example).....	11
Figure 2-4	Gateway – Communication structure (example).....	11
Figure 3-5	VCS_OpenDevice (programming example).....	14
Figure 3-6	VCS_OpenDevice (example) .....	14
Figure 3-7	VCS_SetProtocolStackSettings (programming example).....	15
Figure 3-8	VCS_OpenSubDevice (programming example).....	18
Figure 3-9	VCS_OpenSubDevice (example) .....	18
Figure 3-10	VCS_GetDeviceNameSelection (programming example) .....	24
Figure 3-11	VCS_GetProtocolStackNameSelection (programming example).....	25
Figure 3-12	VCS_GetInterfaceNameSelection (programming example).....	26
Figure 3-13	VCS_GetPortNameSelection (programming example) .....	27
Figure 3-14	VCS_GetBaudrateSelection (programming example) .....	29
Figure 4-15	VCS_ImportParameter (programming example) .....	33
Figure 4-16	VCS_ExportParameter (programming example) .....	34
Figure 4-17	VCS_UpdateFirmware (programming example).....	37
Figure 5-18	VCS_GetNbOfDeviceError (programming example) .....	66
Figure 5-19	VCS_GetDeviceErrorCode (programming example) .....	67
Figure 5-20	VCS_GetAllDigitalInputs (tInputs).....	106
Figure 5-21	VCS_GetAllDigitalOutputs (tOutputs).....	107
Figure 5-22	VCS_SetAllDigitalOutputs (tOutputs).....	108
Figure 9-23	Windows – Library hierarchy .....	136
Figure 9-24	Borland C++Builder – Adding library .....	137
Figure 9-25	Visual Basic – Adding modules .....	139
Figure 9-26	Visual Basic – Output path .....	139
Figure 9-27	Visual Basic .NET – Adding modules .....	140
Figure 9-28	Visual Basic .NET – Output path .....	140
Figure 9-29	Visual C# – Project settings .....	141
Figure 9-30	Visual C++ – Project settings .....	142
Figure 9-31	LabVIEW – Project Structure .....	143
Figure 9-32	LabWindows – add files to project .....	144
Figure 9-33	Linux – Library hierarchy .....	148
Figure 9-34	EPOS Command Library installation .....	150
Figure 9-35	EPOS Command Library uninstallation .....	150
Figure 9-36	HelloEposCmd – Parameters list .....	151
Figure 9-37	HelloEposCmd – list available protocols.....	152
Figure 9-38	HelloEposCmd – list available interfaces .....	152
Figure 9-39	HelloEposCmd – read device version.....	152

## LIST OF TABLES

Table 1-1	Notations used in this document .....	5
Table 1-2	Sources for additional information .....	6
Table 1-3	Brand Names and trademark owners .....	7
Table 2-4	Third party supplier products .....	10
Table 2-5	Data type definitions .....	12
Table 4-6	Motor types .....	38
Table 4-7	Position sensor types .....	41
Table 4-8	Digital input configuration .....	55
Table 4-9	Digital output configuration .....	56
Table 4-10	Analog input configuration .....	57
Table 4-11	Velocity notation index .....	58
Table 5-12	Operation modes .....	59
Table 5-13	State modes .....	61
Table 5-14	Homing methods .....	82
Table 5-15	Position compare – Operational modes .....	110
Table 5-16	Position compare – Interval modes .....	111
Table 5-17	Position compare – Direction dependency .....	111
Table 5-18	Position marker edge types .....	115
Table 5-19	Position marker modes .....	115
Table 6-20	Data recorder trigger types .....	120
Table 7-21	Command specifier .....	130
Table 8-22	Communication errors .....	131
Table 8-23	General errors .....	132
Table 8-24	Interface layer errors .....	133
Table 8-25	Interface layer “RS232” errors .....	133
Table 8-26	Interface layer “CAN” errors .....	133
Table 8-27	Interface layer “USB” errors .....	133
Table 8-28	Interface layer “HID” errors .....	133
Table 8-29	Protocol layer “MAXON_RS232” errors .....	134
Table 8-30	Protocol layer “CANopen” errors .....	134
Table 8-31	Protocol layer “Maxon Serial V2” errors .....	134
Table 8-32	Device layer errors .....	134
Table 9-33	Supported platforms, architectures, and interfaces .....	136
Table 9-34	Supported platforms, architectures, and interfaces .....	148
Table 10-35	Version history – Windows OS .....	154
Table 10-36	Version history – Linux OS .....	155
Table 11-37	Hardware and their supported functions – Initialization functions .....	157
Table 11-38	Hardware and their supported functions – Configuration functions .....	159
Table 11-39	Hardware and their supported functions – Operation functions .....	161
Table 11-40	Hardware and their supported functions – Data recording functions .....	162
Table 11-41	Hardware and their supported functions – Low layer functions .....	162

## INDEX

### A

architectures (supported)  
Linux **148**  
Windows **136**

### B

Borland C++ (integration into) **137**  
Borland Delphi (integration into) **138**

### C

CM (Current Mode) functions **98**  
configuration functions **33**

### D

data recording functions **119**  
data type definitions **12**  
Delphi (integration into) **138**  
drivers by 3rd party manufacturers **10**

### E

EPOS Command Library, integration of **135**  
error codes (overview) **131**  
Error Handling functions **66**

### F

functions  
    configuration **33**  
    data recording **119**  
    initialization **13**  
    low layer **129**  
    operation **59**  
functions for  
    Current Mode **98**  
    Homing Mode **80**  
    inputs & outputs **106**  
    Interpolated Position Mode **85**  
    Master Encoder Mode **102**  
    Position Mode **90**  
    Profile Position Mode **72**  
    Profile Velocity Mode **76**  
    Step Direction Mode **104**  
    Velocity Mode **94**  
functions/hardware matrix **157, 163**

### H

hardware/functions matrix **157, 163**  
HM (Homing Mode) functions **80**  
homing methods **82**  
how to  
    integrate the «EPOS Command Library» **135**  
    interpret icons (and signs) used in the document **6**

### I

initialization functions **13**  
input/output functions **106**  
interfaces (supported) **136, 148**  
    Linux **148**  
    Windows **136**  
IPM (Interpolated Position Mode) functions **85**  
IXXAT (supported devices) **10**

### K

Kvaser (supported devices) **10**

### L

LabVIEW (integration into) **143**  
LabWindows (integration into) **144**  
legal notice **7**  
Linux  
    library hierarchy **148**  
low layer functions **129**

### M

manufacturers of supported products **10**  
MEM (Master Encoder Mode) functions **102**  
Motion Info functions **68**

### N

National Instruments (supported devices) **10**  
NI-CAN **10**  
NI-XNET **10**

### O

operation functions **59**  
Operation Mode functions **59**

### P

PM (Position Mode) functions **90**  
PPM (Profile Position Mode) functions **72**  
purpose of this document **5**  
PVM (Profile Velocity Mode) functions **76**

### S

SDM (Step Direction Mode) functions **104**  
signs used **6**  
State Machine functions **61**  
supported products by 3rd party suppliers **10**  
symbols used **6**

## V

- VCI driver **10**
- Vector (supported devices) **10**
- Visual Basic .NET (integration into) **140**
- Visual Basic (integration into) **138**
- Visual C# (integration into) **141**
- Visual C++ (integration into) **142**
- VM (Velocity Mode) functions **94**

## W

- warranty **7**
- Windows
  - communication structure **11**
  - library hierarchies **136**

## X

- XL driver **10**

---

*••page intentionally left blank••*

© 2018 maxon motor. All rights reserved.

The present document – including all parts thereof – is protected by copyright. Any use (including reproduction, translation, microfilming and other means of electronic data processing) beyond the narrow restrictions of the copyright law without the prior approval of maxon motor ag, is not permitted and subject to persecution under the applicable law.

**maxon motor ag**

Brüningstrasse 220  
P.O.Box 263  
CH-6072 Sachseln  
Switzerland

Phone +41 41 666 15 00  
Fax +41 41 666 16 50

[www.maxonmotor.com](http://www.maxonmotor.com)