DEDITEC GMBH

USB-RS485-STICK

Hardware-Description

2010 Oktober

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Introduction

1. Introduction

1.1. General remarks

First of all, we would like to congratulate you to the purchase of a high quality DEDITEC product.

Our products are being developed by our engineers according to quality requirements of high standard. Already during design and development we take care that our products have -besides quality- a long availability and an optimal flexibility.

Modular design

The modular design of our products reduces the time and the cost of development. Therefor we can offer you high quality products at a competitive price.

Availability

Because of the modular design of our products, we have to redesign only a module instead of the whole product, in case a specific component is no longer available.

1.2. Customer satisfaction

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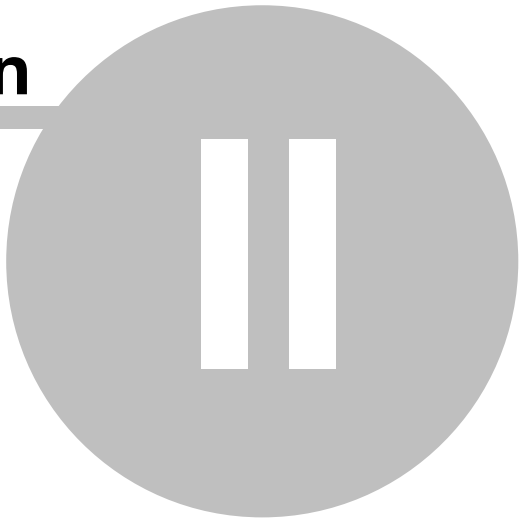
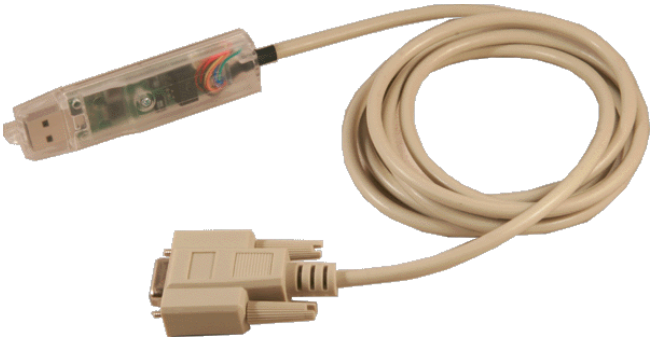
Hardware description



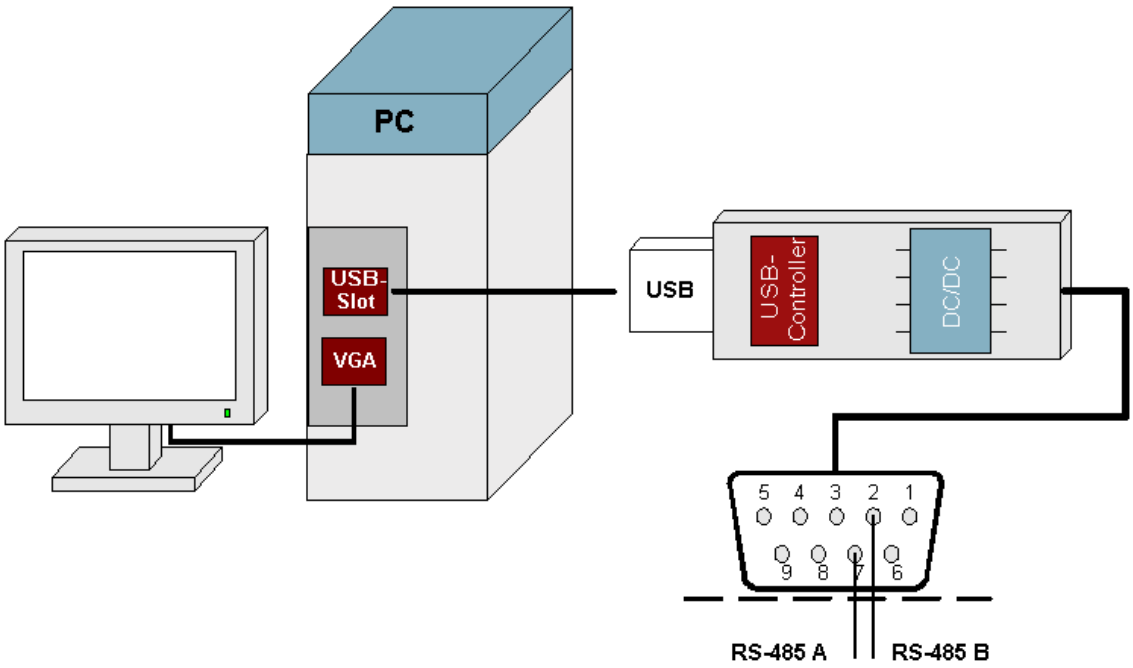
2. Hardware description

With this handy stick your are able to connect your PC/Notebook to the world of RS-485 devices. The galvanical isolation electrically separates the PC from the RS-485 interface. Disruptive impulses from the RS-485 side, that destroy such converters, are now things of the past.

With the help of galvanical isolation it is possible to connect your PC to industrial facilities that operate on an different electrical level than the used PC or notebook.



2.1. Technical data

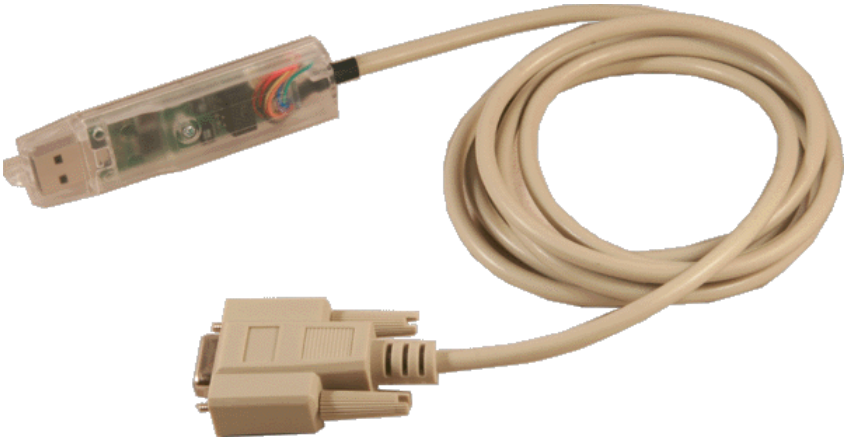


- +5V power supply
- USB to RS-485 converter
- galvanically isolated
- 50 Baud ..115200 Baud (per Software adjustable)
- Windows VCP (Virtuel COM Port)
- Linux drivers included
- Dimensions: 84,5 x 21 x 12,5/9,5 mm (without cable)

2.2. Pin assignment connector

2.2.1. 9pol. D-SUB male

The connection to the stick on the RS-485 side is made by a 9pol. D-Sub male.



RS-485 pin assignment

Pin	
2	RS-485 B
7	RS-485 A

2.3. LED's

Two LED signalize send and receive events.

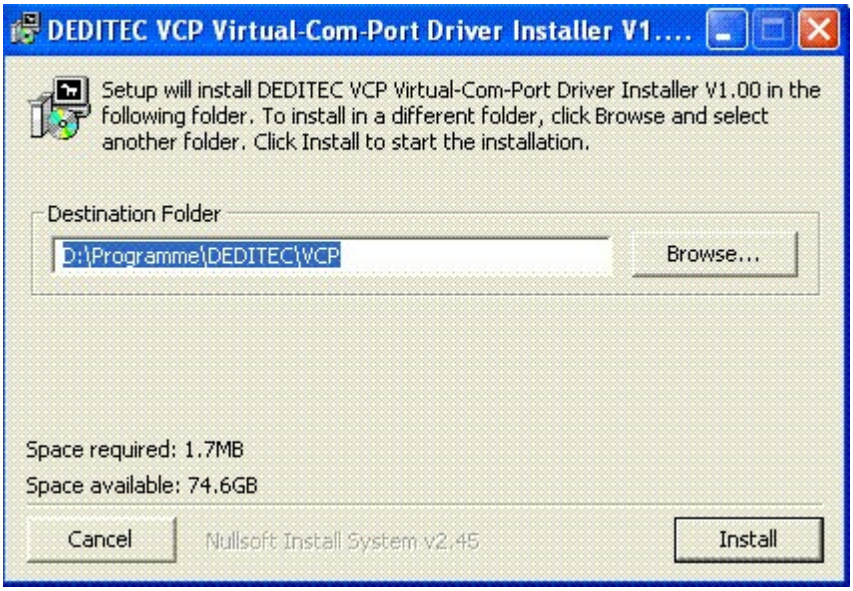
1*TX	(transmit)
1*RX	(receive)

Software

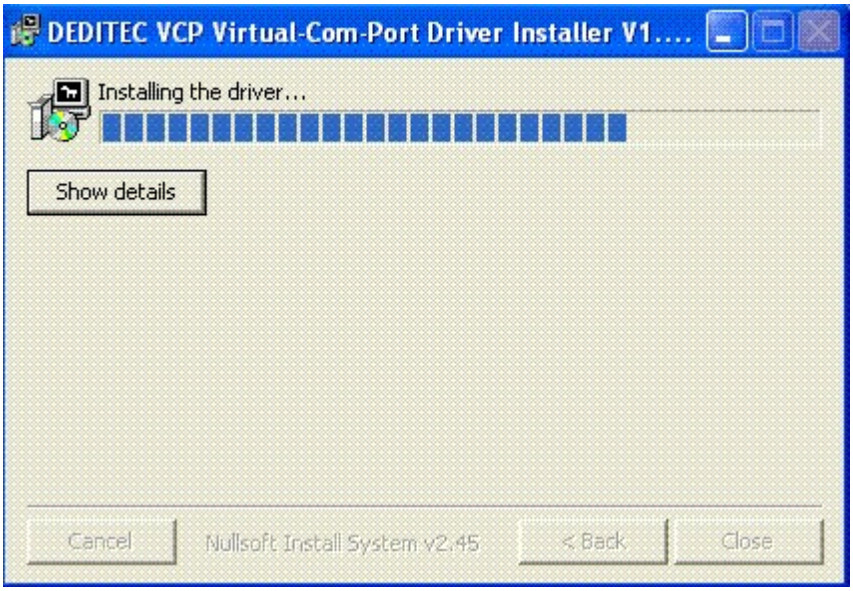
3. Software

3.1. "VCP driver (Virtual COM-Port)" installation

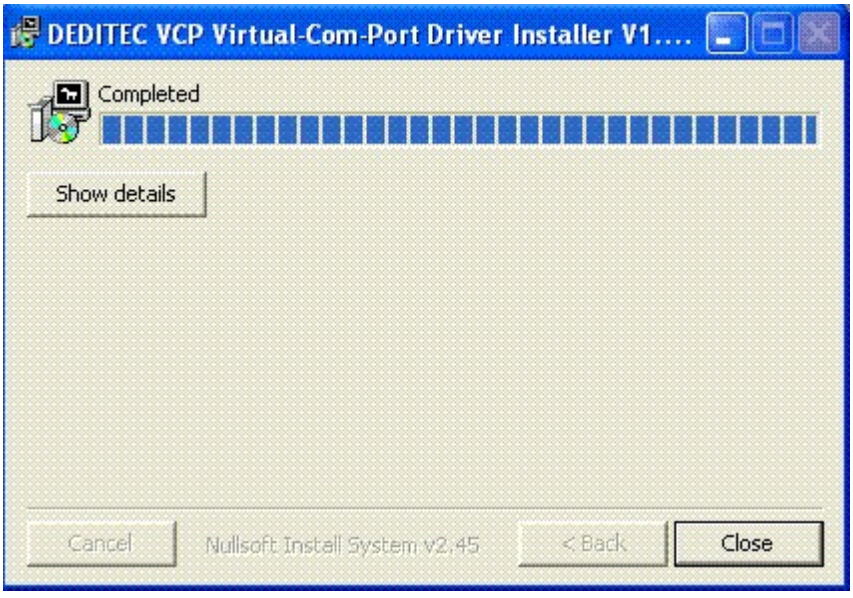
Insert the DEDITEC driver CD in your drive and start **“vcp_driver_install.exe”**. The “VCP driver (Virtual COM-Port)” software is also available at http://www.deditec.de/en/entwicklungstools/download.html.



Press “Install”.



The driver will be installed.



The **“VCP Driver (Virtual COM-Port)”** Software has been installed now.
Press “Close” to finish installation.

Appendix

4. Appendix

4.1. Product information

Ord.no.: USB-RS485-STICK

Product: USB-RS-485-converter with galvanic isolation

Productlink: http://www.deditec.de/en/entwicklungstools/prod/usb-rs485-stick.html

4.2. Revisions

Rev 1.00	First issue
Rev 2.00	Design change

4.3. Copyrights and trademarks

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RO-USB-INTERFACE

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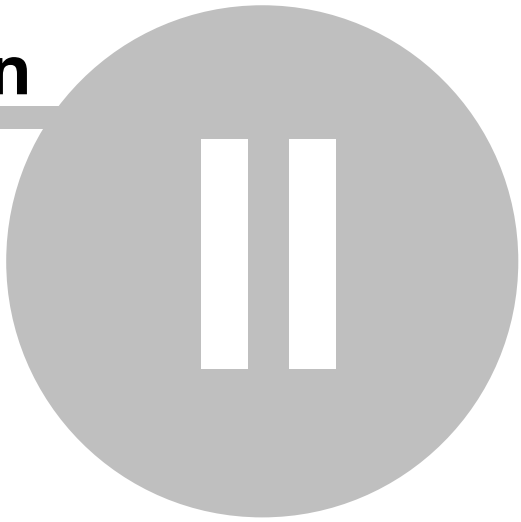
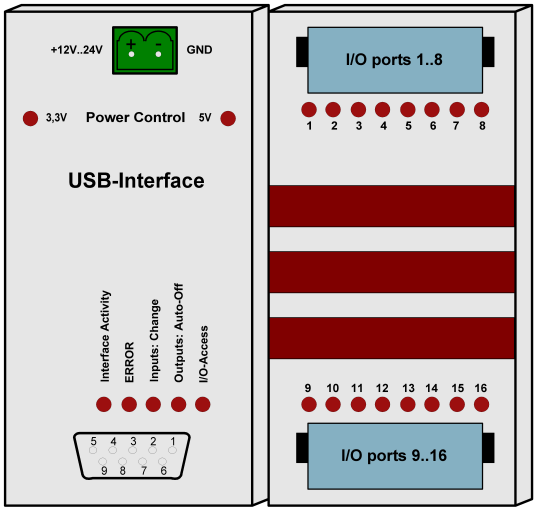


2. Hardware description

2.1. Overview screen

The figure below shows the control module with USB-interface (left side) combined with an input/output module (right side). For a connection to the USB bus, an adequate adapter module in form of a USB-stick is included.



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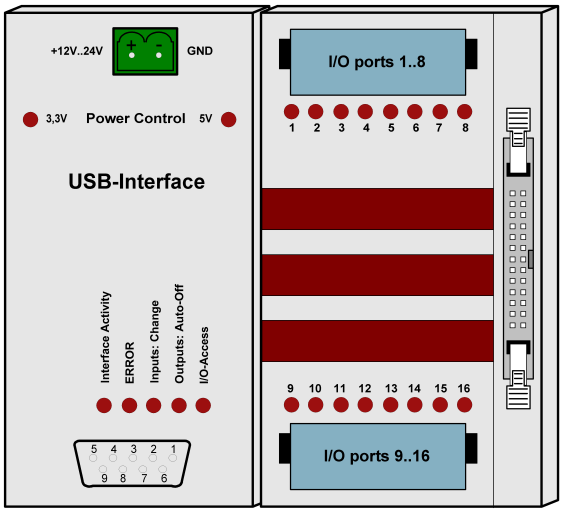


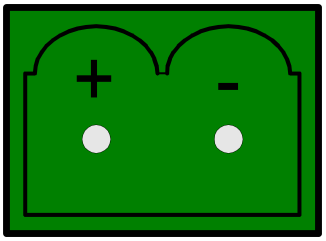
2.2. Technical data

- Single power supply +7V..+24V DC
- 7 control LEDs
- USB interface
- Transmission range up to 100m!
- USB 2.0 and USB 1.1
- Data transfer speed: 12 MBit/s or 1,5 MBit/s
- Galvanically isolated interface using optocouplers
- 9 pol. D-SUB connector
- Timeout feature providing ability to disconnect outputs for safety reasons
- Comfortable connector system with ejection mechanism
- Expandable in 16 gradations
- Can be combined without any problem to other modules of the RO series

2.3. Plug-in connector of the module

2.3.1. Power supply

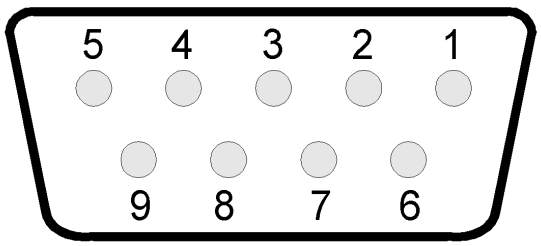
The input-power-supply-range lies between +7V and +24V DC. Power supply can be realized with a standard AC/DC adaptor with 1A output current. A suitable plug-in connector is included.



2.3.2. USB interface

module in form of a USB stick with a connection cable. The stick has two optocouplers ensuring a galvanical isolation to the PC.

The other end of the adapater is a 9 pol. D-SUB connector which is connected to the RO-module.



2.4. Control LEDs

The USB module has a series of control LEDs. They are used for easy visual indication of various state functions.

While switching-on the module, it should signalize the following sequence:

- all five LEDs flashing briefly
- right LED (I/O access) flashing briefly
- all five LEDs flashing briefly

2.4.1. Definition of the LEDs

LED	Description
3,3V	Internal 3,3V power supply
5V	Internal 5V power supply
Interface Activity	Active communication- over the USB bus
ERROR	Error during USB-transfer (for details see document ”USB protocol”)
Inputs: Change	State change between 2 read-out cylces detected
Outputs: Auto-Off	Due to timeout, all outputs are switched-off for safety reasons
I/O Access	CPU-access on the inputs and outputs of the connected modules

Software

3. Software

3.1. Using our products

3.1.1. Access via graphical applications

We provide driverinterfaces e.g. for LabVIEW and ProfiLab. The DELIB driver library is the basis, which can be directly activated by ProfiLAB.
For LabVIEW, we provide a simple driver connection with examples!

3.1.2. Access via the DELIB driver library

In the appendix, you can find the complete function reference for the integration of our API-functions in your software. In addition we provide examples for the following programming languages:

- C
- C++
- C#
- Delphi
- VisualBasic
- VB.NET
- MS-Office

3.1.3. Access via protocol

The protocol for the activation of our products is open source. So you are able to use our products on systems without Windows or Linux.

3.1.4. Access via provided test programs

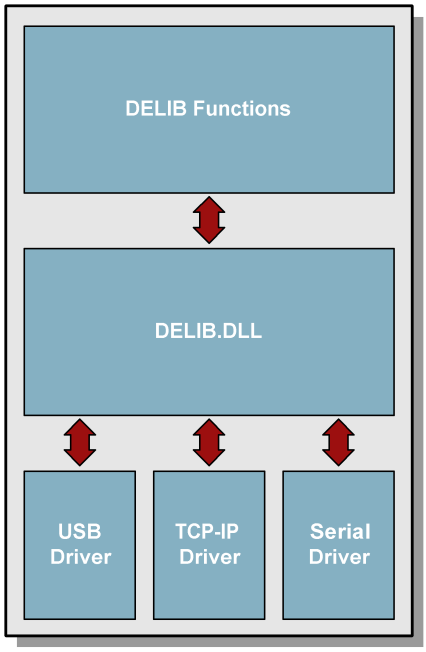
We provide simple handling test programs for the most important functions of our products. These will be installed automatically by the installation of the DELIB driver library.

So you can test directly e.g. relays or you can check the voltage of an A/D converter.

3.2. DELIB driver library

3.2.1. Overview

The following figure explains the structure of the DELIB driver library



The DELIB driver library allows an uniform response of DEDITEC hardware with particular consideration of the following viewpoints:

- Independent of operating system
- Independent of programming language
- Independent of the product

Program under diverse operating systems

The DELIB driver library allows an uniform response of our products on diverse operating systems.

We has made sure, that all of our products can be responded by a few commands.

Whatever which operating system you use. - Therefore the DELIB cares!

Program with diverse programming languages

We provide uniform commands to create own applications. This will be solved by the DELIB driver library.

You choose the programming language!

It can be simply developed applications under C++, C, Visual Basic, Delphi or LabVIEW®.

Program independent of the interface

Write your application independent of the interface !

Program an apllication for an USB product of us. - Also, it will work with an ethernet or RS-232 product of us !

SDK-Kit for Programmer

Integrate the DELIB in your application. On demand you receive an installation script for free, which allows you, to integrate the DELIB installation in your apllication.

3.2.2. Supported operating systems

Our products support the following operating systems:

- Windows 2000
- Windows XP
- Windows Vista
- Windows 7
- Linux

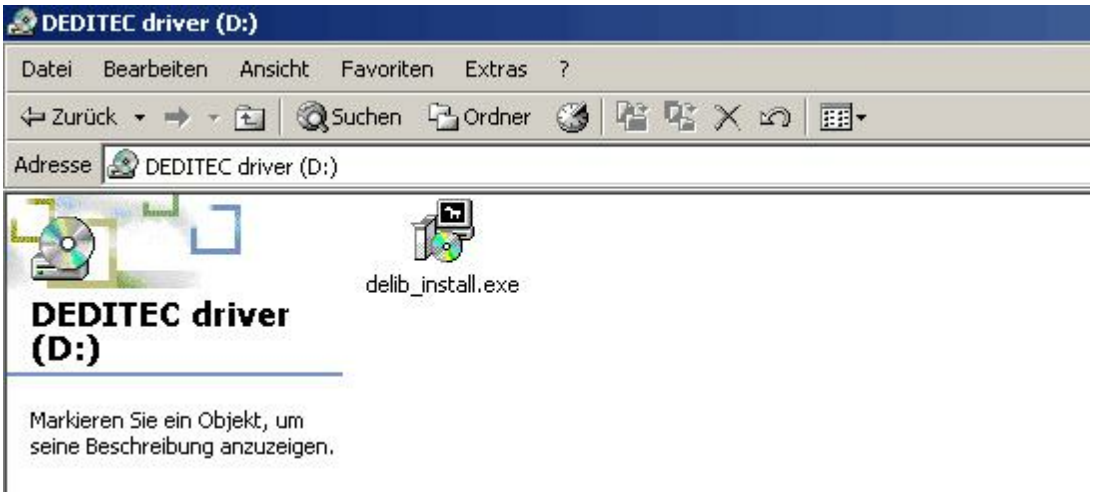
3.2.3. Supported programming languages

Our products are responsive via the following programming languages:

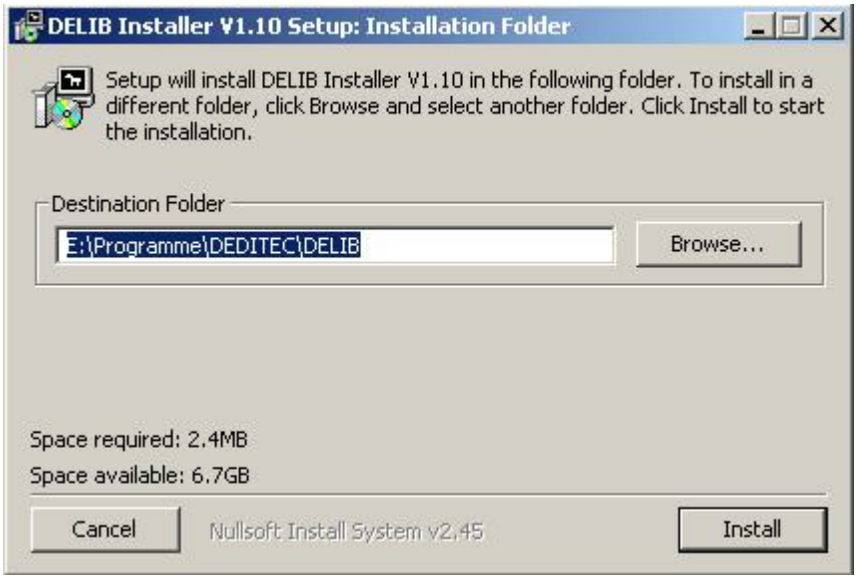
- C
- C++
- C#
- Delphi
- VisualBasic
- VB.NET
- MS-Office

3.2.4. Installation DELIB driver library

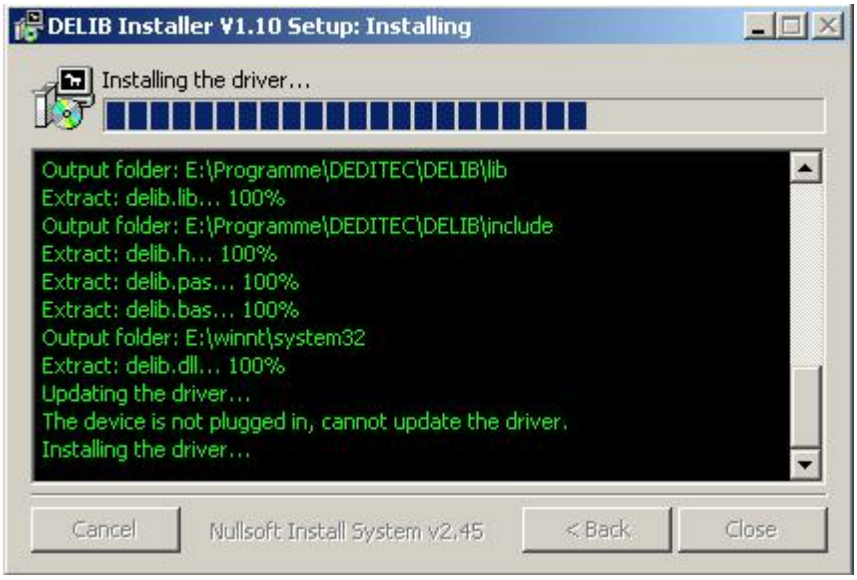
DELIB stands for DEDITEC Library and contains the necessary libraries for the modules in the programming languages C, Delphi and Visual Basic.



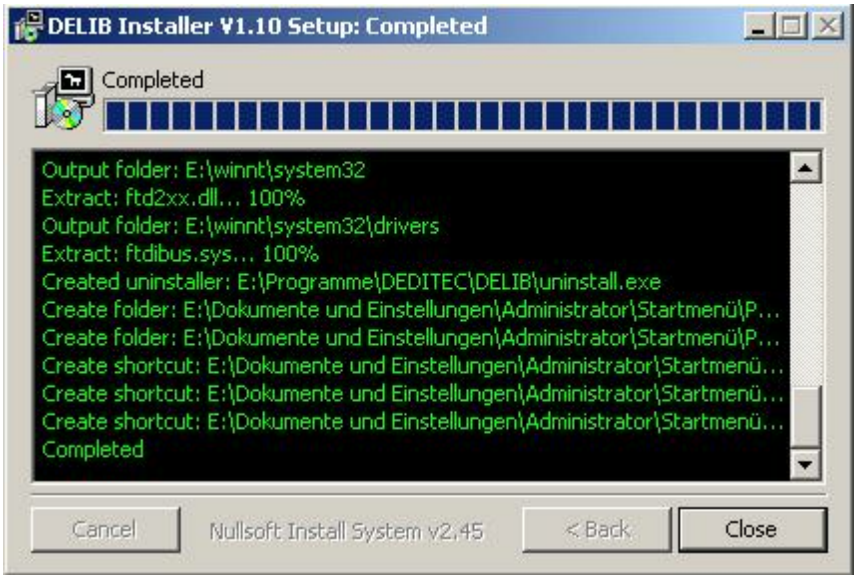
Insert the DEDITEC driver CD into the drive and start **„delib_install.exe“**. The DELIB driver library is also available on http://www.deditec.en/delib



Click on **„Install“**.



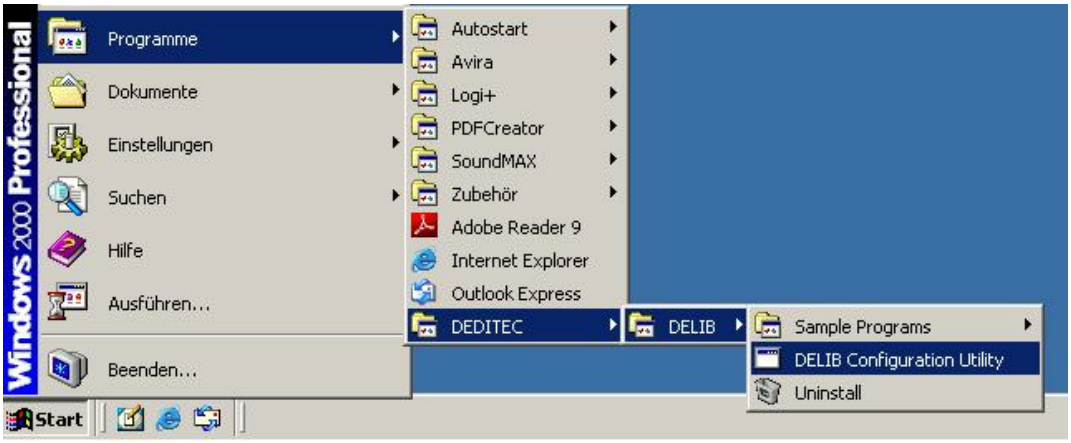
The drivers will be installed.



The DELIB driver library is now installed. Press **„Close“** to finish the installation.

You can configure your module with the **„DELIB Configuration Utility“** (see next chapter). This is only necessary, if more than one module is present.

3.2.5. DELIB Configuration Utility



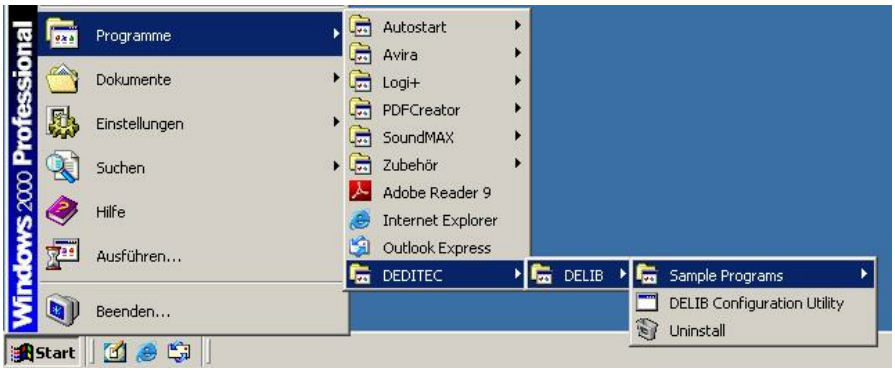
Start the **"DELIB Configuration Utility"** as follows:

Start → Programs → DEDITEC → DELIB → DELIB Configuration Utility.

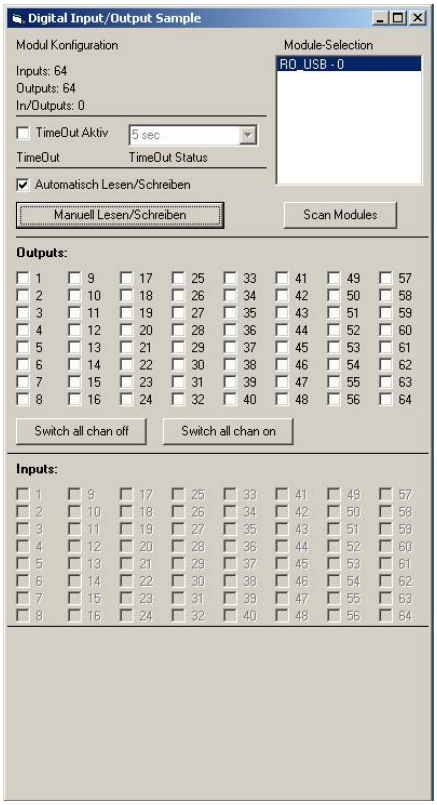
The **„DELIB Configuration Utility"** is a program to configure and subdivide identical USB-modules in the system. This is only necessary if more than one module is present.

3.3. Test programs

3.3.1. Digital Input-Output Demo

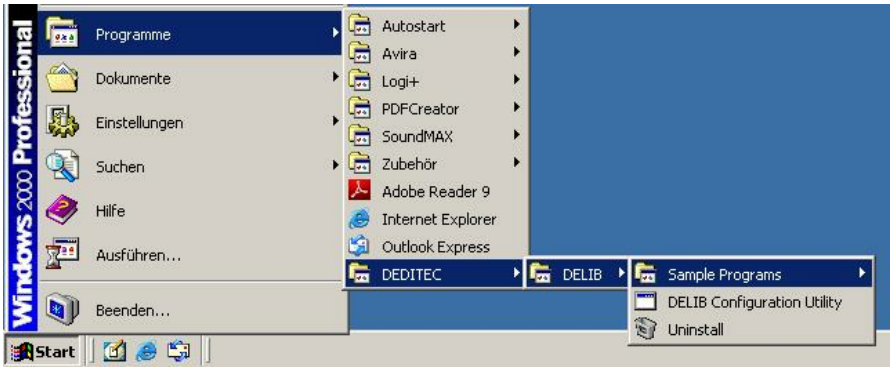


Start **"Digital Input-Output Demo"** as follows:
Start → Programme → DEDITEC → DELIB → Digital Input-Output Demo.

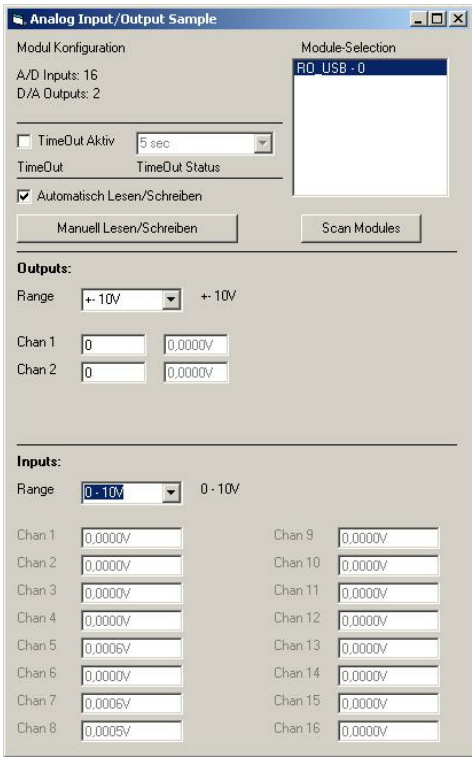


The screenshot shows a test of the RO-USB-O64-R64. The configuration of the module (64 inputs and 64 outputs) is shown on the upper left side.

3.3.2. Analog Input-Output Demo

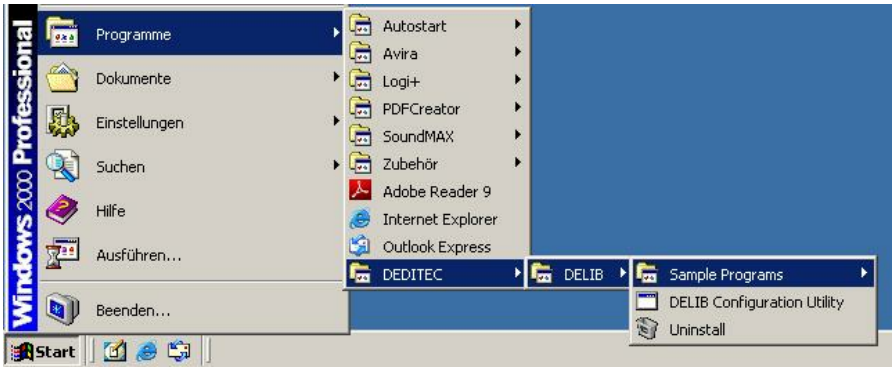


Start **"Analog Input-Output Demo"** as follows:
Start → Programme → DEDITEC → DELIB → Analog Input-Output Demo.

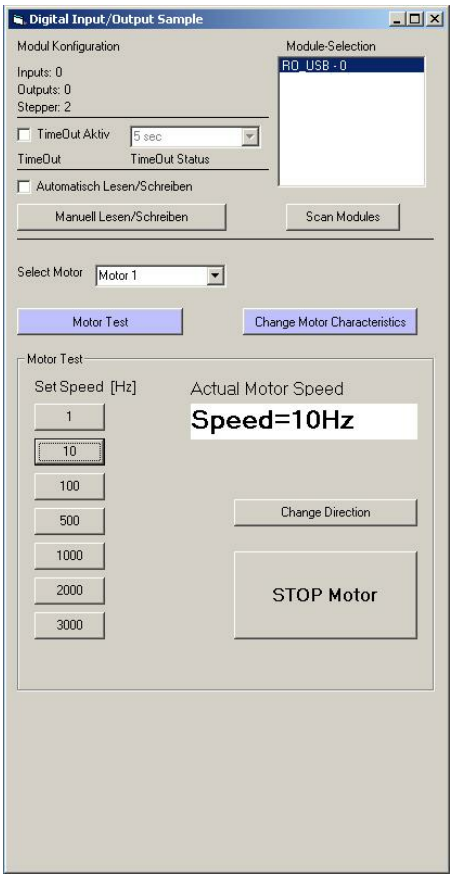


The screenshot shows a test of the RO-USB-AD16-DA2_ISO. The configuration of the module (16 A/D inputs and 2 D/A outputs) is shown on the upper left side.

3.3.3. Stepper Demo



Start **"Stepper Demo"** as follows:
Start → Programme → DEDITEC → DELIB → Stepper Demo.



The screenshot shows a test of the RO-USB-STEPPER2. The configuration of the module (2 Stepper) is shown on the upper left side.

Appendix

4. Appendix

4.1. Revisions

Rev 1.00	First issue
Rev 2.00	Design change

4.2. Copyrights and trademarks

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RO-STEPPER2

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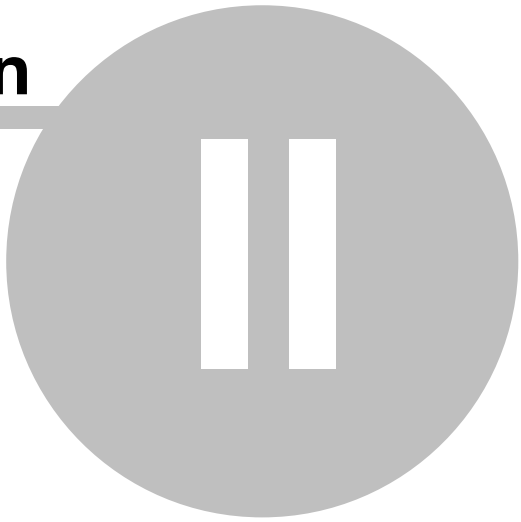
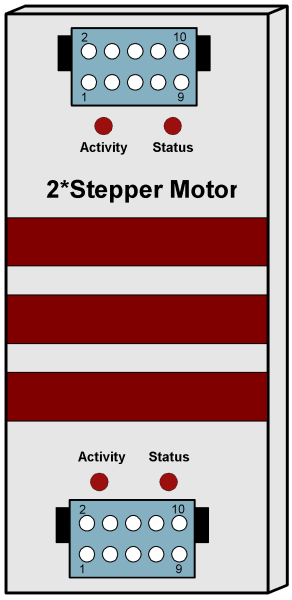


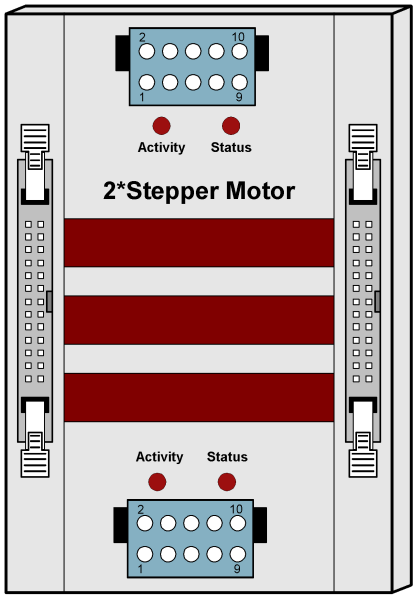
2. Hardware description

2.1. Overview screen

The lower figure shows a module with a terminal block and corresponding numbered connection ports.



The following figure shows a flexible stepper module with a terminal block and corresponding numbered connection ports.



2.2. Technical data

Common:

- Module for two stepper motors
- Comfortable connector system with ejection mechanism
- Can be combined without any problem to other modules of the RO series

Configurable parameters

- Start-/ stop frequency
- Maximum stepping frequency
- Acceleration slope
- Deceleration slope
- Phase current
- Hold current
- Hold time

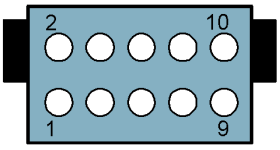
2.3. Stepping motor control

Every parameter can be conveniently set using the DELIB library.

Two reference switches are used to reach a reference position. Two additional end switches provide a save stopping. If they are operated, the motors may exclusively be driven back in the opposite direction.

2.4. Stepper connection wiring (10pol) - pinout

Pinout of a socket connector and also of a stepper motor:



Pin		Pin	
1	24 V (motor power supply)	2	0 V (motor power supply)
3	Phase 1 (+)	4	Reference switch 2*)
5	Phase 1 (-)	6	Reference switch 1*)
7	Phase 2 (+)	8	End switch 2 *)
9	Phase 2 (-)	10	End switch 1 *)

*) The switches must be connected towards 24 V.

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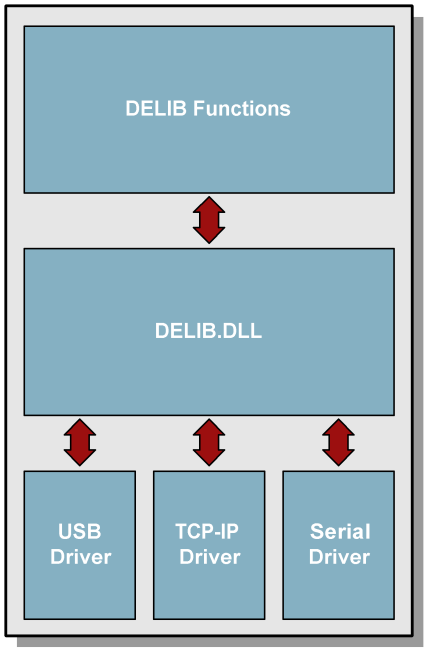

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SDK-Kit for Programmer

Integrate the DELIB in your application. On demand you receive an installation script for free, which allows you, to integrate the DELIB installation in your apllication.

3.2.2. Supported operating systems

Our products support the following operating systems:

- Windows 2000
- Windows XP
- Windows Vista
- Windows 7
- Linux

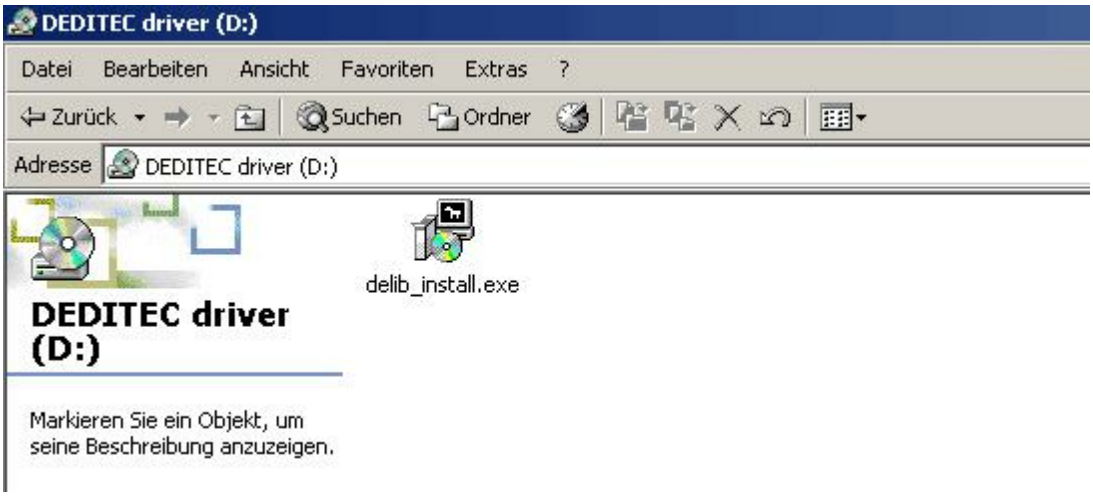
3.2.3. Supported programming languages

Our products are responsive via the following programming languages:

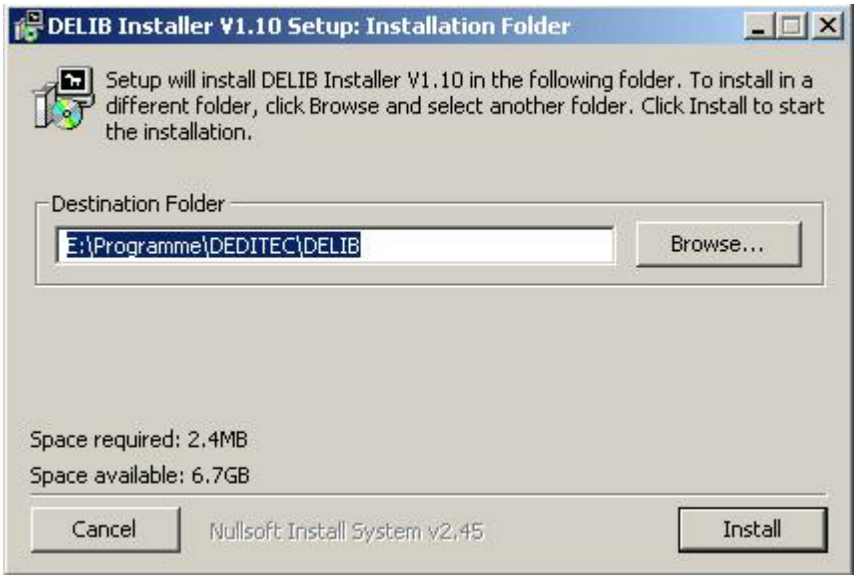
- C
- C++
- C#
- Delphi
- VisualBasic
- VB.NET
- MS-Office

3.2.4. Installation DELIB driver library

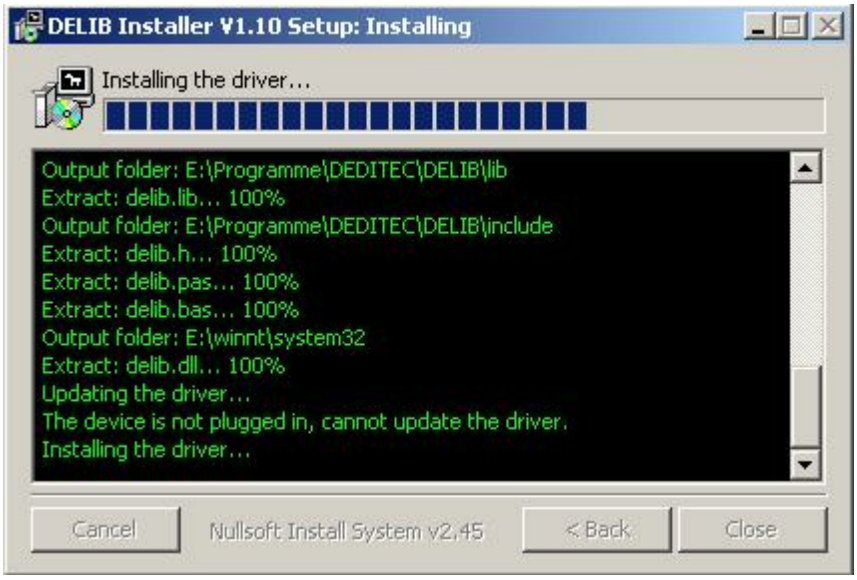
DELIB stands for DEDITEC Library and contains the necessary libraries for the modules in the programming languages C, Delphi and Visual Basic.



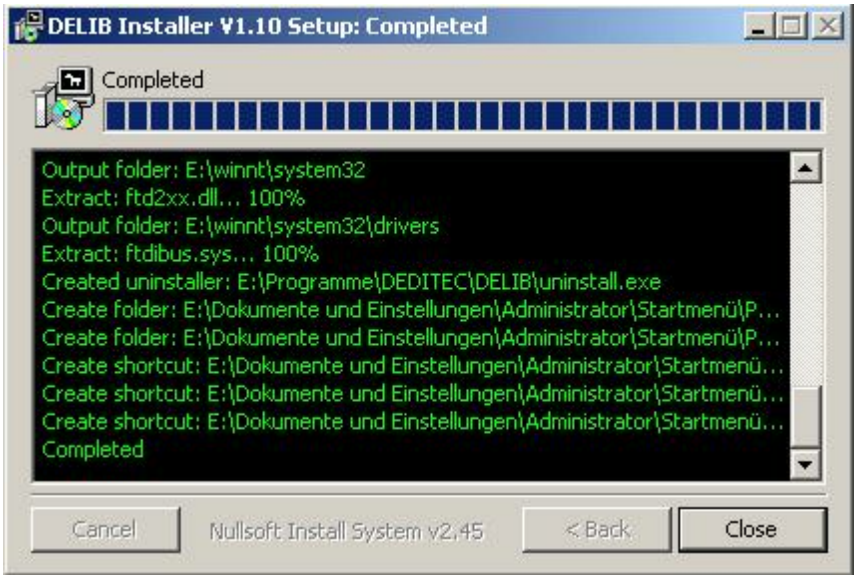
Insert the DEDITEC driver CD into the drive and start **„delib_install.exe“**. The DELIB driver library is also available on http://www.deditec.en/delib



Click on **„Install“**.



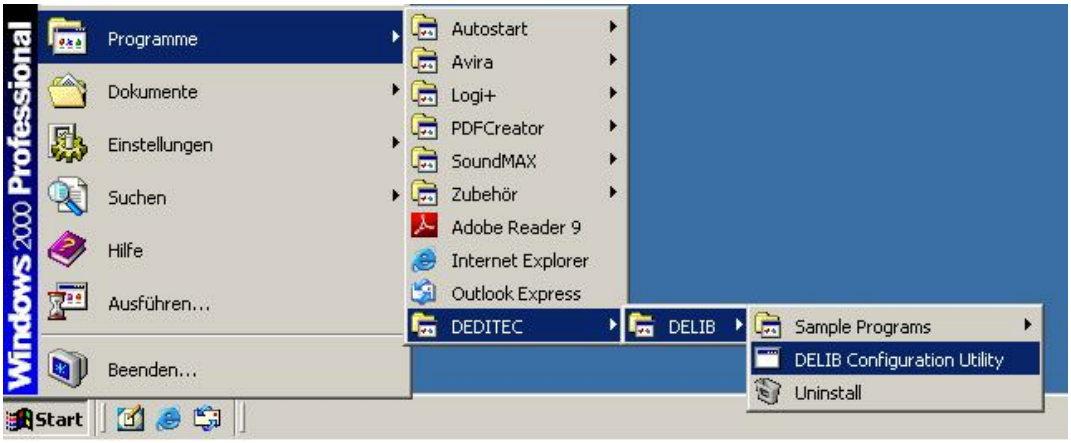
The drivers will be installed.



The DELIB driver library is now installed. Press **„Close“** to finish the installation.

You can configure your module with the **„DELIB Configuration Utility“** (see next chapter). This is only necessary, if more than one module is present.

3.2.5. DELIB Configuration Utility

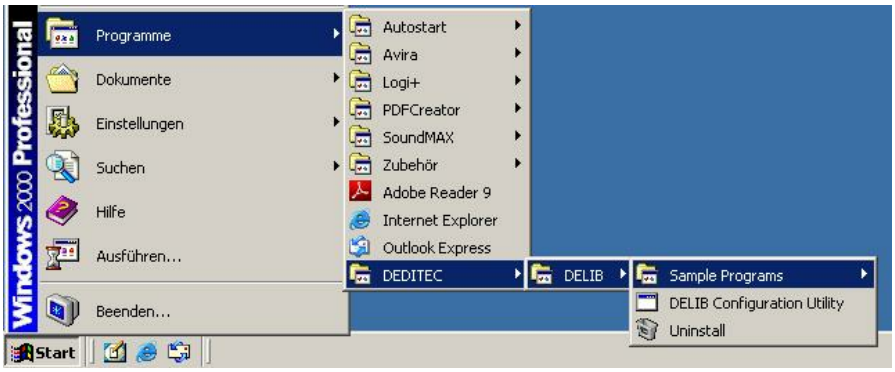


Start the **"DELIB Configuration Utility"** as follows:
Start → Programs → DEDITEC → DELIB → DELIB Configuration Utility.

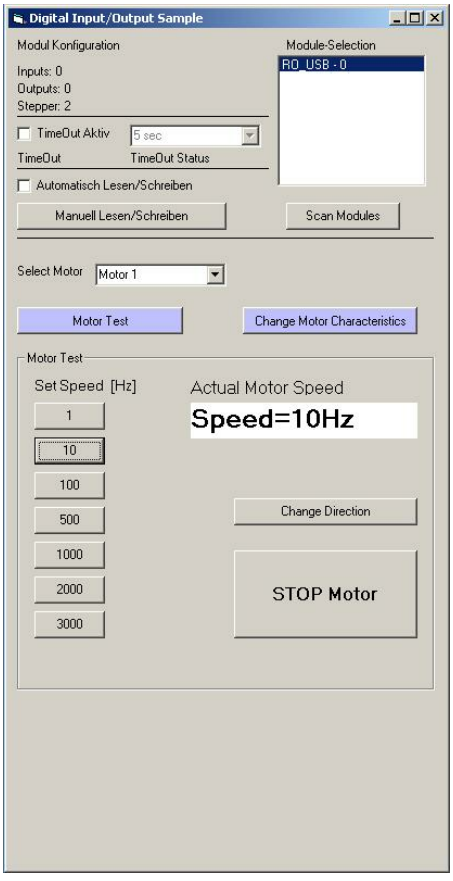
The **„DELIB Configuration Utility"** is a program to configure and subdivide identical USB-modules in the system. This is only necessary if more than one module is present.

3.3. Test programs

3.3.1. Stepper Demo



Start **"Stepper Demo"** as follows:
Start → Programme → DEDITEC → DELIB → Stepper Demo.



The screenshot shows a test of the RO-USB-STEPPER2. The configuration of the module (2 Stepper) is shown on the upper left side.

DELIB API reference

4. DELIB API reference

4.1. Management functions

4.1.1. DapiOpenModule

Description

This function opens a particular module.

Definition

ULONG DapiOpenModule(ULONG moduleID, ULONG nr);

Parameters

moduleID=Specifies the module, which is to be opened (see delib.h)
nr=Indicates No of module which is to be opened.
nr=0 -> 1. module
nr=1 -> 2. module

Return value

handle=handle to the corresponding module
handle=0 -> Module was not found

Remarks

The handle returned by this function is needed to identify the module for all other functions.

Example program

```
// USB-Modul öffnen
handle = DapiOpenModule(RO_USB1, 0);
printf("handle = %x\n", handle);
if (handle==0)
{
// USB Modul wurde nicht gefunden
printf("Modul konnte nicht geöffnet werden\n");
return;
}
```

4.1.2. DapiCloseModule

Description

This command closes an opened module.

Definition

ULONG DapiCloseModule(ULONG handle);

Parameters

handle=This is the handle of an opened module

Return value

none

Example program

```
// Close the module
DapiCloseModule(handle);
```

4.2. Error handling

4.2.1. DapiGetLastError

Description

This function returns the last registered error.

Definition

ULONG DapiGetLastError();

Parameters

None

Return value

Error code

0=no error. (see delib.h)

Example program

```
ULONG error;
error=DapiGetLastError();
if(error==0) return FALSE;
printf("ERROR = %d", error);
```

4.2.2. DapiGetLastErrorText

Description

This function reads the text of the last registered error.

Definition

*extern ULONG __stdcall DapiGetLastErrorText(unsigned char * msg, unsigned long msg_length);*

Parameters

msg = text buffer

msg_length = length of the buffer

Example program

```
BOOL IsError ()
{
  if (DapiGetLastError () != DAPI_ERR_NONE)
       {
         unsigned char msg[500];

         DapiGetLastErrorText((unsigned char*) msg, sizeof(msg));
         printf ("Error Code = %x * Message = %s\n", 0, msg);
         return TRUE;
       }
  return FALSE;
}
```

4.3. Stepper motor functions

4.3.1. DapiStepperCommands

4.3.1.1. DAPI_STEPPER_CMD_GO_POSITION

Description

With this command the motor will drive to a position. This command can only be used when the motor is not disabled and Go_Position or Go_Reference are not executed.

Definition

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_GO_POSITION, position, 0, 0, 0);

Example program

```
DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_GO_POSITION , go_pos_par,
0,0,0);
```

4.3.1.2. DAPI_STEPPER_CMD_GO_POSITION_RELATIVE

Description

With this command the motor will go to a relative position. In contrast to the command GO_POSITION, which goes to an absolute position, this command considers the current position. This command can only be used when the motor is not disabled and Go_Position or Go_Reference are not executed.

Definition

void DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GO_POSITION_RELATIVE, go_pos_rel_par, 0, 0, 0);

Parameters

go_pos_rel_par=the relative position, to which will be gone

Example program

```
DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_GO_POSITION_RELATIVE, 100,
0, 0, 0);
//Motor fährt, von der aktuellen Position aus gesehen, 100 Schritte nach
rechts.
```

4.3.1.3. DAPI_STEPPER_CMD_SET_POSITION

Description

This command ist used to set the motor position. The resolution ist 1/16 Full-step. This command may be used anytime.

Definition

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_POSITION, par1, 0, 0, 0);

Parameters

par1=Motor position

4.3.1.4. DAPI_STEPPER_CMD_SET_FREQUENCY

Description

This command is used to set the motor reference frequency. The motor frequency regulation takes on the compliance of the acceleration and deceleration slope. Step losses do not occur. The motor reference frequency is related to the full-step-mode.

The direction will be defined by the prefix. If the motor reference frequency is higher than the maximum frequency, the command is ignored.

With closed Endswitch1 the motor can only drive in positive direction, with closed Endswitch2 the motor can only drive in negative direction, otherwise the command is ignored.

Definition

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_FREQUENCY, par1, 0, 0, 0);

Parameters

par1=Motor reference frequency [Hz]

4.3.1.5. DAPI_STEPPER_CMD_GET_FREQUENCY

Description

This command is used to read the motor frequency. This command can be used everytime.

Definition

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_GET_FREQUENCY, par1, 0 ,0 ,0);

Return value

Motor frequency [Hz]

4.3.1.6. DAPI_STEPPER_CMD_SET_FREQUENCY_DIRECTLY

Description

This command is used to set the motor frequency. The motor frequency regulation takes no funktion on the compliance of the acceleration and deceleration slope. The user is responsible. Step losses can occur. The motor reference frequency is related to the full-step. The direction can be defined by the prefix.

The motor frequency can't exceed the maximum frequency.

Definition

DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_SET_FREQUENCY_DIRECTLY, par1, 0 ,0 ,0);

Parameters

par1=Motor frequency [Hz]

4.3.1.7. DAPI_STEPPER_CMD_STOP

Description

This command is used to stop the motor, the deceleration slope will be used.

Definition

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_STOP, 0, 0, 0, 0);

4.3.1.8. DAPI_STEPPER_CMD_FULLSTOP

Description

This command is used to stop the motors immediately without using the the deceleration slope. After this command the motor position might be ignorred because the motor has been stopped uncontrolled.

Definition

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_FULLSTOP, 0, 0, 0, 0);

Example program

```
DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_FULLSTOP , 0, 0, 0, 0);
```

4.3.1.9. DAPI_STEPPER_CMD_DISABLE

Description

This command is used to disable/enable the motor. The motor stops or starts driving. This command can be only used when the motor stopped.

Definition

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_DISABLE, par1, 0, 0, 0);

Parameters

par1 = Disablemode (0=Normal function / 1=Disable)

4.3.1.10. DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC

Description

With this command, you can set motor characteristics.

Definition

DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC, par1, par2, 0, 0);

Parameters

Set Parameter-Stepmode

par1=DAPI_STEPPER_MOTORCHAR_PAR_STEPMODE

par2=0 (Full-step)

par2=1 (1/2-step)

par2=2 (1/4-step)

par2=3 (1/8-step)

par2=4 (1/16-step)

Set Parameter-GO-Frequency

par1=DAPI_STEPPER_MOTORCHAR_PAR_GOFREQUENCY

par2=Speed [Full-step / s] - related to full-step frequency - (maximum value=5000)

Set Parameter-Start-Frequency

par1=DAPI_STEPPER_MOTORCHAR_PAR_STARTFREQUENCY

par2=Startfrequency [Full-step / s] - related to full-step frequency - (maximum value=5000)

Set Parameter-Stop-Frequency

par1=DAPI_STEPPER_MOTORCHAR_PAR_STOPFREQUENCY

par2=Stopfrequency [Full-step / s] - related to full-step frequency - (maximum value=5000)

Set Parameter-Max-Frequency

par1=DAPI_STEPPER_MOTORCHAR_PAR_MAXFREQUENCY

par2=maximum frequency [Full-step / s] - related to full-step frequency - (maximum value=5000)

Set Parameter-Accelerationslope
par1=DAPI_STEPPER_MOTORCHAR_PAR_ACCELERATIONSLOPE
par2=Acceleration slope [Full-step / 10ms] - (maximum value=1000)

Set Parameter-Decelerationslope
par1=DAPI_STEPPER_MOTORCHAR_PAR_DECELERATIONSLOPE
par2=Deceleration slope [Full-step / 10ms] - (maximum value=1000)

Set Parameter-Phasecurrent
par1=DAPI_STEPPER_MOTORCHAR_PAR_PHASECURRENT
par2=Phase current [mA] - (maximum value=1500)

Set Parameter-Hold-Phasecurrent
par1=DAPI_STEPPER_MOTORCHAR_PAR_HOLDPHASECURRENT
par2=Phase current at motor hold [mA] - (maximum value=1500)

Set Parameter-Hold-Time
par1=DAPI_STEPPER_MOTORCHAR_PAR_HOLDTIME
par2=Time in that the hold goes to motorstop [ms]
par2=-1 / FFFF hex / 65535 dez (endless time)

Set Parameter-Status-LED-Mode
par1=DAPI_STEPPER_MOTORCHAR_PAR_STATUSLEDMODE
par2=Mode of the Status-LED
par2=0 (MOVE - LED is on if the stepper moves)
par2=1 (HALT - LED is on if the stepper stands still)
par2=2 (ENDSW1 - LED is on if the end switch1 is closed)
par2=3 (ENDSW2 - LED is on if the end switch2 is closed)
par2=4 (REFSW1 - LED is on if the Reference switch1 is closed)
par2=5 (REFSW2 - LED is on if the Reference switch2 is closed)

Set Parameter-Invert-END-Switch1
par1=DAPI_STEPPER_MOTORCHAR_PAR_INVERT_ENDSW1
par2=Endswitch1 is being inverted (0=normal / 1=inverted)

Set Parameter-Invert-END-Switch2

par1=DAPI_STEPPER_MOTORCHAR_PAR_INVERT_ENDSW2

par2=Endswitch2 is being inverted (0=normal / 1=inverted)

Set Parameter-Invert-Ref-Switch1

par1=DAPI_STEPPER_MOTORCHAR_PAR_INVERT_REFSW1

par2=Referenzswitch1 is being inverted (0=normal / 1=inverted)

Set Parameter-Invert-Ref-Switch2

par1=DAPI_STEPPER_MOTORCHAR_PAR_INVERT_REFSW2

par2=Referenzswitch2 is being inverted (0=normal / 1=inverted)

Set Parameter-Invert-direction

par1=DAPI_STEPPER_MOTORCHAR_PAR_INVERT_DIRECTION

par2=invert all direction details (0=normal / 1=inverted)

Set Parameter-Endswitch-Stopmode

par1= DAPI_STEPPER_MOTORCHAR_PAR_ENDSWITCH_STOPMODE

par2=setting of the stop behaviour (0=Fullstop / 1=Stop)

Set Parameter-GoReferenceFrequency (WARNING: This parameter will not be supported anymore)

par1=DAPI_STEPPER_MOTORCHAR_PAR_GOREFERENCEFREQUENCY

Remark: This parameter is replaced completely by the following three parameters.

Set Parameter-GoReferenceFrequnecyToEndSwitch

par1=DAPI_STEPPER_MOTORCHAR_PAR_GOREFERENCEFREQUENCY_TOENDSWITCH

par2=frequency [Full-step / s] - (maximum value=5000)

Set Parameter-GoReferenceFrequencyAfterEndSwitch

par1=DAPI_STEPPER_MOTORCHAR_PAR_GOREFERENCEFREQUENCY_AFTERENDSWITCH

par2=frequency [Full-step / s] - (maximum value=5000)

Set Parameter-GoReferenceFrequencyToOffSet

par1=DAPI_STEPPER_MOTORCHAR_PAR_GOREFERENCEFREQUENCY_TO OFFSET

par2=frequency [Full-step / s] - (maximum value=5000)

Example program

```
DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_STEPMODE, 4,0,0);
// Schrittmode (Voll-, Halb-, Viertel-, Achtel-, Sechszehntelschritt)

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_GOFREQUENCY, 1000,0,0);
// Schrittmode (Voll-, Halb-, Viertel-, Achtel-, Sechszehntelschritt)

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_STARTFREQUENCY, 100,0,0);
// Startfrequenz [Vollschritt / s]

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_STOPFREQUENCY, 100,0,0);
// Stopfrequenz [Vollschritt / s]

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_MAXFREQUENCY, 3500,0,0);
// maximale Frequenz [Vollschritt / s]

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_ACCELERATIONSLOPE, 20,0,0);
// Beschleunigun in [Vollschritten / ms]

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_DECELERATIONSLOPE, 20,0,0);
// Bremsung in [Vollschritten / ms]

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_PHASECURRENT, 750,0,0);
// Phasenstrom [mA]

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_HOLDPHASECURRENT, 500,0,0);
// Phasenstrom bei Motorstillstand [mA]

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_HOLDTIME, 15000,0,0);
// Zeit in der der Haltestrom fließt nach Motorstop [s]

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_STATUSLEDMODE, 0,0,0);
// Betriebsart der Status-LED

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_INVERT_ENDSW1, 0,0,0);
// invertiere Funktion des Endschalter1
```

```
DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_INVERT_ENDSW2, 0,0,0);
// invertiere Funktion des Endschalter2

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_INVERT_REFSW1, 0,0,0);
// invertiere Funktion des Referenzschalterschalter1

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_INVERT_REFSW2, 0,0,0);
// invertiere Funktion des Referenzschalterschalter2

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_INVERT_DIRECTION, 0,0,0);
// invertiere alle Richtungsangaben

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_ENDSWITCH_STOPMODE, 0,0,0);
// einstellen des Stopverhaltens

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_GOREFERENCEFREQUENCY_TOENDSWITCH, 100,0,0);
// Einstellung der Geschwindigkeit, mit der zum Endschalter angefahren wird.

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_GOREFERENCEFREQUENCY_AFTERENDSWITCH , 200,0,0);
// Einstellung der Geschwindigkeit, mit der vom Endschalter abgefahren wird.

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_GOREFERENCEFREQUENCY_TOOFFSET, 300,0,0);
// Einstellung der Geschwindigkeit, mit der zum optionalen Offset angefahren
wird.
```

4.3.1.11. DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC

Description

With this command, motor specific parameter can be read. This command may be used everytime. It is splitted in sub commands, that are analog to the parameters of the DAPI_STEPPER_CMD_SET_MOTORCHARATERISTIC.

Definition

DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC, par1, 0, 0, 0);

Parameters

Get Parameter-Stepmode

par1=DAPI_STEPPER_MOTORCHAR_PAR_STEPMODE

Get Parameter-GO-Frequency

par1=DAPI_STEPPER_MOTORCHAR_PAR_GOFREQUENCY

Get Parameter-Start-Frequency

par1=DAPI_STEPPER_MOTORCHAR_PAR_STARTFREQUENCY

Get Parameter-Stop-Frequency

par1=DAPI_STEPPER_MOTORCHAR_PAR_STOPFREQUENCY

Get Parameter-Max-Frequency

par1=DAPI_STEPPER_MOTORCHAR_PAR_MAXFREQUENCY

Get Parameter-Accelerationslope

par1=DAPI_STEPPER_MOTORCHAR_PAR_ACCELERATIONSLOPE

Get Parameter-Decelerationslope

par1=DAPI_STEPPER_MOTORCHAR_PAR_DECELERATIONSLOPE

Get Parameter-Phasecurrent

par1=DAPI_STEPPER_MOTORCHAR_PAR_PHASECURRENT

Get Parameter-Hold-Phasecurrent
par1=DAPI_STEPPER_MOTORCHAR_PAR_HOLDPHASECURRENT

Get Parameter-Hold-Time
par1=DAPI_STEPPER_MOTORCHAR_PAR_HOLDTIME

Get Parameter-Status-LED-Mode
par1=DAPI_STEPPER_MOTORCHAR_PAR_STATUSLEDMODE

Get Parameter-Invert-END-Switch1
par1=DAPI_STEPPER_MOTORCHAR_PAR_INVERT_ENDSW1

Get Parameter-Invert-END-Switch2
par1=DAPI_STEPPER_MOTORCHAR_PAR_INVERT_ENDSW2

Get Parameter-Invert-Ref-Switch1
par1=DAPI_STEPPER_MOTORCHAR_PAR_INVERT_REFSW1

Get Parameter-Invert-Ref-Switch2
par1=DAPI_STEPPER_MOTORCHAR_PAR_INVERT_REFSW2

Get Parameter-Invert-direction
par1=DAPI_STEPPER_MOTORCHAR_PAR_INVERT_DIRECTION

Get Parameter-Endswitch-Stopmode
par1= DAPI_STEPPER_MOTORCHAR_PAR_ENDSWITCH_STOPMODE

Get Parameter-GoReferenceFrequency (WARNING: This parameter will not be supported anymore)
par1=DAPI_STEPPER_MOTORCHAR_PAR_GOREFERENCEFREQUENCY - (maximum value=5000)
Remark: This parameter is replaced completely by the following three parameters.

Get Parameter-GoReferenceFrequnecyToEndSwitch
par1=DAPI_STEPPER_MOTORCHAR_PAR_GOREFERENCEFREQUENCY_TOENDSWITCH

Get Parameter-GoReferenceFrequencyAfterEndSwitch

par1=DAPI_STEPPER_MOTORCHAR_PAR_GOREFERENCEFREQUENCY_AFTERENDSWITCH

Get Parameter-GoReferenceFrequencyToOffSet

par1=DAPI_STEPPER_MOTORCHAR_PAR_GOREFERENCEFREQUENCY_TOOFFSET

Return value

Parameter-Stepmode

par1=DAPI_STEPPER_MOTORCHAR_PAR_STEPMODE
return=0 (Full-step)
return=1 (1/2-step)
return=2 (1/4-step)
return=3 (1/8-step)
return=4 (1/16-step)

Parameter-GO-Frequency

par1=DAPI_STEPPER_MOTORCHAR_PAR_GOFREQUENCY
return=Speed [Full-step / s] - related to full-step

Parameter-Start-Frequency

par1=DAPI_STEPPER_MOTORCHAR_PAR_STARTFREQUENCY
return=Startfrequency [Full-step / s]

Parameter-Stop-Frequency

par1=DAPI_STEPPER_MOTORCHAR_PAR_STOPFREQUENCY
return=Stopfrequency [Full-step / s]

Parameter-Max-Frequency

par1=DAPI_STEPPER_MOTORCHAR_PAR_MAXFREQUENCY
return=maximum frequency [Full-step / s]

Parameter-Accelerationslope

par1=DAPI_STEPPER_MOTORCHAR_PAR_ACCELERATIONSLOPE
return=Acceleration slope [Full-step / 10ms]

Parameter-Decelerationslope

par1=DAPI_STEPPER_MOTORCHAR_PAR_DECELERATIONSLOPE
return=Deceleration slope [Full-step / 10ms]

Parameter-Phasecurrent
par1=DAPI_STEPPER_MOTORCHAR_PAR_PHASECURRENT
return=Phase current [mA]

Parameter-Hold-Phasecurrent
par1=DAPI_STEPPER_MOTORCHAR_PAR_HOLDPHASECURRENT
return=Phase current for motor hold [mA]

Parameter-Hold-Time
par1=DAPI_STEPPER_MOTORCHAR_PAR_HOLDTIME
return=Time in that the hold goes to motorstop [ms]
return=-1 / FFFF hex / 65535 dez (endless time)

Parameter-Status-LED-Mode
par1=DAPI_STEPPER_MOTORCHAR_PAR_STATUSLEDMODE
return=Mode of the Status-LED
return=0 (MOVE - LED is on if the stepper moves)
return=1 (HALT - LED is on if the stepper stands still)
return=2 (ENDSW1 - LED is on if the end switch1 is closed)
return=3 (ENDSW2 - LED is on if the end switch2 is closed)
return=4 (REFSW1 - LED is on if the Reference switch1 is closed)
return=5 (REFSW2 - LED is on if the Reference switch2 is closed)

Parameter-Invert-END-Switch1
par1=DAPI_STEPPER_MOTORCHAR_PAR_INVERT_ENDSW1
return=invert endswitch1 (0=normal / 1=inverted)

Parameter-Invert-END-Switch2
par1=DAPI_STEPPER_MOTORCHAR_PAR_INVERT_ENDSW2
return=invert endswitch2 (0=normal / 1=inverted)

Parameter-Invert-Ref-Switch1
par1=DAPI_STEPPER_MOTORCHAR_PAR_INVERT_REFSW1
return=invert referenceswitch1 (0=normal / 1=inverted)

Parameter-Invert-Ref-Switch2

par1=DAPI_STEPPER_MOTORCHAR_PAR_INVERT_REFSW2

return=invert referenceswitch2 (0=normal / 1=inverted)

Parameter-Invert-direction

par1=DAPI_STEPPER_MOTORCHAR_PAR_INVERT_DIRECTION

return=invert all direction details (0=normal / 1=inverted)

Parameter-Endswitch-Stopmode

par1= DAPI_STEPPER_MOTORCHAR_PAR_ENDSWITCH_STOPMODE

return=setting of the stop behaviour (0=Fullstop / 1=Stop)

Parameter-GoReferenceFrequnecyToEndSwitch

par1=DAPI_STEPPER_MOTORCHAR_PAR_GOREFERENCEFREQUENCY_TOENDSWITCH

return=frequency [Full-step / s]

Parameter-GoReferenceFrequencyAfterEndSwitch

par1=DAPI_STEPPER_MOTORCHAR_PAR_GOREFERENCEFREQUENCY_AFTERENDSWITCH

return=frequency [Full-step / s]

Parameter-GoReferenceFrequencyToOffSet

par1=DAPI_STEPPER_MOTORCHAR_PAR_GOREFERENCEFREQUENCY_TOOFFSET

return=frequency [Full-step / s]

Example program

```
value = DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC, DAPI_STEPPER_MOTORCHAR_PAR_STEPMODE,
0, 0, 0);
// Schrittmode (Voll-, Halb-, Viertel-, Achtel-, Sechszehntelschritt)

value = DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_GOFREQUENCY, 0, 0, 0);
// Schrittmode bei Motorstop (Voll-, Halb-, Viertel-, Achtel-,
Sechszehntelschritt)

value = DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC,
```

```
DAPI_STEPPER_MOTORCHAR_PAR_STARTFREQUENCY, 0, 0, 0);
// Startfrequenz [Vollschritt / s]

value = DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_STOPFREQUENCY, 0, 0, 0);
// Stopfrequenz [Vollschritt / s]

value = DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_MAXFREQUENCY, 0, 0, 0);
// maximale Frequenz [Vollschritt / s]

value = DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_ACCELERATIONSLOPE, 0, 0, 0);
// Beschleunigun in [Vollschritten / ms]

value = DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_DECELERATIONSLOPE, 0, 0, 0);
// Bremsung in [Vollschritten / ms]

value = DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_PHASECURRENT, 0, 0, 0);
// Phasenstrom [mA]

value = DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_HOLDPHASECURRENT, 0, 0, 0);
// Phasenstrom bei Motorstillstand [mA]

value = DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC, DAPI_STEPPER_MOTORCHAR_PAR_HOLDTIME,
0, 0, 0);
// Zeit in der der Haltestrom fließt nach Motorstop [s]

value = DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_STATUSLEDMODE, 0, 0, 0);
// Betriebsart der Status-LED

value = DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_INVERT_ENDSW1, 0, 0, 0);
// invertiere Funktion des Endschalter1

value = DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_INVERT_ENDSW2, 0, 0, 0);
// invertiere Funktion des Endschalter12

value = DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_INVERT_REFSW1, 0, 0, 0);
```

```
// invertiere Funktion des Referenzschalterschalter1

value = DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_INVERT_REFSW2, 0, 0, 0);
// invertiere Funktion des Referenzschalterschalter2

value = DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_INVERT_DIRECTION, 0, 0, 0);
// invertiere alle Richtungsangaben

value = DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_ENDSWITCH_STOPMODE, 0, 0, 0);
// einstellen des Stopverhaltens

value = DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_GOREFERENCEFREQUENCY_TOENDSWITCH, 0,0,0);
// Abfrage der Geschwindigkeit, mit der der Endschalter angefahren wird.

value = DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_GOREFERENCEFREQUENCY_AFTERENDSWITCH, 0,0,0);
// Abfrage der Geschwindigkeit, mit der vom Endschalter abgefahren wird.

value = DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_GOREFERENCEFREQUENCY_TOOFFSET, 0,0,0);
// Abfrage der Geschwindigkeit, mit der der optionale Offset angefahren wird.
```

4.3.1.12. DAPI_STEPPER_CMD_MOTORCHARACTERISTIC_EEPROM_SAVE

Description

The current motor characteristic will be stored in the EEPROM.

Definition

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_MOTORCHARACTERISTIC_EEPROM_SAVE, 0, 0, 0, 0);

4.3.1.13. DAPI_STEPPER_CMD_MOTORCHARACTERISTIC_EEPROM_LOAD

Description

The motor characteristic can be loaded from the EEPROM.

Definition

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_MOTORCHARACTERISTIC_EEPROM_LOAD, 0, 0, 0, 0);

4.3.1.14. DAPI_STEPPER_CMD_MOTORCHARACTERISTIC_LOAD_DEFAULT

Description

The characteristic of the motor is set back to default.

Definition

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_MOTORCHARACTERISTIC_LOAD_DEFAULT, 0, 0, 0, 0);

Remarks

The default values are:

- Stepmode: Full-step
- Step frequency at GoPosition [Full-step / s]: 1000 Hz
- Start frequency [Full-step / s]: 200Hz
- Stop frequency [Full-step / s]: 200Hz
- Maximal step frequency [Full-step / s]: 3000Hz
- Acceleration slope [Hz/10ms]: 10Hz/10ms
- Deceleration slope [Hz/10ms]: 10Hz/10ms
- Phase current 0..1,5A [1mA]: 750mA
- Hold current 0..1,5A [1mA]: 500mA
- Hold time 0..infinite [ms]: 15000ms
- Status_LED-function: Move
- Function of the Endswitch1: not inverted
- Function of the Endswitch2: not inverted
- Function of the Referenceswitch1: not inverted
- Function of the Referenceswitch2: not inverted
- Function of all direction details: not inverted
- Endswitchmode: Fullstop
- Step frequency at GoReference [Full-step / s]: 1000 Hz

4.3.1.15. DAPI_STEPPER_CMD_GO_REFSWITCH

Description

The motor goes to the referece position.

Definition

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_GO_REFSWITCH, par1, par2, par3, 0);

Parameters

Values for par1: (if multiple are needed, the individual must be added)
DAPI_STEPPER_GO_REFSWITCH_PAR_REF1
DAPI_STEPPER_GO_REFSWITCH_PAR_REF2
DAPI_STEPPER_GO_REFSWITCH_PAR_REF_LEFT
DAPI_STEPPER_GO_REFSWITCH_PAR_REF_RIGHT
DAPI_STEPPER_GO_REFSWITCH_PAR_REF_GO_POSITIVE
DAPI_STEPPER_GO_REFSWITCH_PAR_REF_GO_NEGATIVE
DAPI_STEPPER_GO_REFSWITCH_PAR_SET_POS_0
par2=Motorpositionsoffset (1/16 Full-step)
par3=Timeout [ms]

Remarks

At first the motor goes to referenceposition 1 or 2 (see par1). Therefor the speed GOREFERENCEFREQUENCY_TOENDSWITCH is used for (see DapiStepperCommand_SetMotorcharacteristic). After this the motor goes with the speed GOREFERENCEFREQUENCY_AFTERENDSWITCH out of the Referenceposition.

If there is declaration of an offset as parameter (par2), the motor will go to this offset with the speed GOREFERENCEFREQUENCY_TOOFFSET

Example program

```
DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_GO_REFSWITCH,
DAPI_STEPPER_GO_REFSWITCH_PAR_REF1 + DAPI_STEPPER_GO_REFSWITCH_PAR_REF_LEFT +
DAPI_STEPPER_GO_REFSWITCH_PAR_REF_GO_POSITIVE +
DAPI_STEPPER_GO_REFSWITCH_PAR_SET_POS_0, 0, 15000, 0);
```

4.3.1.16. DAPI_STEPPER_CMD_GET_CPU_TEMP

Description

The temperature of the CPU can be read.

Definition

ULONG DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_GET_CPU_TEMP);

Parameters

cmd=DAPI_STEPPER_CMD_GET_CPU_TEMP

Return value

temperature [°C]

4.3.1.17. DAPI_STEPPER_CMD_GET_MOTOR_SUPPLY_VOLTAGE

Description

The voltage supply of the CPU can be read.

Definition

DapiStepperCommand(handle, motor,
DAPI_STEPPER_GET_MOTOR_SUPPLY_VOLTAGE, 0, 0, 0, 0);

Parameters

cmd=DAPI_STEPPER_CMD_GET_MOTOR_SUPPLY_VOLTAGE

Return value

Motor voltage supply in [mV]

4.3.2. DapiStepperGetStatus

4.3.2.1. DAPI_STEPPER_STATUS_GET_ACTIVITY

Description

With this command, some status informations (e.g. activity of the motor phase current) can be read.

Definition

ULONG DapiStepperGetStatus(handle, motor, DAPI_STEPPER_STATUS_GET_ACTIVITY);

Parameters

handle=This is the handle of an opened module

motor=Number of addressed motor (1,2 ..)

Return value

Bit	Command	Description
0	DISABLE	Motor is disabled
1	MOTORSTROMACTIV	Motor phase current is active
2	HALTESTROMACTIV	Hold phase current is active
3	GOPOSITIONACTIV	GoPosition is active
4	GOPOSITIONBREMSEN	GoPosition deceleration is active
5	GOREFERENZACTIV	GoReference is active

Example program

```
ret = DapiStepperGetStatus(handle, motor, DAPI_STEPPER_STATUS_GET_ACTIVITY);
```

4.3.2.2. DAPI_STEPPER_STATUS_GET_POSITION

Description

With this command, the motor position can be read.

Definition

ULONG DapiStepperGetStatus(handle, motor, cmd);

Parameters

cmd=DAPI_STEPPER_STATUS_GET_POSITION

Return value

The current motor position in 1/16 step-units can be read back

Example program

```
value = DapiStepperGetStatus(handle, motor, DAPI_STEPPER_STATUS_GET_POSITION);
```

4.3.2.3. DAPI_STEPPER_STATUS_GET_SWITCH

Description

With this command, the status of the switches can be read.

Definition

ULONG DapiStepperGetStatus(handle, motor, cmd);

Parameters

cmd=DAPI_STEPPER_STATUS_GET_SWITCH

Return value

Status of the switches will be delivered back
Bit0: ENDSWITCH1; 1 = Endswitch1 is closed
Bit1: ENDSWITCH2; 1 = Endswitch2 is closed
Bit2: REFSWITCH1; 1 = Referenceswitch1 is closed
Bit3: REFSWITCH2; 1 = Referenceswitch2 is closed

Example program

```
pos = DapiStepperGetStatus(handle, motor, DAPI_STEPPER_STATUS_GET_SWITCH);
```

4.3.3. DapiStepperCommandEx

Description

This extended command controls stepper motors.

Definition

ULONG DapiStepperCommandEx(ULONG handle, ULONG motor, ULONG cmd, ULONG par1, ULONG par2, ULONG par3, ULONG par4, ULONG par5, ULONG par6, ULONG par7);

Parameters

handle=This is the handle of an opened module

motor=Number of addressed motor (1,2 ..)

cmd=Extended command

par1..7=Extended command-depedent parameter (see remarks)

Remarks

See delib.h for the extended commands and parameters.

4.4. Example program

```
// ******************************************************************************
// ******************************************************************************
// ******************************************************************************
// ******************************************************************************
// ******************************************************************************
//
// (c) DEDITEC GmbH, 2009
//
// web: http://www.deditec.de
//
// mail: vertrieb@deditec.de
//
//
//
// dtapi_prog_beispiel_input_output.cpp
//
//
// ******************************************************************************
// ******************************************************************************
// ******************************************************************************
// ******************************************************************************
// ******************************************************************************
//
//
// Folgende Bibliotheken beim Linken mit einbinden: delib.lib
// Dies bitte in den Projekteinstellungen (Projekt/Einstellungen/Linker(Objekt-
Bibliothek-Module) .. letzter Eintrag konfigurieren
#include <windows.h>
#include <stdio.h>
#include "conio.h"
#include "delib.h"
// ------------------------------------------------------------------------------
// ------------------------------------------------------------------------------
// ------------------------------------------------------------------------------
// ------------------------------------------------------------------------------
// ------------------------------------------------------------------------------

void main(void)
{
unsigned long handle;
unsigned long data;
unsigned long anz;
unsigned long i;
unsigned long chan;
// ----------------------------------------------------
// USB-Modul öffnen
handle = DapiOpenModule(USB_Interface8,0);
printf("USB_Interface8 handle = %x\n", handle);
if (handle==0)
{
// USB Modul wurde nicht gefunden
printf("Modul konnte nicht geöffnet werden\n");
printf("TASTE für weiter\n");
getch();
```

```
return;
}
// Zum Testen - ein Ping senden
// -----------------------------------------------------
printf("PING\n");
anz=10;
for(i=0;i!=anz;++i)
{
data=DapiPing(handle, i);
if(i==data)
{
// OK
printf(".");
}
else
{
// No answer
printf("E");
}
}
printf("\n");

// -----------------------------------------------------
// Einen Wert auf die Ausgänge schreiben
data = 255;
DapiWriteByte(handle, 0, data);
printf("Schreibe auf Adresse=0 daten=0x%x\n", data);
// -----------------------------------------------------
// Einen Wert auf die Ausgänge schreiben
data = 255;
DapiWriteByte(handle, 1, data);
printf("Schreibe auf Adresse=0 daten=0x%x\n", data);
// -----------------------------------------------------
// Einen Wert auf die Ausgänge schreiben
data = 255;
DapiWriteByte(handle, 2, data);
printf("Schreibe auf Adresse=2 daten=0x%x\n", data);
// -----------------------------------------------------
// Einen Wert von den Eingängen lesen
data = (unsigned long) DapiReadByte(handle, 0);
printf("Gelesene Daten = 0x%x\n", data);
// -----------------------------------------------------
// Einen A/D Wert lesen
chan=11; // read chan. 11
data = DapiReadWord(handle, 0xff010000 + chan*2);
printf("Adress=%x, ret=%x volt=%f\n", chan, data, ((float) data) / 1024*5);//
Bei 5 Volt Ref
// -----------------------------------------------------
// Modul wieder schliessen
DapiCloseModule(handle);
printf("TASTE für weiter\n");
getch();
return ;
}
```

Appendix

5. Appendix

5.1. Revisions

Rev 1.00	First issue
Rev 2.00	Design change
Rev 2.01	Pinout modification Update of the DELIB functions
Rev 2.02	Supplement of DELIB functions "DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC", "DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC" and "DAPI_STEPPER_CMD_GO_REFSWITCH"
Rev 2.03	Supplement of return value for command "DAPI_STEPPER_STATUS_GET_ACTIVITY" Supplement of parameter hold-time (endless time) at command "DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC"

5.2. Copyrights and trademarks

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DEDITEC GMBH

RO-Series

Hardware-Description

2010 November

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Introduction

1. Introduction

1.1. General remarks

First of all, we would like to congratulate you to the purchase of a high quality DEDITEC product.

Our products are being developed by our engineers according to quality requirements of high standard. Already during design and development we take care that our products have -besides quality- a long availability and an optimal flexibility.

Modular design

The modular design of our products reduces the time and the cost of development. Therefor we can offer you high quality products at a competitive price.

Availability

Because of the modular design of our products, we have to redesign only a module instead of the whole product, in case a specific component is no longer available.

1.2. Customer satisfaction

Our philosophy: a content customer will come again. Therefor customer satisfaction is in first place for us.

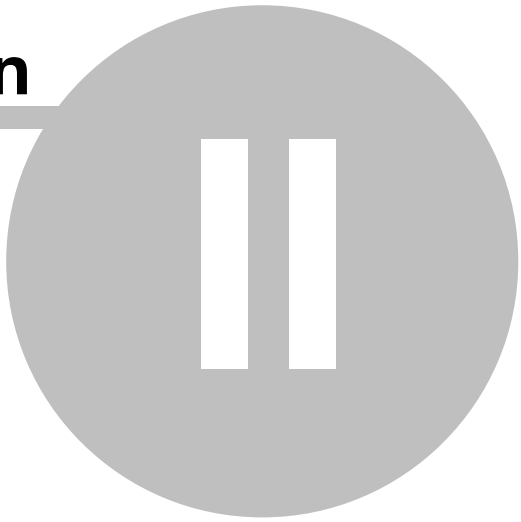
If by any chance, you are not content with the performance of our product, please contact us by phone or mail immediately.

We take care of the problem.

1.3. Customer response

Our best products are co-developments together with our customers. Therefor we are thankful for comments and suggestions.

Hardware description



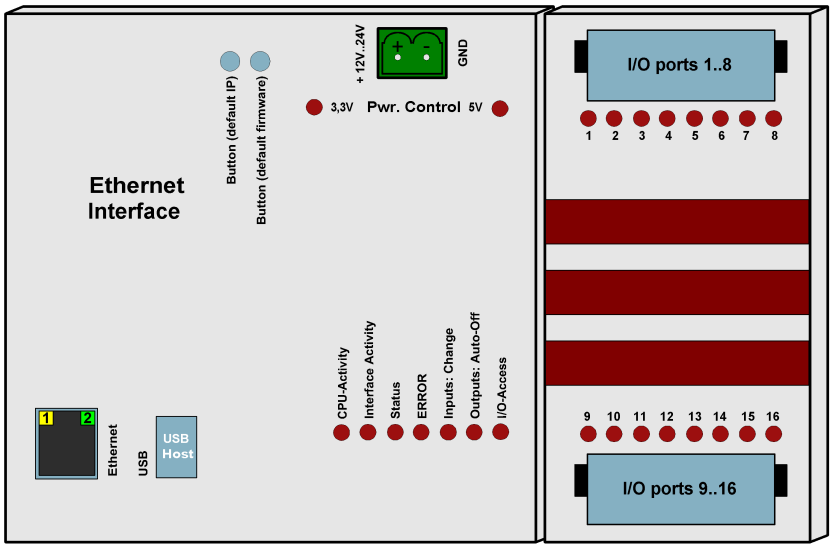
2. Hardware description

2.1. Ethernet Interface

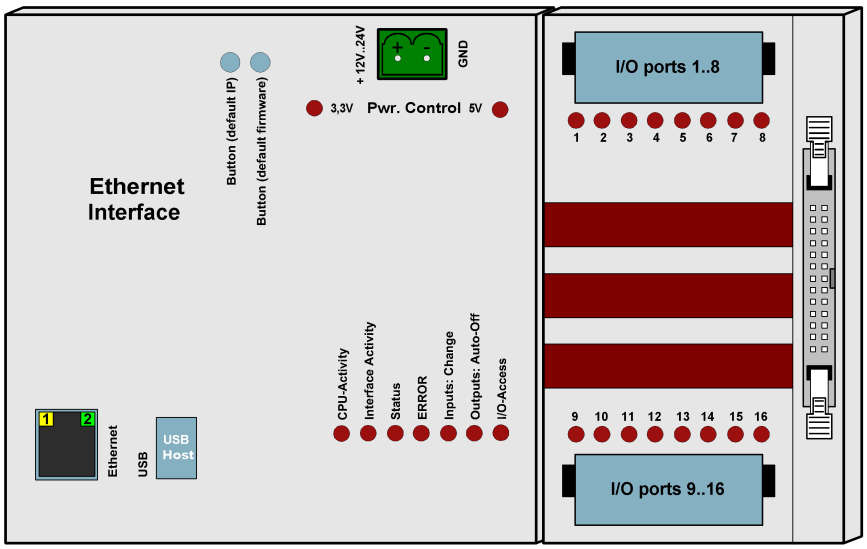
2.1.1. Hardware description

2.1.1.1. Overview screen

The figure shows the control module with ethernet interface (left side) combined with an input/output module (right side).



The figure shows the control module with ethernet interface (left side) combined with a flexible connector input/output module (right side).



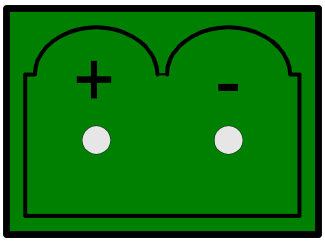
2.1.1.2. Technical data

- Single power supply +7V..+24V DC
- 10/100 Mbit/sec Ethernet interface
- Input/output access over TCP/IP
- WEB interface
- Configuration over web interface
- 9 Control LEDs
- RJ45 Socket
- Timeout feature providing ability to disconnect outputs for safety reasons
- Expandable in 16 gradations
- Can be combined without any problem to other modules of the RO series
- Windows driver library DELIB

2.1.1.3. Plug-in connector of the module

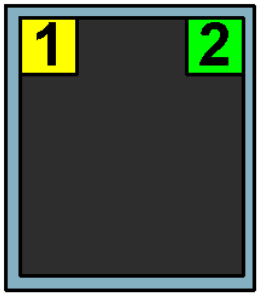
2.1.1.3.1. Power supply

The input-power-supply-range lies between +7V and +24V DC.The power supply can be realized with a standard AC/DC adaptor with 1A output current. A suitable plug-in connector is delivered.



2.1.1.3.2. Ethernet interface

The network connection is provided by a RJ45 socket.



LED	Description
1	Activity
2	10/100 Mbit

2.1.1.4. Buttons of the module

Left Button:

Reset IP address to default

(see chapter 5.1)

Right Button:

Reset firmware to factory settings.

(see chapter 5.2)

2.1.1.5. Controll LEDs

The Ethernet module has a series of control LEDs. They are used for easy visual indication of various state functions.

While switching the module on, in normal operating mode, the module should signalize the following sequence:

- approx. 20 sec after switching the module on, LED 1 and 2 are flashing briefly. -> Operating system has been loaded successfully.
- Then LED 3 is on permanently and LED 1 is flashing. -> Module is ready.

2.1.1.5.1. Definition of LEDs

LED	Label	Description
above	3,3V	Internal 3,3V power supply
above	5V	Internal 5V power supply
1	CPU Activity	2x flashing + long break. Operating system reports: Status OK
2	Interface Activity	Active communication over Ethernet
3	Status	LED is on -> Module is ready
4	ERROR	Error during ethernet-transfer (for details see document ”Serial protocol”)
5	Inputs: Change	"State change" between 2 read-out cycles detected
6	Outputs: Auto-Off	Due to timeout, all outputs are switched-off for safety reasons
7	I/O Access	CPU-access to the connected I/O modules.

2.1.2. Restore basic configuration

2.1.2.1. Restore IP address

The default value of the IP address is: **192.168.1.1**

Left Button: Restore IP address to default (192.168.1.1):

To restore the IP address proceed as follow:

- Push the button at least 5 sec.
- After that, the left LEDs "CPU Activity" and "Interface Activity" should be flashing four times (confirmation of receipt)
- After this, the module has following settings:

IP address	**192.168.1.1**
Subnet mask	**255.255.255.0**
Standard gateway	**192.168.1.254**

2.1.2.2. Restore firmware

To restore the firmware to default value proceed as follow:

Right Button: Restore firmware to factory settings

To restore the firmware to factory settings proceed as follow:

- Press the button at least 10sec.
- After this, the three LED‘s “CPU Activity”, “Interface Activity” and “Status” should be flashing four times (confirmation of receipt).
- After this, the module restarts.

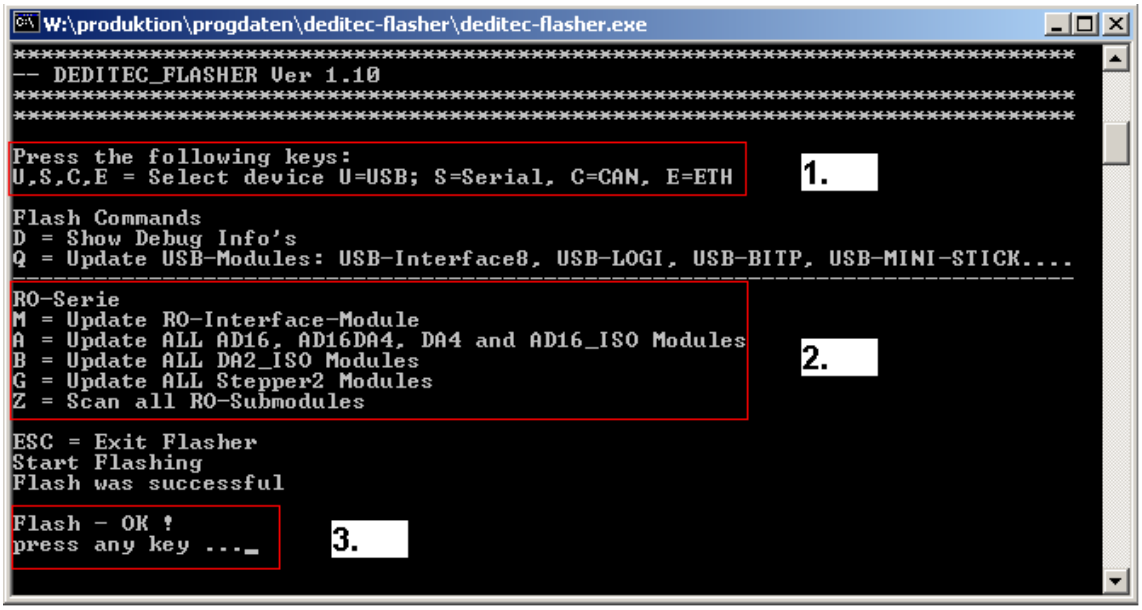
The firmware and configuration of the factory settings are now active again!

2.1.3. Firmware Update

2.1.3.1. DEDITEC Flasher

Approach:

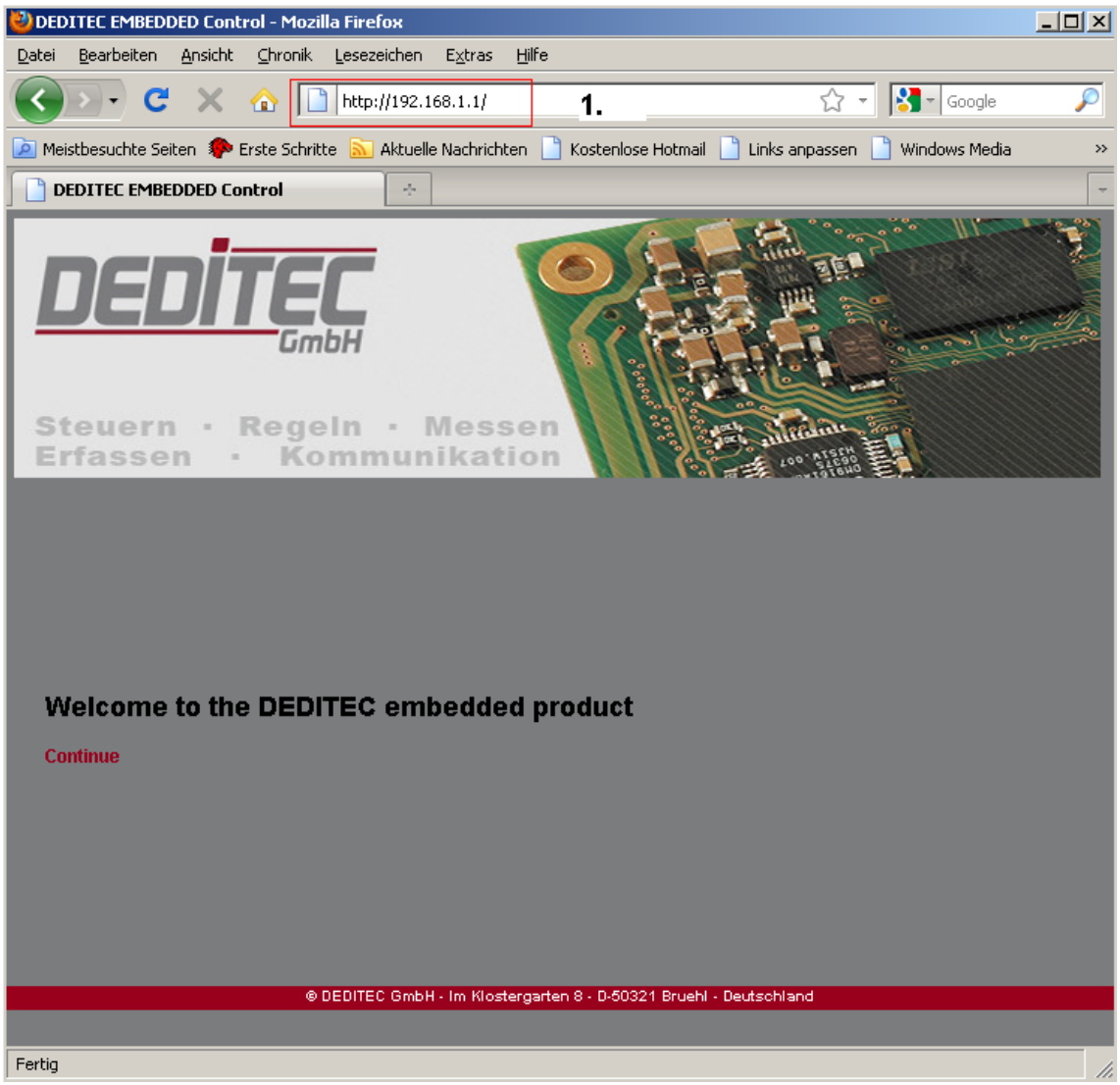
- Download the latest firmware inclusive software update. http://www.deditec.de/en/module/software/delib/download.html
- Extract all data to one folder
- Start the application **deditec-flasher.exe**



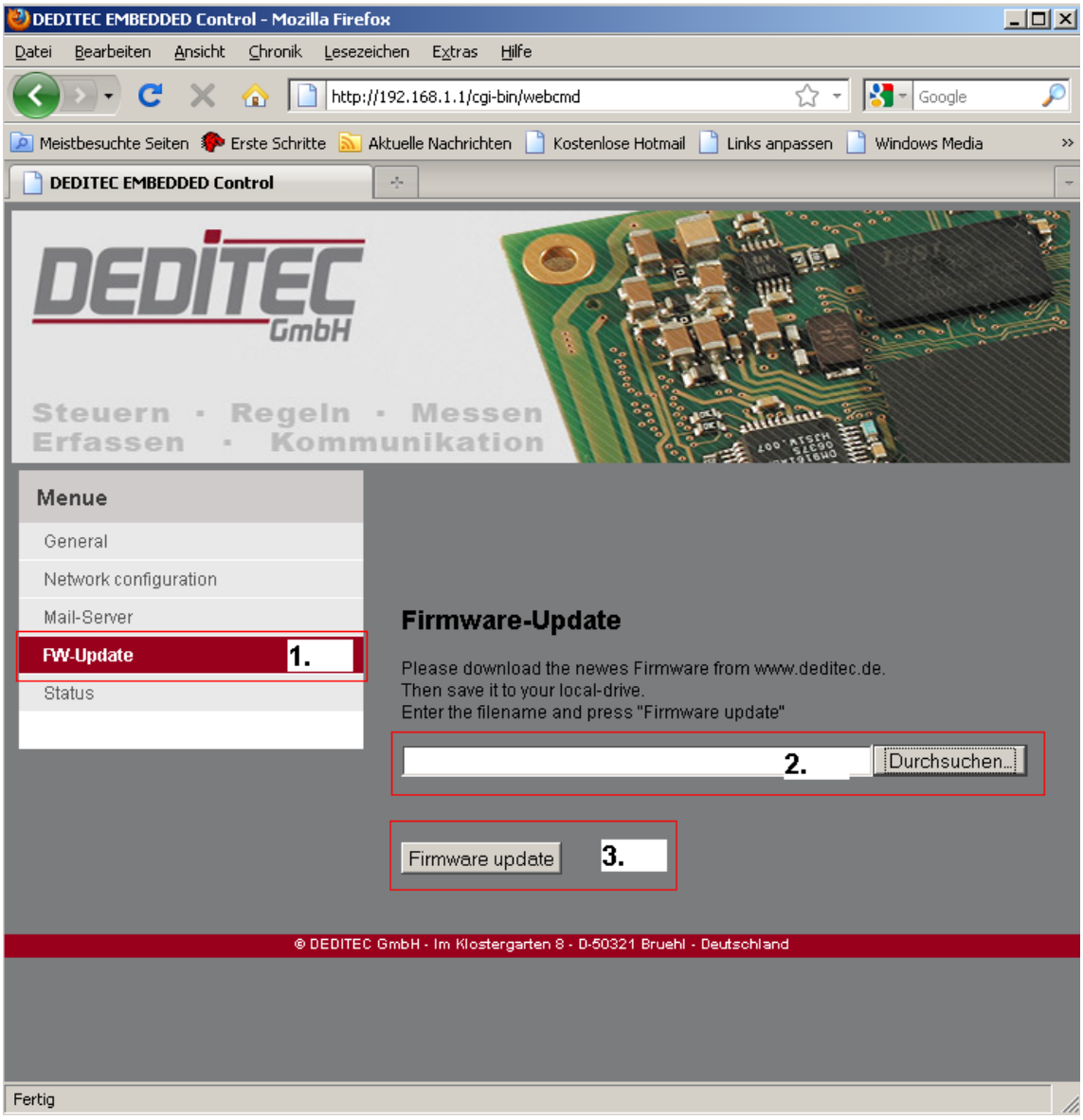
1. Select the interface. For ethernet press the key "E"
2. Select the module which you want to update. Press the key "M" for CPU interface
3. After successfully flashing , in the prompt appears: Flash OK!

2.1.3.2. Web interface

Approach:



1. Type the IP address of your module in the browser



1. Click on FW-Update
2. Select the file **“ro_cpu_eth_fw.dfw”**
3. Click on Firmware update

2.1.4. Configuring the module

2.1.4.1. Configuration via DELIB Configuration utility

This method allows a simple configuration of the product. Following basic values can be changed.

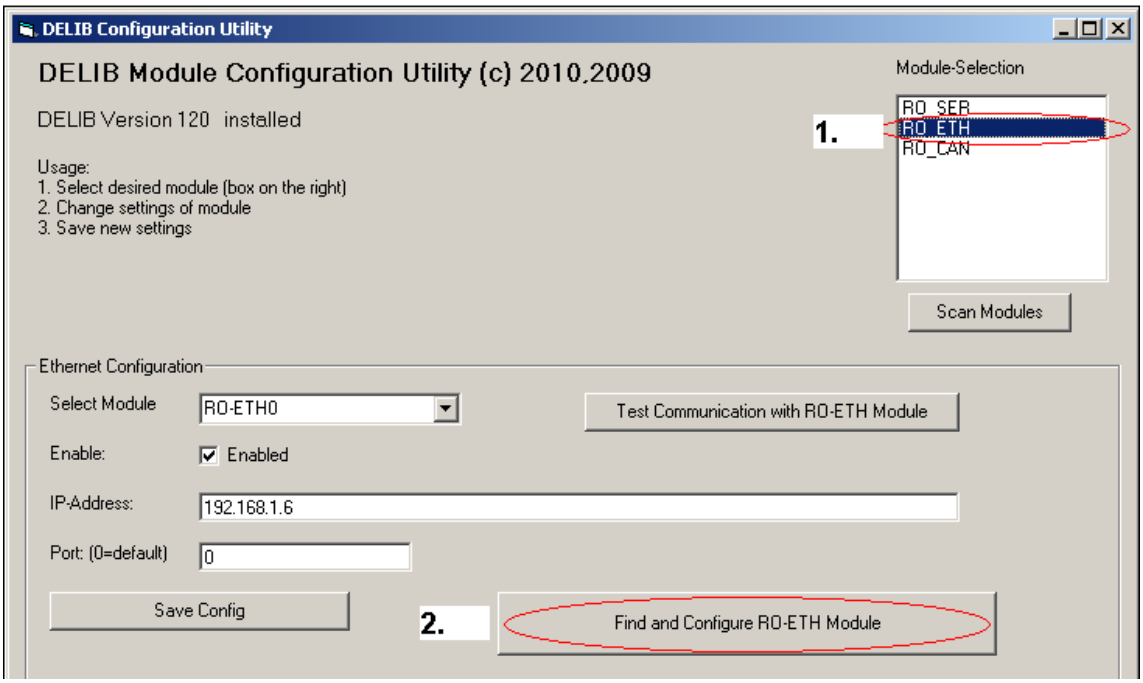
- Module name
- IP address
- Net mask
- Default gateway
- DNS server

Additionally with this tool all DEDITEC ethernet devices in the LAN network are displayed.

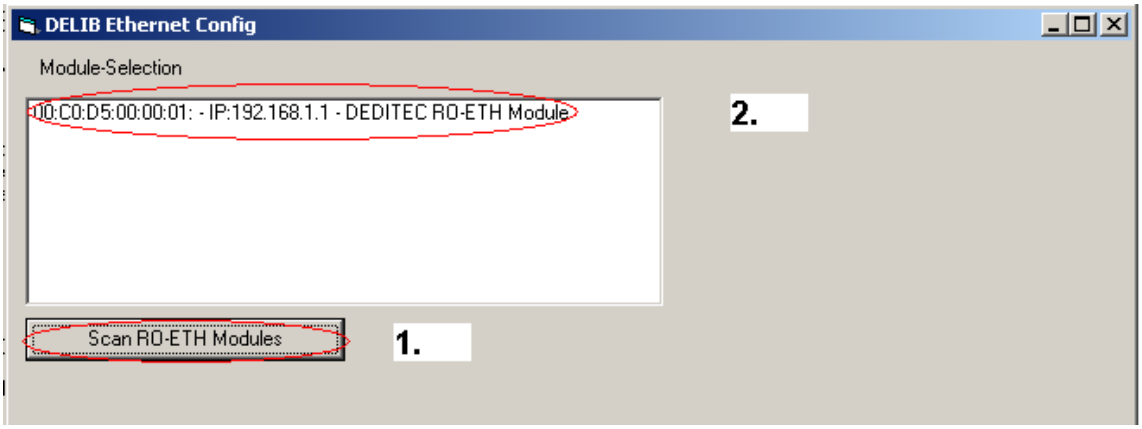
The following pages describe how it works...

Start DELIB Configuration utility as follows:

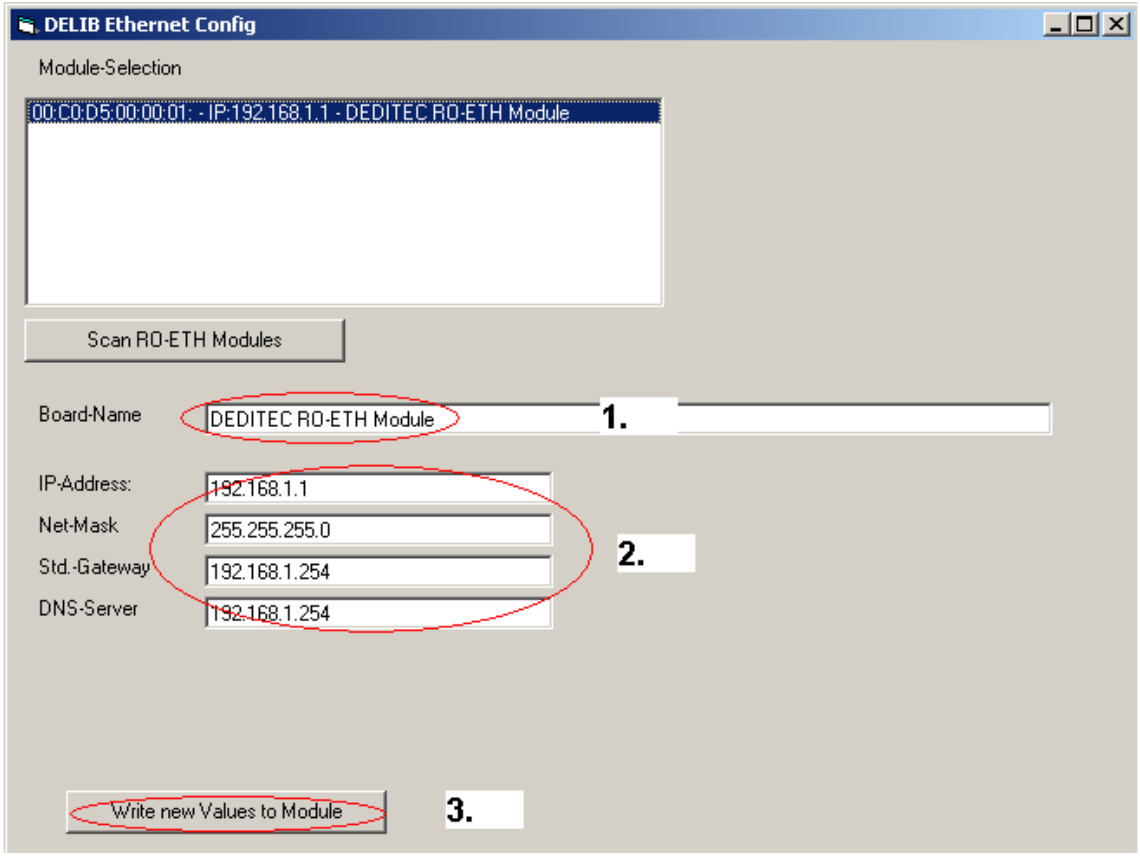
Start -> Programs -> DEDITEC -> DELIB -> DELIB Configuration Utility



1. Module Selection: select RO-ETH
2. Find and configure RO-ETH Module



1. Scan RO-ETH modules: So you can find all DEDITEC ETH modules on local ethernet stream. Therefore we use an ethernet protocol which will not be routed. Because of that you can configure only modules which are connected to the bus. The advantage of this method is, that you can find modules which are not in the same sub net, of which you are configuring.
2. Click on the module, which you want to configure.



Here you can change the module name according to your wishes

1. You can change module name, IP address, net mask, default gateway and DNS server.
2. Write new Values to Module.

Notice:

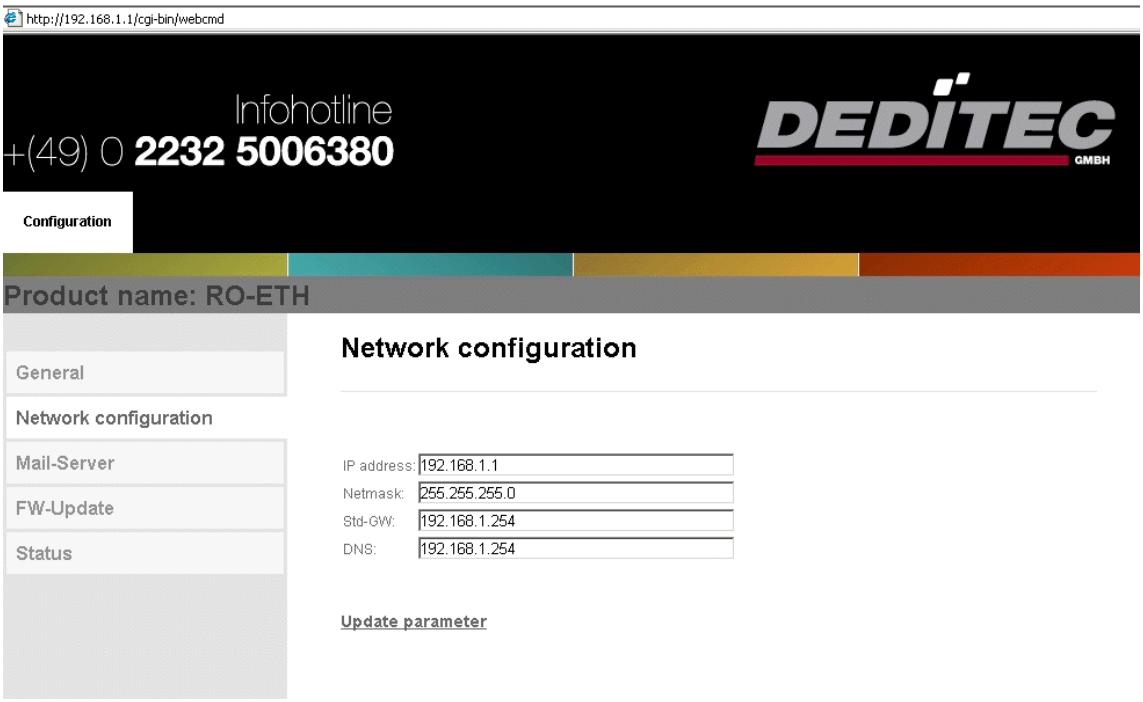
At the configuration of the RO-ETH module should be paid attention to the IP address. It has to be in the same IP segment in which the control PC is. Of course you must not select an already used IP address.

If the standard IP address of the module is not from the address range of the network, the module will not be reachable by TCP/IP at the moment. Problems of accessibility will also occur, if the IP address is already used. However the IP address and the net mask of the ethernet module are configurable by this utility. Alternatively you can connect the module to the PC and set the IP address and the net mask directly. After the accessibility is given, the further configuration is ensued by a browser via the integrated web server of the ethernet module.

To these belongs ask your system administrator.

2.1.4.2. Configuration via internal web server

The RO-ETH module has an own web server by which it can be configured, too.



2.1.4.3. Factory settings

The factory settings of the ethernet module include following settings:
IP address: **192.168.1.1**

The factory settings can be restored by pushing the left button -> see chapter 5.2

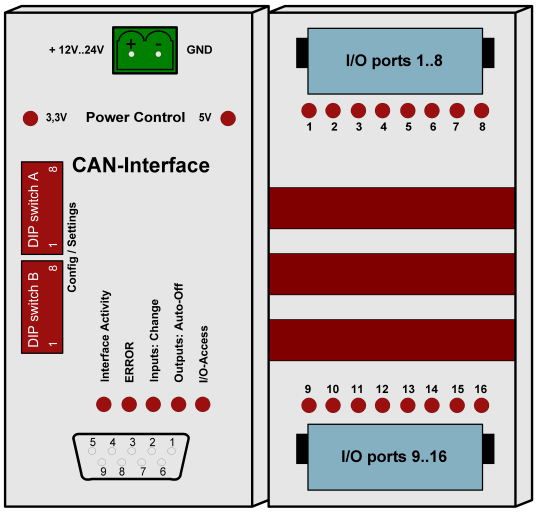
IP address	**192.168.1.1**
Subnet mask	**255.255.255.0**
Standard gateway	**192.168.1.254**

2.2. CAN Interface

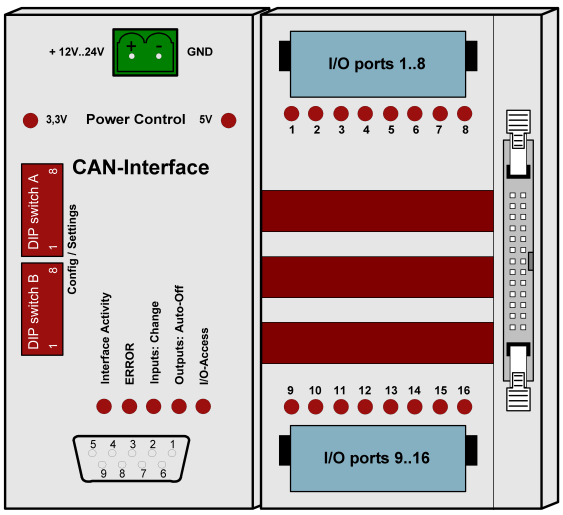
2.2.1. Hardware description

2.2.1.1. Overview screen

The figure shows the control module with CAN-interface (left side) combined with an input/output module (right side).



The figure shows the control module with CAN-interface (left side) combined with a flexible connector input/output module (right side).



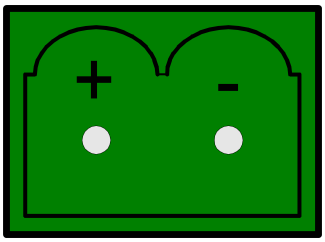
2.2.1.2. Technical data

- Single power supply +7V..+24V DC
- 7 control LEDs
- CAN 2.0A (11 Bit addressing)
- CAN 2.0B (29 Bit addressing)
- Transmission range up to 10km (at 10Kbit/s)
- Easy to configure over DIP switches
- Galvanically isolated interface using optocouplers
- 9 pol. D-SUB socket
- Timeout feature providing ability to disconnect outputs for safety reasons
- Comfortable connector system with ejection mechanism
- Expandable in 16 gradations
- Can be combined without any problem to other modules of the RO series

2.2.1.3. Plug-in connector of the module

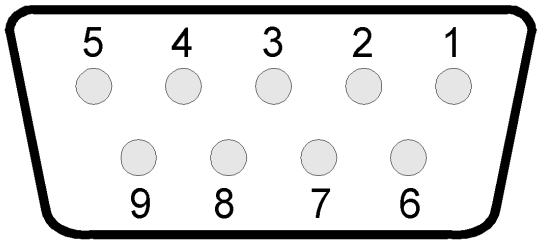
2.2.1.3.1. Power supply

The input-power-supply-range lies between +7V and +24V DC. Power supply can be realized with a standard AC/DC adaptor with 1A output current. A suitable plug-in connector is included.



2.2.1.3.2. CAN interface

The connection to the CAN bus is realized through a 9 pol D-SUB connector. It is galvanically isolated through optocouplers. The CAN module is configured over the PC's RS-232 interface using the the included adaptor plug.



Pin	
1	RS-232 config
3	RS-232 config
2	CAN low
7	CAN high
5	GND

2.2.1.4. Control LEDs

The CAN module has a series of control LEDs. They are used for easy visual indication of various state functions.

While switching-on the module in DIP-switch mode oder software mode, the module should signalize the following sequence:

all five LEDs flashing briefly
right LED (I/O access) flashing briefly

In ”special mode”, the following signal sequence should be seen:

all five LEDs flashing briefly
right LED (I/O access) flashing briefly
all five LEDs flashing briefly

2.2.1.4.1. Definition of LEDs

LED	Description
3,3V	Internal 3,3V power supply
5V	Internal 5V power supply
Interface Activity	Active communication- over the CAN bus
ERROR	Error during CAN-transfer (for details see document ”CAN protocol”)
Inputs: Change	State change between 2 read-out cylces detected
Outputs: Auto-Off	Due to timeout, all outputs are switched-off for safety reasons
I/O Access	CPU-access on the inputs and outputs of the connected modules

2.2.2. Configuring the module

In order to integrate a module into an existing bus system, it is necessary to first assign a free module address and the appropriate bit rate. The ”special mode” may be alternatively used to quickly operate the system.

2.2.2.1. DIP-switches

Some of the settings are easily configurable using DIP-switches. Configurable are the ”special mode”, the activation of the extended IDs, the data transfer range or the module’s address.

DIP-switch A8	DIP-switch A7	Description
ON	ON	”special mode” -> Blinking squency during start-up (5 LEDs, 1 right LED, 5 LEDs), 100KHz, CAN-ID=0x100, Response-Module-Addr=1, keine 29 Bit Adressen
ON	OFF	Only for SERVICE-purpose: application won’t start. Forced into bootloader
OFF	ON	Software mode: configuration by software
OFF	OFF	DIP-switch mode: configuration by DIP-Switches, Response-Module-Addr=1, CAN 2.0A

DIP-switch	Description
A6 to A4	*) Setting up transfer rate
A3 to A1	*) Setting up CAN address
B8 to B1	*) Setting up CAN address

*) if A8 and A7 = OFF

2.2.2.2. The “special mode”

The ”special mode” is to quickly and easily set the device to the default values. This is helpfull for a quick and easy setup and facilitates an error analysis or an initial operation.

This mode is active, if switching the DIP-switches A7 and A8 to ”ON”. The remaining DIP-switches are disabled. The module will work with the following settings:

11 bit-addressing

100 kbit/s bitrate

CAN-address = 0x100

Response-Modul-Addr = 1 (responses are sent to this address)

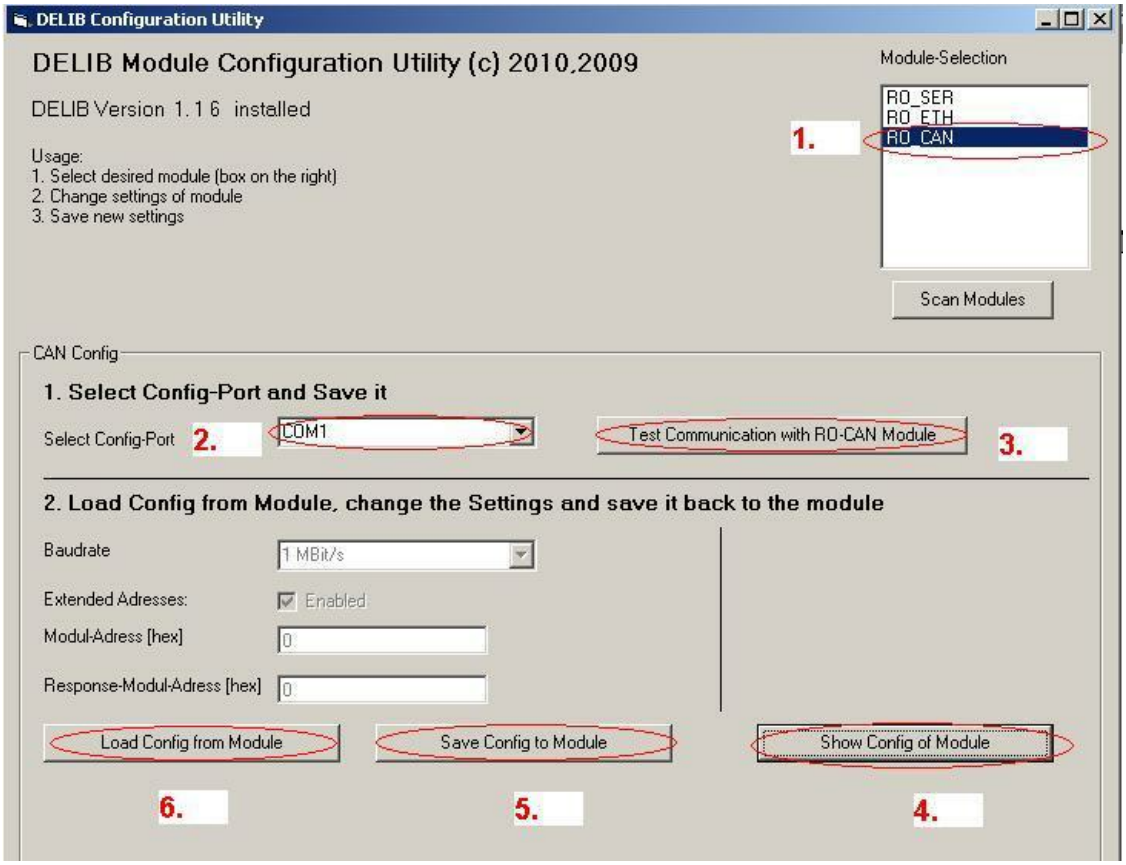
2.2.2.3. Software mode

This module can configured in “software mode” only with the small CAN/SER program adpater, which is included in delivery. Configuration will be done by the serial interface of your pc.

For using the software mode, the dip switches A7 and A8 must be set “on”. Dip switch changes will be taken over, only by restart of the module.

Connect the module with a DSUB-9 cable to the RS-232 interface of your pc with the CAN/SER adapter and connect it with the CAN-module.

After installing the DELIB driver library, you can find under Start ->Programs -> DEDITEC ->DELIB, the DELIB Configuration Utility.



Approach:

1. Choose the RO-CAN module
2. Choose COM port, that is connected to the module
3. Test commuikation with RO-CAN module
4. This button shows the config of the module
5. Here you can save your configuration to the module
6. This button loads the config of the module

2.2.2.4. DIP-switch mode

In this mode, the module is entirely set up by DIP-switch. This mode is active, if DIP-switch A7=OFF and A8=OFF. The address range is 11 bit large (CAN 2.0A). The module-address is set using the DIP-switches (DIP A3..A1 und B8..B1). The Response-Modul-Addr = 1 (responses are sent to this address).

2.2.2.4.1. Setting up the transfer rate

The bit rate is dependent on the CAN bus data transfer range. 3 DIP-switches are used to set the bit rate. Other bit rates can be implemented on customer request.

Bitrate	1Mbit	500K	250K	125K	100K	50K	20K	10K
DIP-switch A6	On	On	On	On	Off	Off	Off	Off
DIP-switch A5	On	On	Off	Off	On	On	Off	Off
DIP-switch A4	On	Off	On	Off	On	Off	On	Off

2.2.2.4.2. Setting up the CAN module address

Any connected device to the CAN network needs a fix address in order to be directly accessed. With the 11 DIP-switches, up to 2047 different addresses are selectable. Further 18 addressing bits may be supplemented by software. To unlock this option, DIP-switch 7A must be set to ON.

Baud rate	Bit	Value ON	Value OFF
DIP-switch A3	Bit 10	1024	0
DIP-switch A2	Bit 9	512	0
DIP-switch A1	Bit 8	256	0
DIP-switch B8	Bit 7	128	0
DIP-switch B7	Bit 6	64	0
DIP-switch B6	Bit 5	32	0
DIP-switch B5	Bit 4	16	0
DIP-switch B4	Bit 3	8	0
DIP-switch B3	Bit 2	4	0
DIP-switch B2	Bit 1	2	0
DIP-switch B1	Bit 0	1	0

Examples:

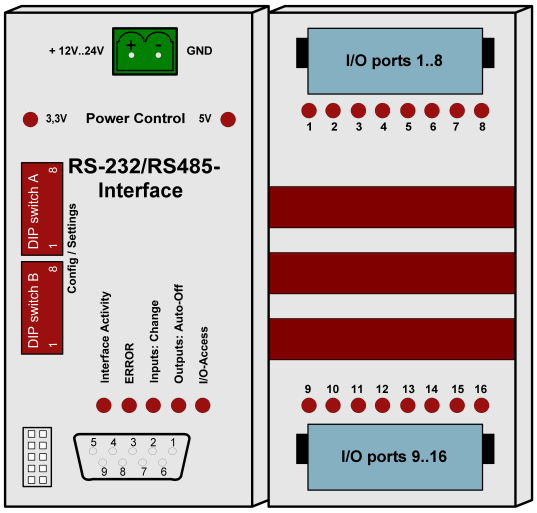
Baud rate	Address 0	Address 117	Address 588
DIP-switch A3	Off	Off	Off
DIP-switch A2	Off	Off	On
DIP-switch A1	Off	Off	Off
DIP-switch B8	Off	Off	Off
DIP-switch B7	Off	On	On
DIP-switch B6	Off	On	Off
DIP-switch B5	Off	On	Off
DIP-switch B4	Off	Off	On
DIP-switch B3	Off	On	On
DIP-switch B2	Off	Off	Off
DIP-switch B1	Off	On	Off

2.3. RS-232/RS-485 Interface

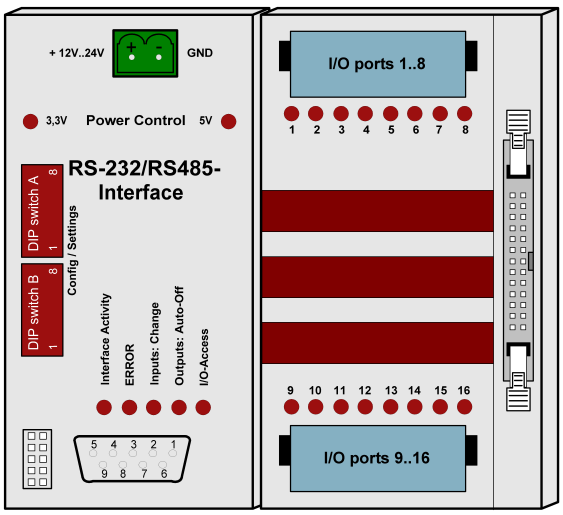
2.3.1. Hardware description

2.3.1.1. Overview screen

The figure shows the control module with RS-232/RS-485 interface (left side) combined with an input/output module (right side).



The figure shows the control module with a RS-232/RS-485 interface (left side) combined with a flexible conntector input/output module (right side).



2.3.1.2. Technical data

- Single power supply +7V..+24V DC
- 7 control LEDs
- RS-232/RS-485 interface
- Easy to configure over DIP switches
- Galvanically isolated interface using optocouplers
- Connection through 9 pol. D-SUB connector
- Timeout feature providing ability to disconnect outputs for safety reasons
- Comfortable connector system with ejection mechanism
- Expandable in 16 gradations
- Can be combined without any problem to other modules of the RO series

2.3.1.3. Selecting between RS-232 or RS-485 interface

The factory setting mode of the interface is RS-232. The following describes how to change the interface mode to RS-485.

Notice!
Bevore opening the device, please note the following:

Disconnect the power supply (unplug AC/DC adaptor)!

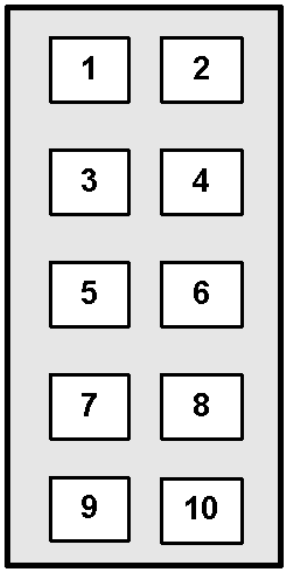
Do not touch electronic components. They could be destroyed by electrostatic discharge! If necessary, touch grounded metal casings or radiators.

Remove a module‘s side element. Unscrew the three Phillips screws.

Pull the circuit board together with the front panel sideways out.

Lift the front panel from the module.

Next to the left side of the serial interface (D-SUB 9 pol. connector) is a 10pol. header with corresponding jumpers. The following table shows, which jumpers to plug-in.

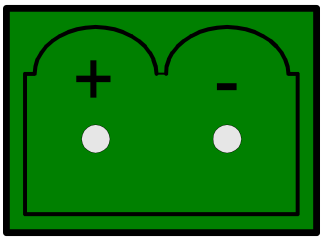
Header	Interface	Set jumper
	RS-232	Pin1 & Pin3 Pin2 & Pin4
	RS-485	Pin3 & Pin5 Pin4 & Pin6 Pin7 & Pin8
	Resistance terminator	Pin9 & Pin10

Assembling the elements in done the reverse order.

2.3.1.4. Plug-in connector of the module

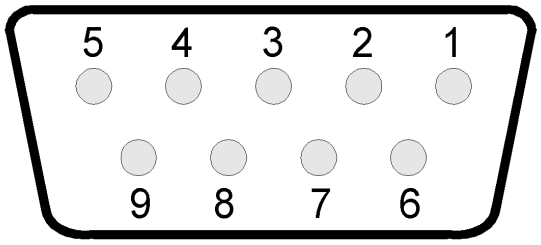
2.3.1.4.1. Power supply

The input-power-supply-range lies between +7V and +24V DC. Power supply can be realized with a standard AC/DC adaptor with 1A output current. A suitable plug-in connector is included.



2.3.1.4.2. RS-232/RS-485 Interface

The connection to the serial bus is realized through a 9 pol D-SUB conector. It is galvanically isolated through optocouplers.



2.3.1.4.2.1. RS-232 Pinout

Pin	
2	TX
3	RX
5	GND

2.3.1.4.2.2. RS-485 Pinout

Pin	
2	RS-485 B
7	RS-485 A
5	GND

2.3.1.5. Control LEDs

The RS-232/RS-485 module has a series of control LEDs. They are used for easy visual indication of various state functions.

While switching the module on in normal operating mode, the module should signalize the following sequence:

- all five LEDs flashing briefly
- right LED (I/O access) flashing briefly

In ”special mode”, the following signal sequence should be seen:

- all five LEDs flashing briefly
- right LED (I/O access) flashing briefly
- all five LEDs flashing briefly

2.3.1.5.1. Definition of LEDs

LED	Description
3,3V	Internal 3,3V power supply
5V	Internal 5V power supply
Interface Activity	Active communication over the RS-232/RS-485 bus
ERROR	Error during serial-transfer (for details see document ”Serial protocol”)
Inputs: Change	State change between 2 read-out cylces detected
Outputs: Auto-Off	Due to timeout, all outputs are switched-off for safety reasons
I/O Access	CPU-access on the inputs and outputs of the connected modules

2.3.2. Configuring the module

In order to integrate a module into an existing bus system, it is necessary to first assign a free module address and the appropriate bit rate. The ”special mode” may be alternatively used to quickly operate the system.

2.3.2.1. DIP-switches

Some of the settings are easily configurable using DIP-switches. Configurable are ”special mode”, the Baud rate, the module’s address or interface-specific settings.

DIP-switch A8	DIP-switch A7	Description
ON	ON	Special-mode (115K baud rate, module-address = 0, Echo = OFF)
ON	OFF	Only for SERVICE-purpose: application won’t start. Forced into bootloader
OFF	ON	Use setup of DIP-switch A4..A1and B8..B1
OFF	OFF	Use setup of DIP-switch A4..A1and B8..B1

DIP-switch A6	Description
ON	Echo = ON, serial received characters are sent back (Echo = OFF, if DIP A8 and A7 = ON)
OFF	Echo = OFF

DIP-switch	Description
A5	Reserved
A4 to A1	Setting up the baud rate
B8 to B1	Setting up the serial module number

2.3.2.2. The "special-mode"

The ”special mode” is to quickly and easily set the device to the default values. This is helpfull for a quick and easy setup and facilitates an error analysis or an initial operation.
This mode is active, if switching the DIP-switches A7 and A8 to ”ON. The remaining DIP-switches are disabled.

The module is now set to a baud rate of 115Kbauds, the module number and ”echo” are inactive.

2.3.2.3. Activating echo

Received serial characters are returned back to display them on the monitor (ON = yes, OFF = no).

2.3.2.4. Setting up Baud rate

The table lists the possible Baud rates. The trasfer rate is set using the 4 DIP-switches (A1 to A4).

Baud rate	DIP-switch A4	DIP-switch A3	DIP-switch A2	DIP-switch A1
1,25 Mbit	On	On	On	On
625 Kbit	On	On	On	Off
250 Kbit	On	On	Off	On
125 Kbit	On	On	Off	Off
115200 Bit	On	Off	On	On
57600 Bit	On	Off	On	Off
50000 Bit	On	Off	Off	On
38400 Bit	On	Off	Off	Off
19200 Bit	Off	On	On	On
9600 Bit	Off	On	On	Off
4800 Bit	Off	On	Off	On
2400 Bit	Off	On	Off	Off
1200 Bit	Off	Off	On	On
600 Bit	Off	Off	On	Off
300 Bit	Off	Off	Off	On

2.3.2.5. Setting up module address (RS-485 only)

The operation in RS-485 mode allows to connect several modules to the bus. It is therefore necessary to assign an individual address to each module. This is realized by means of DIP-switches B1 to B8, resulting in a range of 0 to 255. The module-no. 0 is ignored, i.e. any no. will address the module.

Baud rate	BIt	Value ON	Value OFF
DIP-switch B8	Bit 7	128	0
DIP-switch B7	Bit 6	64	0
DIP-switch B6	Bit 5	32	0
DIP-switch B5	Bit 4	16	0
DIP-switch B4	Bit 3	8	0
DIP-switch B3	Bit 2	4	0
DIP-switch B2	Bit 1	2	0
DIP-switch B1	Bit 0	1	0

Examples:

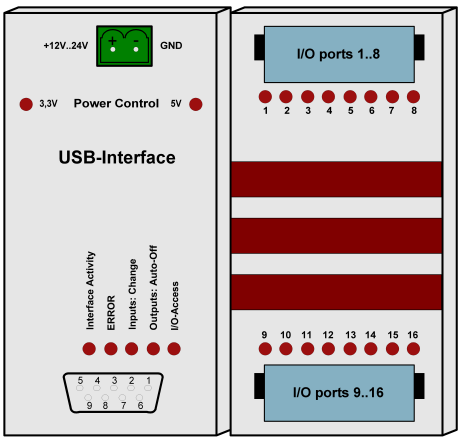
Baud rate	Address 0	Address 25	Address 237
DIP-switch B8	Off	Off	On
DIP-switch B7	Off	Off	On
DIP-switch B6	Off	Off	On
DIP-switch B5	Off	On	Off
DIP-switch B4	Off	On	On
DIP-switch B3	Off	Off	On
DIP-switch B2	Off	Off	Off
DIP-switch B1	Off	On	On

2.4. USB Interface

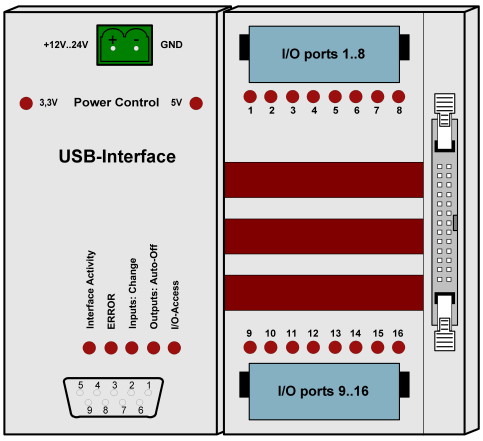
2.4.1. Hardware description

2.4.1.1. Overview screen

The figure below shows the control module with USB-interface (left side) combined with an input/output module (right side). For a connection to the USB bus, an adequate adapter module in form of a USB-stick is included.



The figure below shows the control module with USB interface (left side) combined with a flexible conntector input/output module (right side). For a connection to the USB bus, an adequate adapter module in form of a USB-stick is included with.



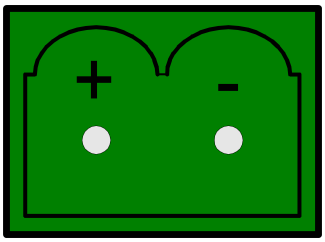
2.4.1.2. Technical data

- Single power supply +7V..+24V DC
- 7 control LEDs
- USB interface
- Transmission range up to 100m!
- USB 2.0 and USB 1.1
- Data transfer speed: 12 MBit/s or 1,5 MBit/s
- Galvanically isolated interface using optocouplers
- 9 pol. D-SUB connector
- Timeout feature providing ability to disconnect outputs for safety reasons
- Comfortable connector system with ejection mechanism
- Expandable in 16 gradations
- Can be combined without any problem to other modules of the RO series

2.4.1.3. Plug-in connector of the module

2.4.1.3.1. Power supply

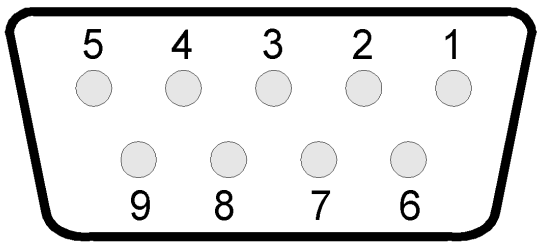
The input-power-supply-range lies between +7V and +24V DC. Power supply can be realized with a standard AC/DC adaptor with 1A output current. A suitable plug-in connector is included.



2.4.1.3.2. USB interface

module in form of a USB stick with a connection cable. The stick has two optocouplers ensuring a galvanical isolation to the PC.

The other end of the adapater is a 9 pol. D-SUB connector which is connected to the RO-module.



2.4.1.4. Control LEDs

The USB module has a series of control LEDs. They are used for easy visual indication of various state functions.

While switching-on the module, it should signalize the following sequence:

- all five LEDs flashing briefly
- right LED (I/O access) flashing briefly
- all five LEDs flashing briefly

2.4.1.4.1. Definition of the LEDs

LED	Description
3,3V	Internal 3,3V power supply
5V	Internal 5V power supply
Interface Activity	Active communication- over the USB bus
ERROR	Error during USB-transfer (for details see document ”USB protocol”)
Inputs: Change	State change between 2 read-out cylces detected
Outputs: Auto-Off	Due to timeout, all outputs are switched-off for safety reasons
I/O Access	CPU-access on the inputs and outputs of the connected modules

2.5. Digital in-/output modules

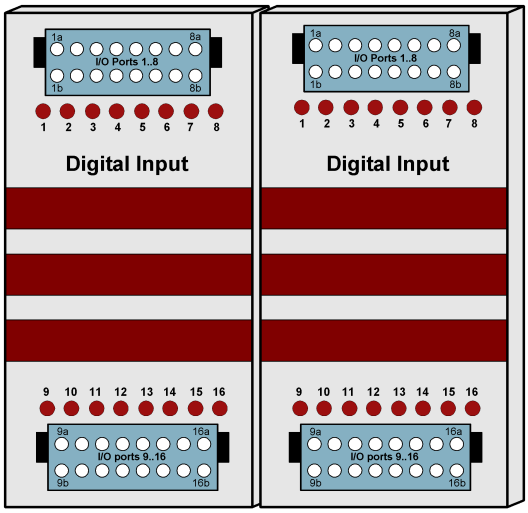
2.5.1. Hardware description

Using the in-/output modules is based on two 16 pol. connectors with each 8 different current circuits. Each state of these (total 16) current circuits is signalized by a LED. The modules are numbered from left to right (see overview screen).

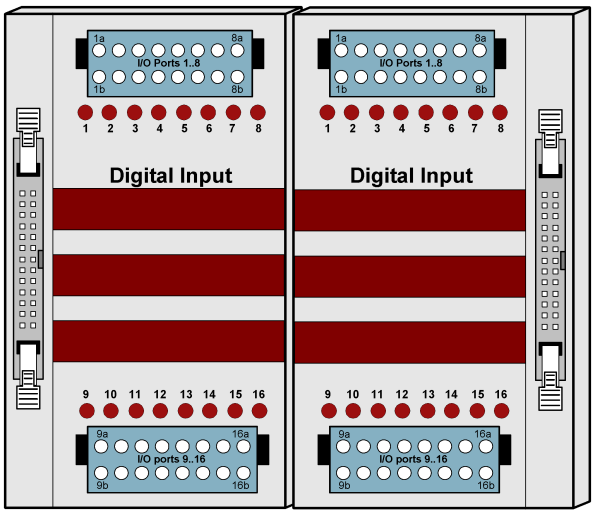
2.5.1.1. Opto-coupler inputs

2.5.1.1.1. Overview screen

The figure shows two modules next to each other with corresponding numbering of the terminal blocks.



The lower figure shows a flexible conntector module with 32 outputs and corresponding numbered ports. Each outer end of the module has a 26 pol. wire trap connector. Thus, multiple modules can be connected in series using a ribbon cable for each connection.



2.5.1.1.2. Technical data

- Variable power supply min. 5V, max. 30V AC
- 16-bit counter for the first 16 input channels
- Pulse-detection between 2 read out cycles, indicated by LED
- LED status indication of the inputs
- Galvanically isolated using optocouplers
- Comfortable connector system with ejection mechanism
- Expandable in 16 gradations
- Can be combined without any problem to other modules of the RO series

2.5.1.1.3. 16-bit counter

The first 16 input channels have each a 16 bit counter. Thus, events as light barriers, turnstiles or push-buttons are counted. Easy logical circuits are realizable, which may e.g. switch one or several outputs, if a counter reached a certain amount (set-point is reached). Please refer to the manual ”RO-series” to implement such logical circuits into software.

2.5.1.1.4. Registering short input pulses

Short input pulses between to read-out cycles are registered through an additional logic and can be separately read-out. A registered pulse on one or more inputs is signalized by the LED ”Inputs: Change” on the control module. The LED is extinguishing, if the software-register of the input state change is read out by the user. For more indformation, see ”Register assignment”.

2.5.1.1.5. Galvanically decouppled through optocouplers

AC input optocouplers provide a galvanic isolation of the module towards the connected equipment. They also provide a safe connection to the module for reverse currents and high voltage peaks.

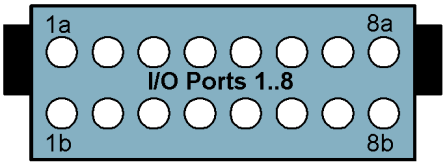
2.5.1.1.6. Plug-in connector on the module

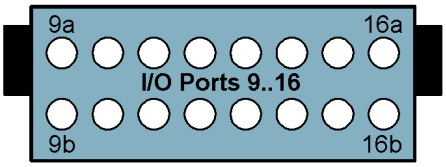
As terminal block, user-friendly terminal strips with locking protection and ejection mechanism are used. They are reverse-polarity protected and allow quick replugging. The wire connection itself is realised with a screwless connector system. A tool is included with each module.

2.5.1.1.6.1. Connection wiring

Connecting the wires is to be effected at the ports with the same numbering, for example: 1a & 1b, 2a & 2b. ...
The optocoupler inputs are suitable for AC voltage. Therefore it is not necessary to take care of the connection polarity.

The figure shows two terminal blocks with numbered connection ports.





2.5.1.1.6.2. Visual control of the inputs

The state of each input is directly signalized by a separate LED. This simplifies to detect and rectify wiring errors, because the signals on the cables are directly observable.

2.5.1.1.6.3. Pinout

Port	Pin	Port	Pin
1	1a & 1b	9	9a & 9b
2	2a & 2b	10	10a & 10b
3	3a & 3b	11	11a & 11b
4	4a & 4b	12	12a & 12b
5	5a & 5b	13	13a & 13b
6	6a & 6b	14	14a & 14b
7	7a & 7b	15	15a & 15b
8	8a & 8b	16	16a & 16b

2.5.1.1.7. Variable input voltage range

The factory-default of the inputs is set to a voltage range of 15V to 30V. This may be changed to a range of 5V to 15V (even afterward).

Input voltage range	5V – 15V	15V – 30V
Resistance value	1K	2K2

2.5.1.1.7.1. Changing the input voltage

Each terminal block has 8 inputs sudivided in two groups and each group has its own input voltage range (resulting groups: 1-4, 5-8, 9-12 und 13-16). Each group‘s input voltage range is defined by a corresponding resistor network.

The following steps describes how to exchange one or more resistor networks.

Notice!

Bevore opening the device, please note the following:

Disconnect the power supply (unplug AC/DC adaptor)!

Do not touch electronic components. They could be destroyed by electrostatic discharge! If necessary, touch grounded metal casings or radiators.

Remove a module‘s side element. Unscrew the three Phillips screws.

Pull the circuit board together with the front panel sideways out.

Lift the front panel from the module.

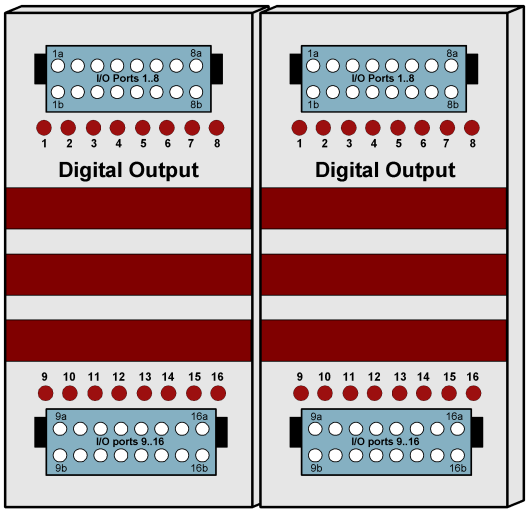
Every input module has two single rowed socket terminal strips in which the resistor networks are plugged in. Please carefully remove the desired resistor network and replace them it appropriate one.

Assembling the elements in done the reverse order.

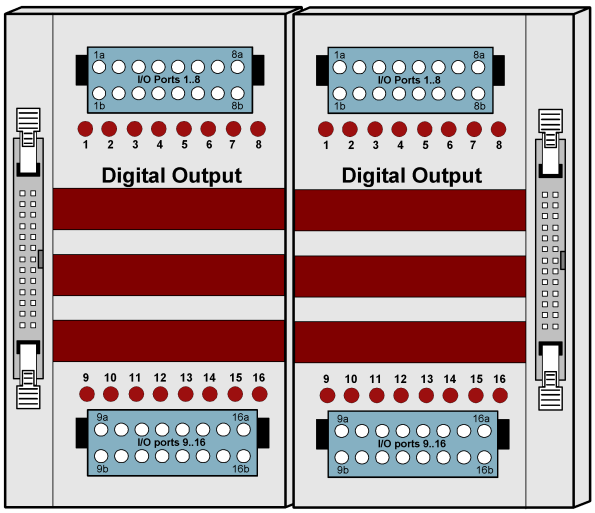
2.5.1.2. Relay outputs

2.5.1.2.1. Overview screen

The figure shows two modules next to each other with corresponding numbering of the terminal blocks.



The lower figure shows a flexible conntector module with 32 outputs and corresponding numbered ports. Each outer end of the module has a 26 pol. wire trap connector. Thus, multiple modules can be connected in series using a ribbon cable for each connection.



2.5.1.2.2. Technical data

- Timeout-protection
- LED status indication of the outputs
- Galvanically isolated using optocouplers
- Comfortable connector system with ejection mechanism
- Expandable in 16 gradations
- Can be combined without any problem to other modules of the RO series
- Max. switching voltage: 36V
- Max. switching current: 1A
- Max. switching power: 20W
- Switching cycles according to the manufacturer: 10 Mio.

2.5.1.2.3. Timeout-protection

The timeout-protection gives the possibility to switch-off automatically the outputs on its own to prevent damage. This takes place, if in a predefined time frame no communication with the module was possible. Reasons could be cable disruption, PC-crash and more. This way damage control, surcharge of connected equipment and risk of accidents can be avoided. Switching off the outputs is indicated by a LED.

2.5.1.2.4. Plug-in connector on the module

As terminal block, user-friendly terminal strips with locking protection and ejection mechanism are used. They are reverse-polarity protected and allow quick replugging. The wire connection itself is realised with a screwless connector system. A tool is included with each module.

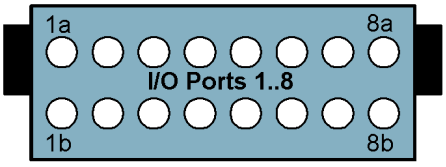
2.5.1.2.4.1. Relay-outputs (galvanically decoupled, max. 1A)

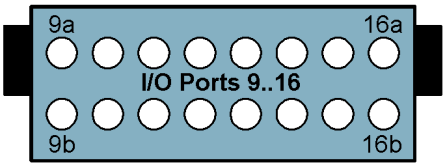
The relays are able to switch voltages up to 36V. The max. current is 1A at a max. power of 20W.

Additionally, the relays provide a safe electrical isolation of the module to the connected equipment.

2.5.1.2.4.2. Connection wiring

Connecting the wires is to be effected at the ports with the same numbering, for example: 1a & 1b, 2a & 2b. ...
It is not necessary to take care to the correct polarity.





2.5.1.2.4.3. Visual control of the outputs

The state of each output is directly signalized by a separate LED. This simplifies to detect and rectify wiring errors, because the signals on the cables are directly observable.

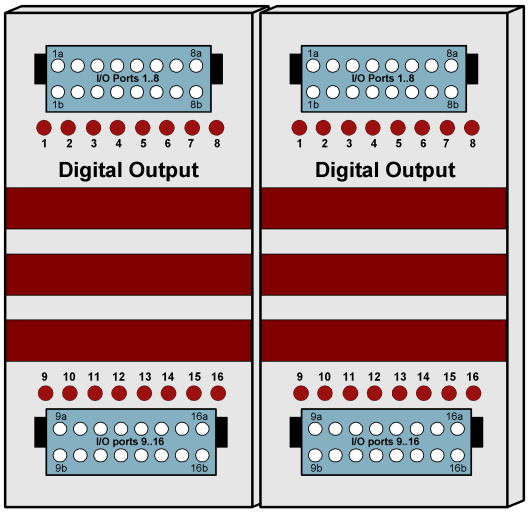
2.5.1.2.4.4. Pinout

Port	Pin	Port	Pin
1	1a & 1b	9	9a & 9b
2	2a & 2b	10	10a & 10b
3	3a & 3b	11	11a & 11b
4	4a & 4b	12	12a & 12b
5	5a & 5b	13	13a & 13b
6	6a & 6b	14	14a & 14b
7	7a & 7b	15	15a & 15b
8	8a & 8b	16	16a & 16b

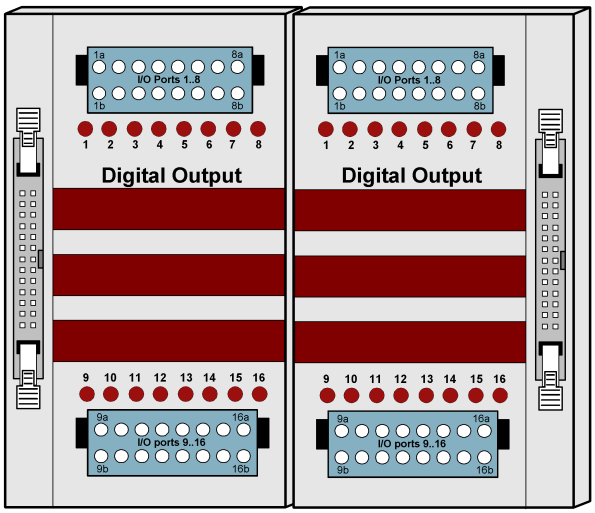
2.5.1.3. MOSFET outputs

2.5.1.3.1. Overview screen

The figure shows two modules next to each other with corresponding numbering of the terminal blocks.



The lower figure shows a flexible conntector module with 32 outputs and corresponding numbered ports. Each outer end of the module has a 26 pol. wire trap connector. Thus, multiple modules can be connected in series using a ribbon cable for each connection.



2.5.1.3.2. Technical data

- Timeout-protection
- LED status indication of the outputs
- Galvanically isolated using optocouplers
- Comfortable connector system with ejection mechanism
- Expandable in 16 gradations
- Can be combined without any problem to other modules of the RO series
- Max. switching voltage: 30V DC
- Max. switching current: 2A DC
- Max. switching power: 40W

2.5.1.3.3. Timeout-protection

The timeout-protection gives the possibility to switch-off automatically the outputs on its own to prevent damage. This takes place, if in a predefined time frame no communication with the module was possible. Reasons could be cable disruption, PC-crash and more. This way damage control, surcharge of connected equipment and risk of accidents can be avoided. Switching off the outputs is indicated by a LED.

2.5.1.3.4. Plug-in connector on the module

As terminal block, user-friendly terminal strips with locking protection and ejection mechanism are used. They are reverse-polarity protected and allow quick replugging. The wire connection itself is realised with a screwless connector system. A tool is included with each module.

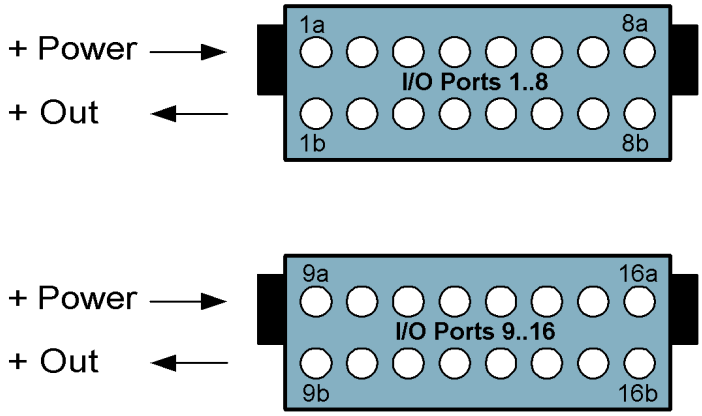
2.5.1.3.4.1. Optocoupler-outputs (galvanically isolated, max. 2A DC)

Every output is realized using high current optocouplers. Using optocouplers provides a secure galvanical decoupling of the module-driven equipment to the module itself.

Pay attention to the optocoupler's output polarity while wiring (see figure below)!

2.5.1.3.4.2. Connection wiring

Connecting the wires is to be effected at the ports with the same numbering, for example: 1a & 1b, 2a & 2b, ... Pay attention to the optocoupler's output polarity while wiring, else the outputs will get damaged. Connect the positive voltage to port "a", and the switched positive voltage to port "b".



2.5.1.3.4.3. Pinout

Port	Pin	Port	Pin
1	1a & 1b	9	9a & 9b
2	2a & 2b	10	10a & 10b
3	3a & 3b	11	11a & 11b
4	4a & 4b	12	12a & 12b
5	5a & 5b	13	13a & 13b
6	6a & 6b	14	14a & 14b
7	7a & 7b	15	15a & 15b
8	8a & 8b	16	16a & 16b

2.6. Analog in-/output modules

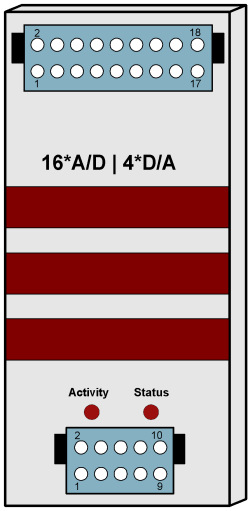
2.6.1. Hardware description

2.6.1.1. RO-AD16-DA4

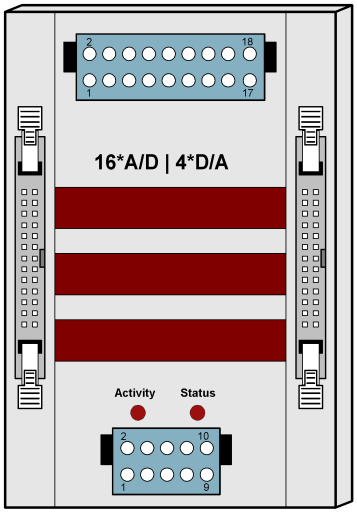
This module has 16 A/D channels and provides a good basis to convert voltages to digital values. It has furthermore 4 D/A outputs allowing to convert digital values to an analog voltage.

2.6.1.1.1. Overview screen

The lower figure shows a module with two terminal blocks and corresponding numbered connection ports.



The following figure shows a flexible conntector module with two terminal blocks and corresponding numbered connection ports.



2.6.1.1.2. Technical data

- Timeout-protection
- Comfortable connector system with ejection mechanism
- Can be combined without any problem to other modules of the RO series

A/D outputs

Mode U: (voltage)
Unipolar: 0-5V, 0-10V
Bipolar: +5V, +10V

Mode I: (current)
Range: 0-20mA (optional)

D/A outputs

Timeout-protection

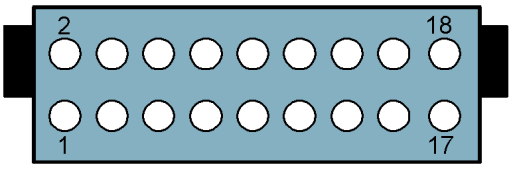
Mode U: (voltage)
Unipolar: 0V-5V, 0V-10V
Bipolar: +5V, +10V

2.6.1.1.3. Timeout-protection

The timeout-protection gives the possibility to switch automatically off the outputs on its own to prevent damage. This takes place, if in a predefined time frame no communication with the module was possible. Reasons could be cable disruption, PC-crash and more. This way damage control, surcharge of connected equipment and risk of accidents can be avoided. Switching off the outputs is indicated by a LED.

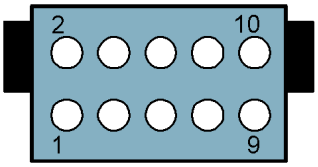
2.6.1.1.4. Pinout

2.6.1.1.4.1. A/D connection wiring (18pol)



Pin		Pin	
1	AGND	2	AGND
3	AD1	4	AD0
5	AD3	6	AD2
7	AD5	8	AD4
9	AD7	10	AD6
11	AD9	12	AD8
13	AD11	14	AD10
15	AD13	16	AD12
17	AD15	18	AD14

2.6.1.1.4.2. D/A connection wiring (10pol)



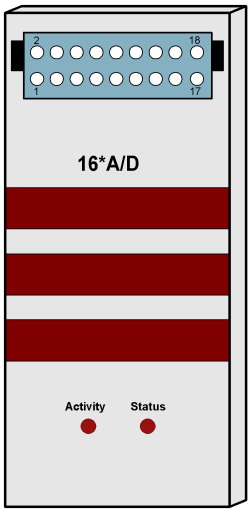
Pin		Pin	
1	AGND	2	DA0
3	AGND	4	DA1
5	AGND	6	DA2
7	AGND	8	DA3
9	AGND	10	AGND

2.6.1.2. RO-AD16

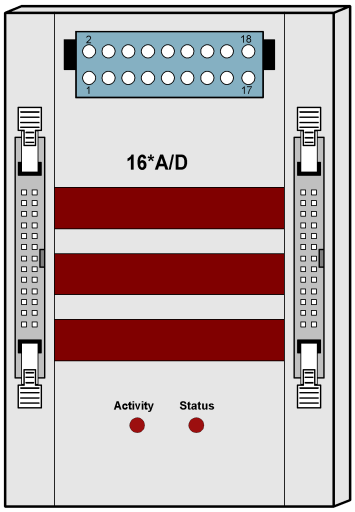
This module has 16 A/D input channels and provides a good basis to convert voltages to digital values.

2.6.1.2.1. Overview screen

The lower figure shows a module with a terminal block and corresponding numbered connection ports.



The following figure shows a flexible conntector module with a terminal block and corresponding numbered connection ports.



2.6.1.2.2. Technical data

- Timeout-protection
- Comfortable connector system with ejection mechanism
- Can be combined without any problem to other modules of the RO series

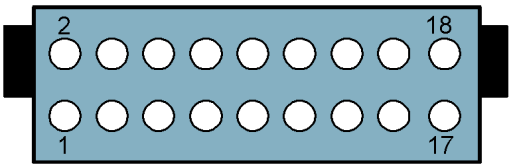
A/D inputs

Mode U: (voltage)
Unipolar: 0-5V, 0-10V
Bipolar: +5V, +10V

Mode I: (current)
Range: 0-20mA (optional)

2.6.1.2.3. Pinout

2.6.1.2.3.1. A/D connection wiring (18pol)



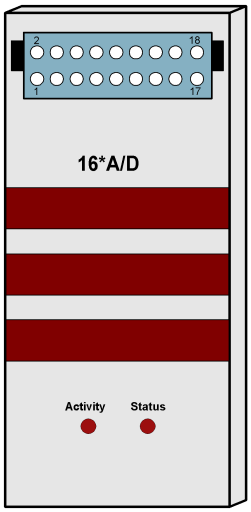
Pin		Pin	
1	AGND	2	AGND
3	AD1	4	AD0
5	AD3	6	AD2
7	AD5	8	AD4
9	AD7	10	AD6
11	AD9	12	AD8
13	AD11	14	AD10
15	AD13	16	AD12
17	AD15	18	AD14

2.6.1.3. RO-AD16_ISO

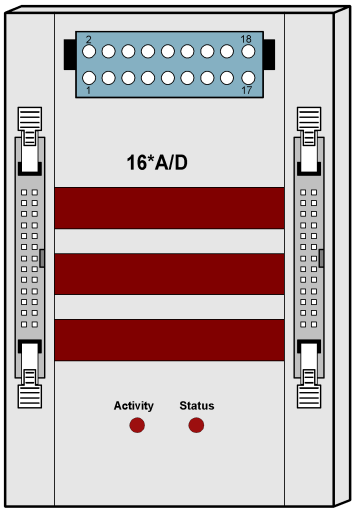
This module has 16 A/D input channels (galvancally isolated) and provides a good basis to convert voltages to digital values.

2.6.1.3.1. Overview screen

The lower figure shows a module with a terminal block and corresponding numbered connection ports.



The following figure shows a flexible conntector module with a terminal block and corresponding numbered connection ports.



2.6.1.3.2. Technical data

- Timeout-protection
- Comfortable connector system with ejection mechanism
- Can be combined without any problem to other modules of the RO series

A/D inputs

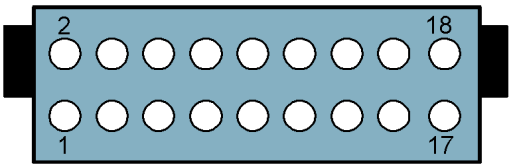
Galvanically isolated

Mode U: (voltage)
Unipolar: 0-5V, 0-10V
Bipolar: +5V, +10V

Mode I: (current)
Range: 0-20mA (optional)

2.6.1.3.3. Pinout

2.6.1.3.3.1. A/D connection wiring (18pol)



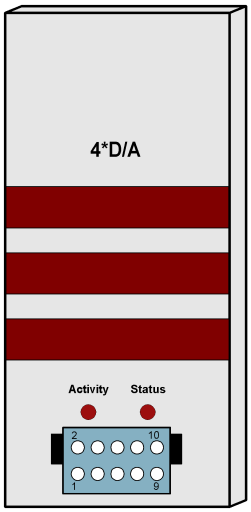
Pin		Pin	
1	AGND	2	AGND
3	AD1	4	AD0
5	AD3	6	AD2
7	AD5	8	AD4
9	AD7	10	AD6
11	AD9	12	AD8
13	AD11	14	AD10
15	AD13	16	AD12
17	AD15	18	AD14

2.6.1.4. RO-DA4

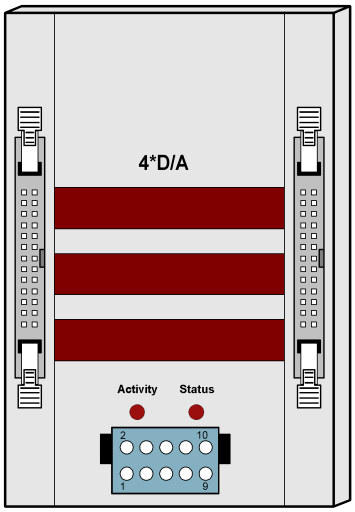
This module has 4 D/A outputs and provides a good basis to convert digital values to a voltage.

2.6.1.4.1. Overview screen

The lower figure shows a module with a terminal block and corresponding numbered connection ports.



The following figure shows a flexible conntector module with a terminal block and corresponding numbered connection ports.



2.6.1.4.2. Technical data

- Timeout-protection
- Comfortable connector system with ejection mechanism
- Can be combined without any problem to other modules of the RO series

D/A outputs

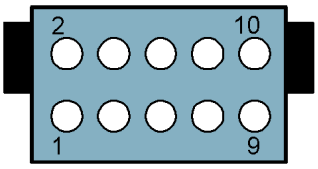
Unipolar: 0V-5V, 0V-10V
Bipolar: +5V, +10V

2.6.1.4.3. Timeout-protection

The timeout-protection gives the possibility to switch automatically off the outputs on its own to prevent damage. This takes place, if in a predefined time frame no communication with the module was possible. Reasons could be cable disruption, PC-crash and more. This way damage control, surcharge of connected equipment and risk of accidents can be avoided. Switching off the outputs is indicated by a LED.

2.6.1.4.4. Pinout

2.6.1.4.4.1. D/A connection wiring (10pol)



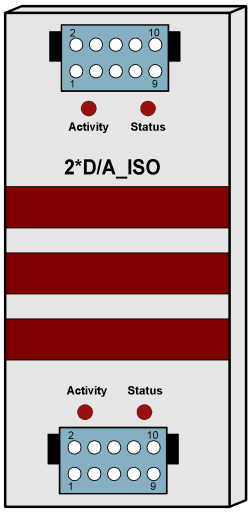
Pin		Pin	
1	AGND	2	DA0
3	AGND	4	DA1
5	AGND	6	DA2
7	AGND	8	DA3
9	AGND	10	AGND

2.6.1.5. RO-DA2_ISO

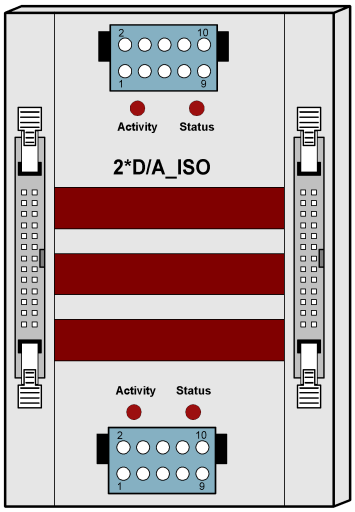
This module has 2 galvanically decoupled D/A outputs and provides a good basis to convert digital values to a voltage.

2.6.1.5.1. Overview screen

The lower figure shows a module with a terminal block and corresponding numbered connection ports.



The following figure shows a flexible conntector module with a terminal block and corresponding numbered connection ports.



2.6.1.5.2. Technical data

- Timeout-protection
- Comfortable connector system with ejection mechanism
- Can be combined without any problem to other modules of the RO series

D/A outputs

Modus U: (Spannung)
Unipolar: 0V-5V, 0V-10V
Bipolar: +5V, +10V

Mode I: (current)
Modus I: (Strom)
0-20mA, 4-20mA, 0-24mA

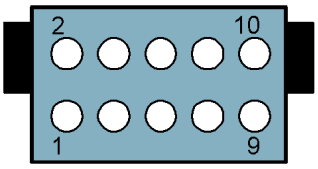
2.6.1.5.3. Timeout-protection

The timeout-protection gives the possibility to switch automatically off the outputs on its own to prevent damage. This takes place, if in a predefined time frame no communication with the module was possible. Reasons could be cable disruption, PC-crash and more. This way damage control, surcharge of connected equipment and risk of accidents can be avoided. Switching off the outputs is indicated by a LED.

2.6.1.5.4. Pinout

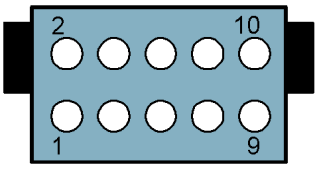
2.6.1.5.4.1. D/A connection wiring (10pol)

Connection wiring top:



Pin		Pin	
1	VOUT_A	2	+Vsense_A
3	VOUT_A	4	+Vsense_A
5	AGND	6	-Vsense_A
7	AGND	8	-Vsense_A
9	AGND	10	IOUT_A

Connection wiring bottom:



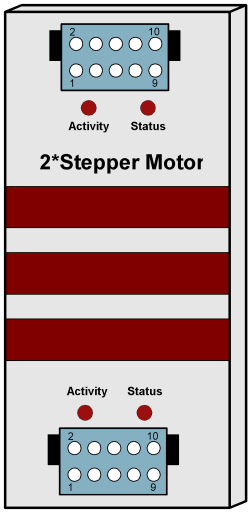
Pin		Pin	
1	VOUT_B	2	+Vsense_B
3	VOUT_B	4	+Vsense_B
5	AGND	6	-Vsense_B
7	AGND	8	-Vsense_B
9	AGND	10	IOUT_B

2.7. Stepper module

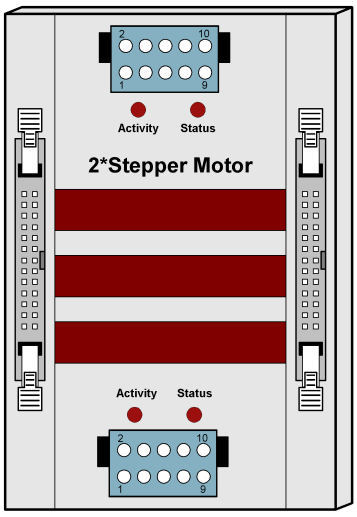
2.7.1. Hardware description

2.7.1.1. Overview screen

The lower figure shows a module with a terminal block and corresponding numbered connection ports.



The following figure shows a flexible stepper module with a terminal block and corresponding numbered connection ports.



2.7.1.2. Technical data

Common:

- Module for two stepper motors
- Comfortable connector system with ejection mechanism
- Can be combined without any problem to other modules of the RO series

Configurable parameters

- Start-/ stop frequency
- Maximum stepping frequency
- Acceleration slope
- Deceleration slope
- Phase current
- Hold current
- Hold time

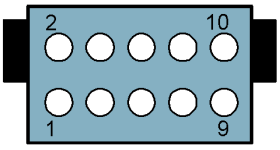
2.7.1.3. Stepping motor control

Every parameter can be conveniently set using the DELIB library.

Two reference switches are used to reach a reference position. Two additional end switches provide a save stopping. If they are operated, the motors may exclusively be driven back in the opposite direction.

2.7.1.4. Stepper connection wiring (10pol) - pinout

Pinout of a socket connector and also of a stepper motor:



Pin		Pin	
1	24 V (motor power supply)	2	0 V (motor power supply)
3	Phase 1 (+)	4	Reference switch 2*)
5	Phase 1 (-)	6	Reference switch 1*)
7	Phase 2 (+)	8	End switch 2 *)
9	Phase 2 (-)	10	End switch 1 *)

*) The switches must be connected towards 24 V.

Software

3. Software

3.1. Using our products

3.1.1. Access via graphical applications

We provide driverinterfaces e.g. for LabVIEW and ProfiLab. The DELIB driver library is the basis, which can be directly activated by ProfiLAB.
For LabVIEW, we provide a simple driver connection with examples!

3.1.2. Access via the DELIB driver library

In the appendix, you can find the complete function reference for the integration of our API-functions in your software. In addition we provide examples for the following programming languages:

- C
- C++
- C#
- Delphi
- VisualBasic
- VB.NET
- MS-Office

3.1.3. Access via protocol

The protocol for the activation of our products is open source. So you are able to use our products on systems without Windows or Linux.

3.1.4. Access via provided test programs

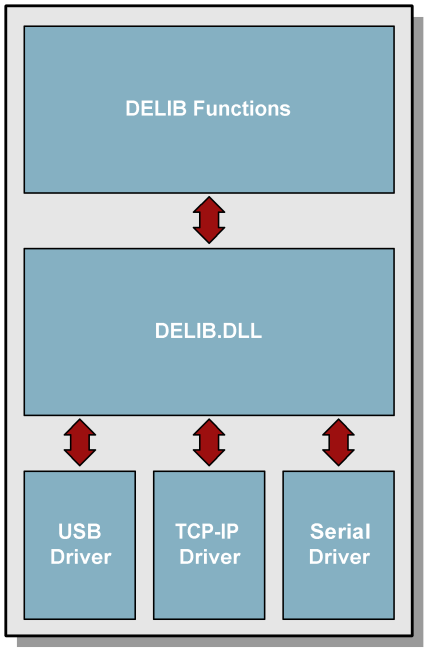
We provide simple handling test programs for the most important functions of our products. These will be installed automatically by the installation of the DELIB driver library.

So you can test directly e.g. relays or you can check the voltage of an A/D converter.

3.2. DELIB driver library

3.2.1. Overview

The following figure explains the structure of the DELIB driver library



The DELIB driver library allows an uniform response of DEDITEC hardware with particular consideration of the following viewpoints:

- Independent of operating system
- Independent of programming language
- Independent of the product

Program under diverse operating systems

The DELIB driver library allows an uniform response of our products on diverse operating systems.

We has made sure, that all of our products can be responded by a few commands.

Whatever which operating system you use. - Therefore the DELIB cares!

Program with diverse programming languages

We provide uniform commands to create own applications. This will be solved by the DELIB driver library.

You choose the programming language!

It can be simply developed applications under C++, C, Visual Basic, Delphi or LabVIEW®.

Program independent of the interface

Write your application independent of the interface !

Program an apllication for an USB product of us. - Also, it will work with an ethernet or RS-232 product of us !

SDK-Kit for Programmer

Integrate the DELIB in your application. On demand you receive an installation script for free, which allows you, to integrate the DELIB installation in your apllication.

3.2.2. Supported operating systems

Our products support the following operating systems:

- Windows 2000
- Windows XP
- Windows Vista
- Windows 7
- Linux

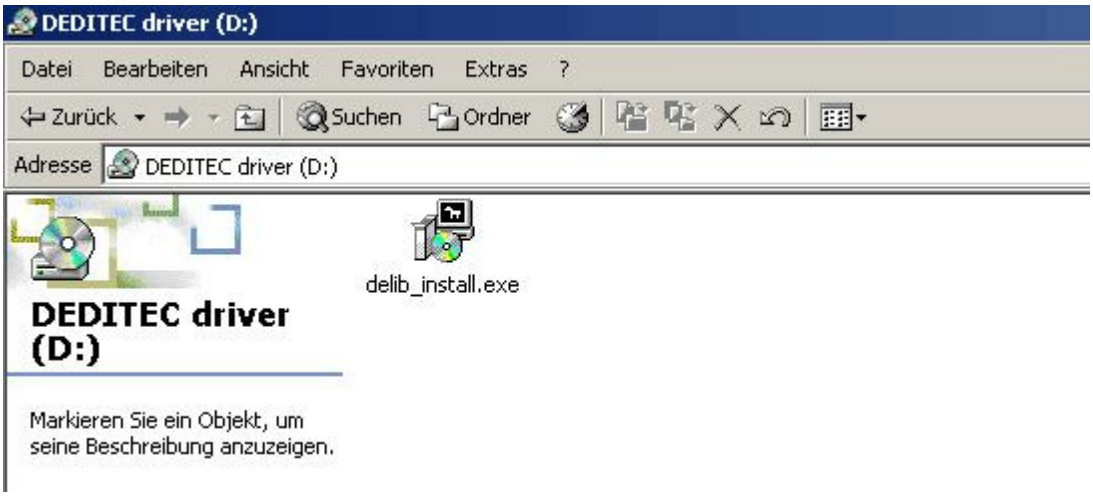
3.2.3. Supported programming languages

Our products are responsive via the following programming languages:

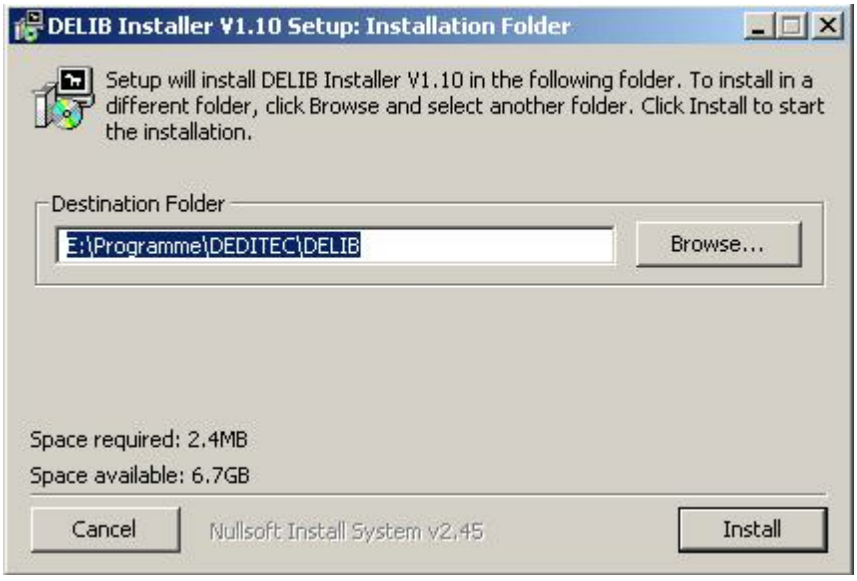
- C
- C++
- C#
- Delphi
- VisualBasic
- VB.NET
- MS-Office

3.2.4. Installation DELIB driver library

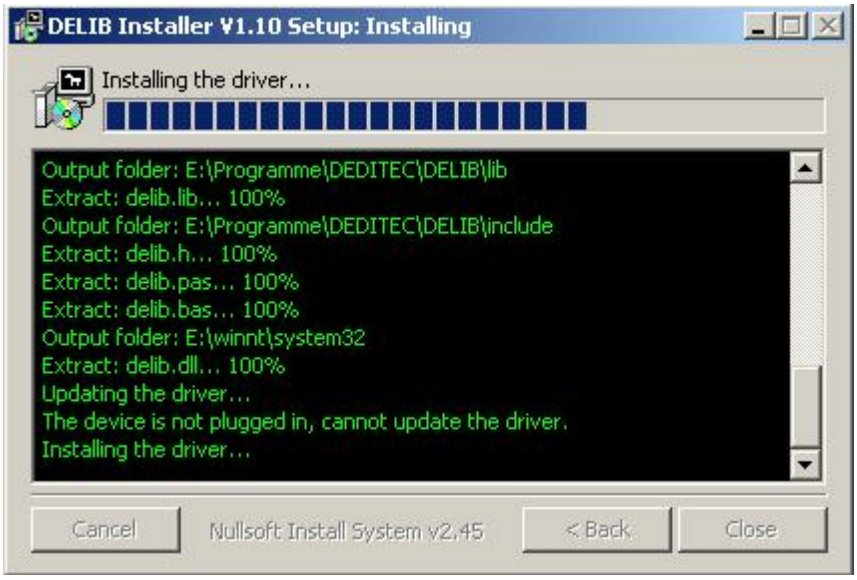
DELIB stands for DEDITEC Library and contains the necessary libraries for the modules in the programming languages C, Delphi and Visual Basic.



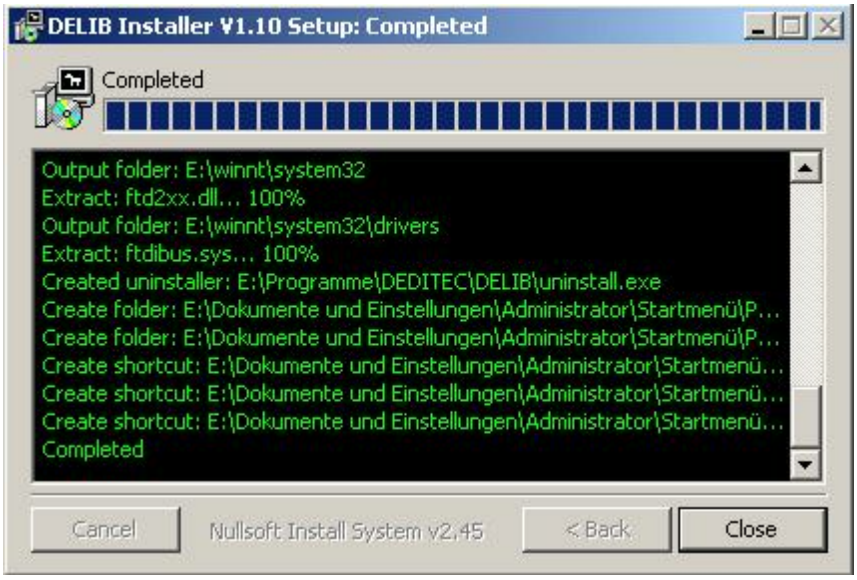
Insert the DEDITEC driver CD into the drive and start **„delib_install.exe“**. The DELIB driver library is also available on http://www.deditec.en/delib



Click on **„Install“**.



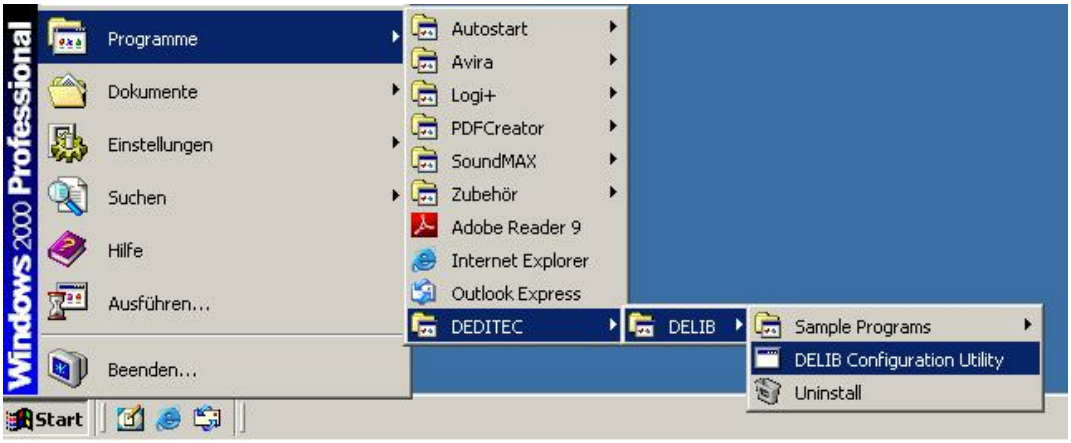
The drivers will be installed.



The DELIB driver library is now installed. Press **„Close“** to finish the installation.

You can configure your module with the **„DELIB Configuration Utility“** (see next chapter). This is only necessary, if more than one module is present.

3.2.5. DELIB Configuration Utility



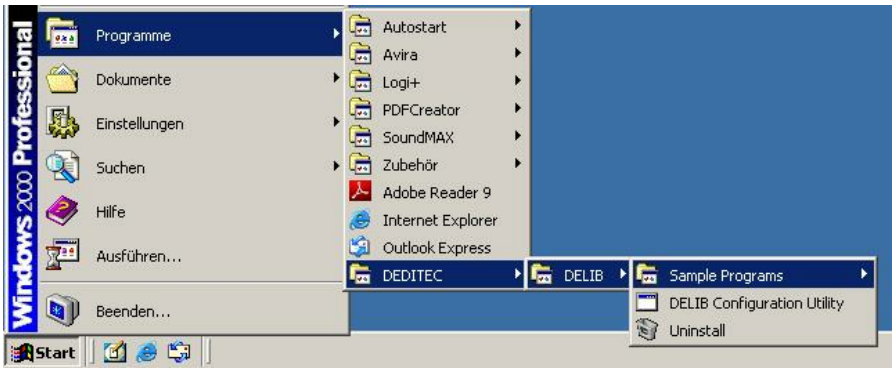
Start the **"DELIB Configuration Utility"** as follows:

Start → Programs → DEDITEC → DELIB → DELIB Configuration Utility.

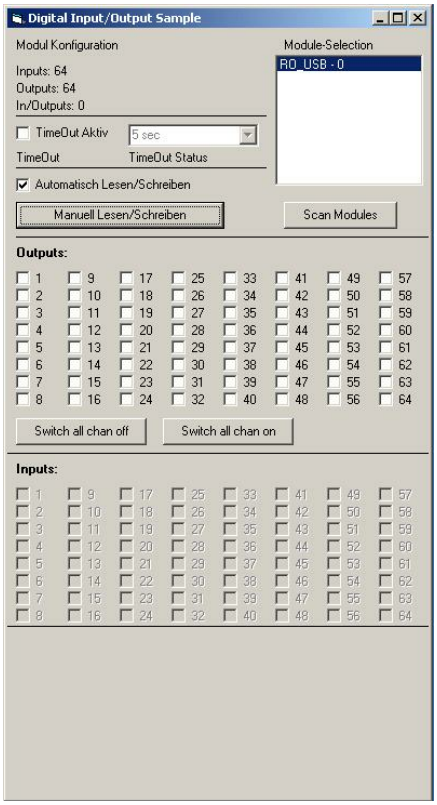
The **„DELIB Configuration Utility"** is a program to configure and subdivide identical USB-modules in the system. This is only necessary if more than one module is present.

3.3. Test programs

3.3.1. Digital Input-Output Demo

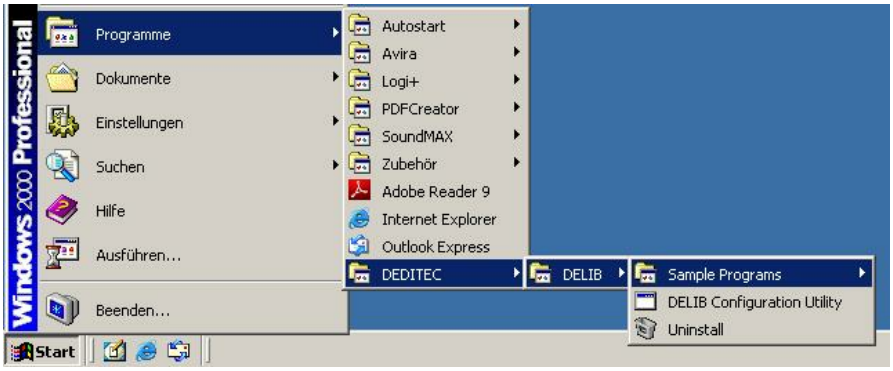


Start **"Digital Input-Output Demo"** as follows:
Start → Programme → DEDITEC → DELIB → Digital Input-Output Demo.

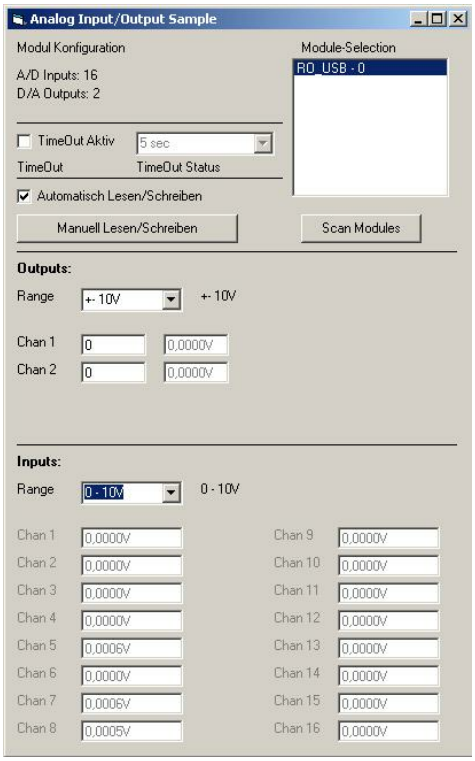


The screenshot shows a test of the RO-USB-O64-R64. The configuration of the module (64 inputs and 64 outputs) is shown on the upper left side.

3.3.2. Analog Input-Output Demo

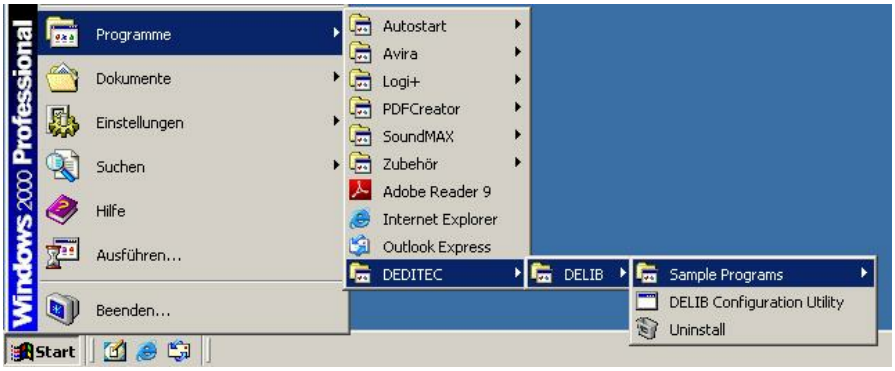


Start **"Analog Input-Output Demo"** as follows:
Start → Programme → DEDITEC → DELIB → Analog Input-Output Demo.



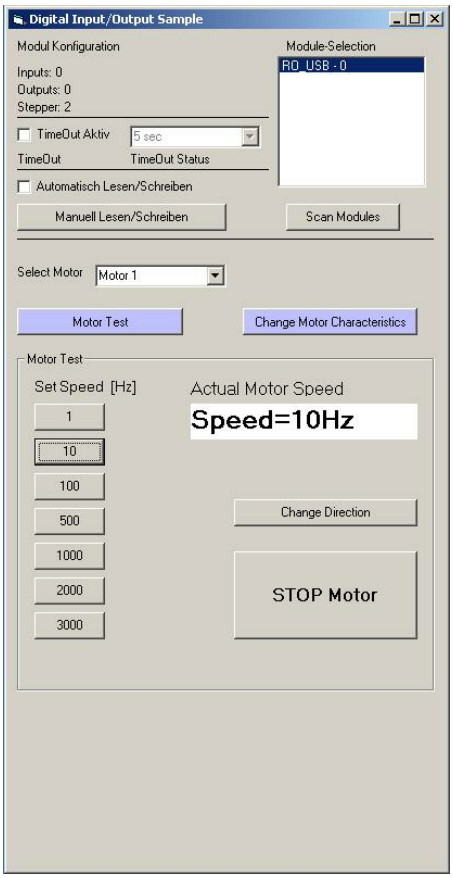
The screenshot shows a test of the RO-USB-AD16-DA2_ISO. The configuration of the module (16 A/D inputs and 2 D/A outputs) is shown on the upper left side.

3.3.3. Stepper Demo



Start **"Stepper Demo"** as follows:

Start → Programme → DEDITEC → DELIB → Stepper Demo.



The screenshot shows a test of the RO-USB-STEPPER2. The configuration of the module (2 Stepper) is shown on the upper left side.

DELIB API reference

4. DELIB API reference

4.1. Management functions

4.1.1. DapiOpenModule

Description

This function opens a particular module.

Definition

ULONG DapiOpenModule(ULONG moduleID, ULONG nr);

Parameters

moduleID=Specifies the module, which is to be opened (see delib.h)
nr=Indicates No of module which is to be opened.
nr=0 -> 1. module
nr=1 -> 2. module

Return value

handle=handle to the corresponding module
handle=0 -> Module was not found

Remarks

The handle returned by this function is needed to identify the module for all other functions.

Example program

```
// USB-Modul öffnen
handle = DapiOpenModule(RO_USB1, 0);
printf("handle = %x\n", handle);
if (handle==0)
{
// USB Modul wurde nicht gefunden
printf("Modul konnte nicht geöffnet werden\n");
return;
}
```

4.1.2. DapiCloseModule

Description

This command closes an opened module.

Definition

ULONG DapiCloseModule(ULONG handle);

Parameters

handle=This is the handle of an opened module

Return value

none

Example program

```
// Close the module
DapiCloseModule(handle);
```

4.2. Error handling

4.2.1. DapiGetLastError

Description

This function returns the last registered error.

Definition

ULONG DapiGetLastError();

Parameters

None

Return value

Error code

0=no error. (see delib.h)

Example program

```
ULONG error;
error=DapiGetLastError();
if(error==0) return FALSE;
printf("ERROR = %d", error);
```

4.2.2. DapiGetLastErrorText

Description

This function reads the text of the last registered error.

Definition

*extern ULONG __stdcall DapiGetLastErrorText(unsigned char * msg, unsigned long msg_length);*

Parameters

msg = text buffer

msg_length = length of the buffer

Example program

```
BOOL IsError ()
{
  if (DapiGetLastError () != DAPI_ERR_NONE)
       {
         unsigned char msg[500];

         DapiGetLastErrorText((unsigned char*) msg, sizeof(msg));
         printf ("Error Code = %x * Message = %s\n", 0, msg);
         return TRUE;
       }
  return FALSE;
}
```

4.3. Reading Digital inputs

4.3.1. DapiDIGet1

Description
This command reads a single digit input.

Definition
ULONG DapiDIGet1(ULONG handle, ULONG ch);

Parameters
handle=This is the handle of an opened module.
ch=Specifies the number of input that is to be read (0 ..).

Return value
State of the input (0 / 1).

4.3.2. DapiDIGet8

Description

This command reads 8 digital inputs simultaneously.

Definition

ULONG DapiDIGet8(ULONG handle, ULONG ch);

Parameters

handle=This is the handle of an opened module.

ch=Specifies the number of the input, from which it begins to read from (0, 8, 16, 24, 32, ..)

Return value

State of the read inputs.

4.3.3. DapiDIGet16

Description

This command reads 16 digital inputs simultaneously.

Definition

ULONG DapiDIGet16(ULONG handle, ULONG ch);

Parameters

handle=This is the handle of an opened module.

ch=Specifies the number of the input, from which it begins to read from (0, 16, 32, ..)

Return value

State of the read inputs.

4.3.4. DapiDIGet32

Description

This command reads 32 digital inputs simultaneously.

Definition

ULONG DapiDIGet32(ULONG handle, ULONG ch);

Parameters

handle=This is the handle of an opened module.

ch=Specifies the number of the input, from which it begins to read from (0, 32, 64, ..)

Return value

State of the read inputs.

Example program

```
unsigned long data;
// ------------------------------------------------------
// Einen Wert von den Eingängen lesen (Eingang 1-31)
data = (unsigned long) DapiDIGet32(handle, 0);
// Chan Start = 0
printf("Eingang 0-31 : 0x%x\n", data);
printf("Taste für weiter\n");
getch();
// ------------------------------------------------------
// Einen Wert von den Eingängen lesen (Eingang 32-64)
data = (unsigned long) DapiDIGet32(handle, 32);
// Chan Start = 32
printf("Eingang 32-64 : 0x%x\n", data);
printf("Taste für weiter\n");
getch();
```

4.3.5. DapiDIGet64

Description
This command reads 64 digital inputs simultaneously.

Definition
ULONGLONG DapiDIGet64(ULONG handle, ULONG ch);

Parameters
handle=This is the handle of an opened module.
ch=Specifies the number of the input,from which it begins to read from (0, 64, ..)

Return value
State of the read inputs.

4.3.6. DapiDIGetFF32

Description

This command reads the flip-flops from the inputs and resets them. (Input state change).

Definition

ULONG DapiDIGetFF32(ULONG handle, ULONG ch);

Parameters

handle=This is the handle of an opened module .

ch=Specifies the number of the input, from which it begins to read from (0, 32, ..)

Return value

State of 32 input change states

4.3.7. DapiDIGetCounter

Description

This command reads the counter of a digital input

Definition

ULONG DapiDIGetCounter(handle, ch, par1);

Parameters

handle=This is the handle of an opened module.

ch=Specifies the digital input, from which the counter will be read

par1=0 (Normal counter function)

par1=DAPI_CNT_MODE_READ_WITH_RESET (Reading and resetting the counter)

Return value

Value of the counter.

Example program

```
value = DapiDIGetCounter(handle, 0 ,0);
// Reading counter of DI Chan 0

value = DapiDIGetCounter(handle, 1 ,0);
// Reading counter of DI Chan 1

value = DapiDIGetCounter(handle, 8 ,0);
// Reading counter of DI Chan 8

value = DapiDIGetCounter(handle, 0 ,DAPI_CNT_MODE_READ_WITH_RESET);
// Reading AND resetting counter of DI Chan 0
```

4.4. Setting Digital outputs

4.4.1. DapiDOSet1

Description
This is the command to set a single output.

Definition
void DapiDOSet1(ULONG handle, ULONG ch, ULONG data);

Parameters
handle=This is the handle of an opened module
ch=Specifies the number of the output to be set to (0 ..)
data=Specifies the data value that is to be written (0 / 1)

Return value
None

4.4.2. DapiDOSet8

Description

This command sets 8 digital outputs simultaneously.

Definition

void DapiDOSet8(ULONG handle, ULONG ch, ULONG data);

Parameters

handle=This is the handle of an opened module

ch=Specifies the number of the output, from which it begins to write to (0, 8, 16, 24, 32, ..)

data=Specifies the data values, to write to the outputs

Return value

None

4.4.3. DapiDOSet16

Description

This command sets 16 digital outputs simultaneously.

Definition

void DapiDOSet16(ULONG handle, ULONG ch, ULONG data);

Parameters

handle=This is the handle of an opened module

ch=Specifies the number of the output, from which it begins to write to (0, 16, 32, ..)

data=Specifies the data values, to write to the outputs

Return value

None

4.4.4. DapiDOSet32

Description

This command sets 32 digital outputs simultaneously.

Definition

void DapiDOSet32(ULONG handle, ULONG ch, ULONG data);

Parameters

handle=This is the handle of an opened module

ch=Specifies the number of the output, from which it begins to write to (0, 32, 64, ..)

data=Specifies the data values, to write to the outputs

Return value

None

Example program

```
// Einen Wert auf die Ausgänge schreiben
data = 0x0000ff00; // Ausgänge 9-16 werden auf 1 gesetzt
DapiDOSet32(handle, 0, data); // Chan Start = 0
printf("Schreibe auf Ausgänge Daten=0x%x\n", data);
printf("Taste für weiter\n");
getch();
// ----------------------------------------------------
// Einen Wert auf die Ausgänge schreiben
data = 0x80000000; // Ausgang 32 wird auf 1 gesetzt
DapiDOSet32(handle, 0, data); // Chan Start = 0
printf("Schreibe auf Ausgänge Daten=0x%x\n", data);
printf("Taste für weiter\n");
getch();
// ----------------------------------------------------
// Einen Wert auf die Ausgänge schreiben
data = 0x80000000; // Ausgang 64 wird auf 1 gesetzt
DapiDOSet32(handle, 32, data); // Chan Start = 32
printf("Schreibe auf Ausgänge Daten=0x%x\n", data);
printf("Taste für weiter\n");
getch();
```

4.4.5. DapiDOSet64

Description
This command is to set 64 digital outputs.

Definition
void DapiDOSet64(ULONG handle, ULONG ch, ULONG data);

Parameters
handle=This is the handle of an opened module
ch=Specifies the number of the output, from which it begins to write to (0, 64, ..)
data=Specifies the data values, to write to the outputs

Return value
None

4.4.6. DapiDOReadback32

Description

This command reads back the 32 digital outputs.

Definition

ULONG DapiDOReadback32(ULONG handle, ULONG ch);

Parameters

handle=This is the handle of an opened module

ch=Specifies the number of the input, from which it begins to read from (0, 32, ..)

Return value

Status of 32 outputs.

4.4.7. DapiDOReadback64

Description

This command reads back the 64 digital outputs.

Definition

ULONGLONG DapiDOReadback64(ULONG handle, ULONG ch);

Parameters

handle=This is the handle of an opened module

ch=Specifies the number of the input, from which it begins to read from (0, 64, ..)

Return value

Status of 64 outputs.

4.5. A/D converter functions

4.5.1. DapiADSetMode

Description
This is the command to configure the input range of an A/D converter.

Definition
void DapiADSetMode(ULONG handle, ULONG ch, ULONG mode);

Parameters
handle=This is the handle of an opened module
ch=Specifies the channel of the A/D converter (0 ..)
mode=Specifies the mode for the channel

Return value
None

Remarks
The following modes are supported:
(these are dependent on the A/D module)

Unipolar voltages:
ADDA_MODE_UNIPOL_10V
ADDA_MODE_UNIPOL_5V
ADDA_MODE_UNIPOL_2V5

Bipolar voltages:
ADDA_MODE_BIPOL_10V
ADDA_MODE_BIPOL_5V
ADDA_MODE_BIPOL_2V5

Currents:

ADDA_MODE_0_20mA
ADDA_MODE_4_20mA
ADDA_MODE_0_24mA
ADDA_MODE_0_25mA
ADDA_MODE_0_50mA

4.5.2. DapiADGetMode

Description

This command reads the set mode of an A/D converter. For mode description see DapiADSetMode.

Definition

ULONG DapiADGetMode(ULONG handle, ULONG ch);

Parameters

handle=This is the handle of an opened module

ch=Specifies the channel of the A/D converter (0 ..)

Return value

Mode of the A/D converter

4.5.3. DapiADGet

Description
This command reads a data value of one channel of an A/D converter

Definition
ULONG DapiADGet(ULONG handle, ULONG ch);

Parameters
handle=This is the handle of an opened module
ch=Specifies the channel of the A/D converter (0 ..)

Return value
Value from the A/D converter in Digits

4.5.4. DapiADGetVolt

Description
This command reads a data value of one channel of an A/D converter in volts.

Definition
float DapiADGetVolt(ULONG handle, ULONG ch);

Parameters
handle=This is the handle of an opened module
ch=Specifies the channel of the A/D converter (0 ..)

Return value
Value from the A/D converter in volts

4.5.5. DapiADGetmA

Description

This command reads a data value of one channel of an A/D converter in mA.

Definition

float DapiADGetmA(ULONG handle, ULONG ch);

Parameters

handle=This is the handle of an opened module

ch=Specifies the channel of the A/D converter (0 ..)

Return value

Value from the A/D converter in mA.

Remarks

This command is module dependent. It only works if the module also supports the current mode.

4.6. D/A outputs management

4.6.1. DapiDASetMode

Description
This command sets the mode for a D/A converter.

Definition
void DapiDASetMode(ULONG handle, ULONG ch, ULONG mode);

Parameters
handle=This is the handle of an opened module
ch=Specifies the channel of the D/A converter (0 ..)
mode=Specifies the mode of the D/A converter

Return value
None

Remarks
The following modes are supported:
(these are dependent on the used D/A module)

Unipolar voltages:
ADDA_MODE_UNIPOL_10V
ADDA_MODE_UNIPOL_5V
ADDA_MODE_UNIPOL_2V5

Bipolar voltages:
ADDA_MODE_BIPOL_10V
ADDA_MODE_BIPOL_5V
ADDA_MODE_BIPOL_2V5

Currents:

ADDA_MODE_0_20mA
ADDA_MODE_4_20mA
ADDA_MODE_0_24mA
ADDA_MODE_0_25mA
ADDA_MODE_0_50mA

4.6.2. DapiDAGetMode

Description
This command reads back the chosen mode of a D/A converter.

Definition
ULONG DapiDAGetMode(ULONG handle, ULONG ch);

Parameters
handle=This is the handle of an opened module
ch=Specifies the channel of the D/A converter (0 ..)

Return value
Mode of the D/A converter

4.6.3. DapiDASet

Description
This command transfers a data value to a channel of a D/A converter.

Definition
void DapiDASet(ULONG handle, ULONG ch, ULONG data);

Parameters
handle=This is the handle of an opened module
ch=Specifies the channel of the D/A converter (0 ..)
data=Specifies the data value, which is written

Return value
None

4.6.4. DapiDASetVolt

Description
This command sets a voltage to a channel of a D/A converter.

Definition
void DapiDASetVolt(ULONG handle, ULONG ch, float data);

Parameters
handle=This is the handle of an opened module
ch=Specifies the channel of the D/A converter (0 ..)
data=the voltage, which is to be set [V]

Return value
None

4.6.5. DapiDASetmA

Description

This command sets a current to a channel of a D/A converter.

Definition

void DapiDASetmA(ULONG handle, ULONG ch, float data);

Parameters

handle=This is the handle of an opened module
ch=Specifies the channel of the D/A converter (0 ..)
data=Specifies the current, which is to be set [mA]

Return value

None

Remarks

This command depends on the module. It only works, if the module also supports the current mode.

4.6.6. DapiSpecialCmd_DA

Description

This command sets the voltage/current value to a D/A channel at powering up or after a timeout. (EEPROM Configuration)

Definition

void DapiSpecialCommand(handle, DAPI_SPECIAL_CMD_DA, cmd, ch, 0);

Parameters

handle=This is the handle of an opened module

ch=Specifies the channel of the D/A converter (0, 1, 2, ..)

Reset settings to default configuration

cmd=DAPI_SPECIAL_DA_PAR_DA_LOAD_DEFAULT

Save configuration to EEPROM

cmd=DAPI_SPECIAL_DA_PAR_DA_SAVE_EEPROM_CONFIG

Load configuration out of EEPROM

cmd=DAPI_SPECIAL_DA_PAR_DA_LOAD_EEPROM_CONFIG

Return value

None

Remarks

DAPI_SPECIAL_CMD_DA_PAR_DA_LOAD_DEFAULT

This command loads the default configuration of a D/A converter. The D/A output has the voltage 0V now.

DAPI_SPECIAL_DA_PAR_DA_SAVE_EEPROM_CONFIG

This command saves the current settings of the D/A converter (voltage/current value, enable/disable and D/A converter mode) to EEPROM.

DAPI_SPECIAL_DA_PAR_DA_LOAD_EEPROM_CONFIG

This command sets the saved EEPROM configuration to the D/A converter.

Example program

```
DapiSpecialCommand(handle, DAPI_SPECIAL_CMD_DA,
DAPI_SPECIAL_DA_PAR_DA_LOAD_DEFAULT, 1, 0);    //Zurücksetzen der EEPROM-
Konfiguration auf Default Konfiguration bei Kanal 1.

DapiSpecialCommand(handle, DAPI_SPECIAL_CMD_DA,
DAPI_SPECIAL_DA_PAR_DA_SAVE_EEPROM_CONFIG, 3, 0);    //Speichern der D/A
Wandler Einstellungen in das EEPROM bei Kanal 3.

DapiSpecialCommand(handle, DAPI_SPECIAL_CMD_DA,
DAPI_SPECIAL_DA_PAR_DA_LOAD_EEPROM_CONFIG, 2, 0);    //Setzen des D/A Wandlers,
mit der im EEPROM gespeicherten Konfiguration bei Kanal 2.
```

4.7. Stepper motor functions

4.7.1. DapiStepperCommands

4.7.1.1. DAPI_STEPPER_CMD_GO_POSITION

Description

With this command the motor will drive to a position. This command can only be used when the motor is not disabled and Go_Position or Go_Reference are not executed.

Definition

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_GO_POSITION, position, 0, 0, 0);

Example program

```
DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_GO_POSITION , go_pos_par,
0,0,0);
```

4.7.1.2. DAPI_STEPPER_CMD_GO_POSITION_RELATIVE

Description

With this command the motor will go to a relative position. In contrast to the command GO_POSITION, which goes to an absolute position, this command considers the current position. This command can only be used when the motor is not disabled and Go_Position or Go_Reference are not executed.

Definition

void DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_GO_POSITION_RELATIVE, go_pos_rel_par, 0, 0, 0);

Parameters

go_pos_rel_par=the relative position, to which will be gone

Example program

```
DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_GO_POSITION_RELATIVE, 100,
0, 0, 0);
//Motor fährt, von der aktuellen Position aus gesehen, 100 Schritte nach
rechts.
```

4.7.1.3. DAPI_STEPPER_CMD_SET_POSITION

Description

This command ist used to set the motor position. The resolution ist 1/16 Full-step. This command may be used anytime.

Definition

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_POSITION, par1, 0, 0, 0);

Parameters

par1=Motor position

4.7.1.4. DAPI_STEPPER_CMD_SET_FREQUENCY

Description

This command is used to set the motor reference frequency. The motor frequency regulation takes on the compliance of the acceleration and deceleration slope. Step losses do not occur. The motor reference frequency is related to the full-step-mode.

The direction will be defined by the prefix. If the motor reference frequency is higher than the maximum frequency, the command is ignored.

With closed Endswitch1 the motor can only drive in positive direction, with closed Endswitch2 the motor can only drive in negative direction, otherwise the command is ignored.

Definition

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_FREQUENCY, par1, 0, 0, 0);

Parameters

par1=Motor reference frequency [Hz]

4.7.1.5. DAPI_STEPPER_CMD_GET_FREQUENCY

Description

This command is used to read the motor frequency. This command can be used everytime.

Definition

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_GET_FREQUENCY, par1, 0 ,0 ,0);

Return value

Motor frequency [Hz]

4.7.1.6. DAPI_STEPPER_CMD_SET_FREQUENCY_DIRECTLY

Description

This command is used to set the motor frequency. The motor frequency regulation takes no funktion on the compliance of the acceleration and deceleration slope. The user is responsible. Step losses can occur. The motor reference frequency is related to the full-step. The direction can be defined by the prefix.

The motor frequency can't exceed the maximum frequency.

Definition

DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_SET_FREQUENCY_DIRECTLY, par1, 0 ,0 ,0);

Parameters

par1=Motor frequency [Hz]

4.7.1.7. DAPI_STEPPER_CMD_STOP

Description

This command is used to stop the motor, the deceleration slope will be used.

Definition

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_STOP, 0, 0, 0, 0);

4.7.1.8. DAPI_STEPPER_CMD_FULLSTOP

Description

This command is used to stop the motors immediately without using the the deceleration slope. After this command the motor position might be ignorred because the motor has been stopped uncontrolled.

Definition

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_FULLSTOP, 0, 0, 0, 0);

Example program

```
DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_FULLSTOP , 0, 0, 0, 0);
```

4.7.1.9. DAPI_STEPPER_CMD_DISABLE

Description

This command is used to disable/enable the motor. The motor stops or starts driving. This command can be only used when the motor stopped.

Definition

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_DISABLE, par1, 0, 0, 0);

Parameters

par1 = Disablemode (0=Normal function / 1=Disable)

4.7.1.10. DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC

Description

With this command, you can set motor characteristics.

Definition

DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC, par1, par2, 0, 0);

Parameters

Set Parameter-Stepmode

par1=DAPI_STEPPER_MOTORCHAR_PAR_STEPMODE

par2=0 (Full-step)

par2=1 (1/2-step)

par2=2 (1/4-step)

par2=3 (1/8-step)

par2=4 (1/16-step)

Set Parameter-GO-Frequency

par1=DAPI_STEPPER_MOTORCHAR_PAR_GOFREQUENCY

par2=Speed [Full-step / s] - related to full-step frequency - (maximum value=5000)

Set Parameter-Start-Frequency

par1=DAPI_STEPPER_MOTORCHAR_PAR_STARTFREQUENCY

par2=Startfrequency [Full-step / s] - related to full-step frequency - (maximum value=5000)

Set Parameter-Stop-Frequency

par1=DAPI_STEPPER_MOTORCHAR_PAR_STOPFREQUENCY

par2=Stopfrequency [Full-step / s] - related to full-step frequency - (maximum value=5000)

Set Parameter-Max-Frequency

par1=DAPI_STEPPER_MOTORCHAR_PAR_MAXFREQUENCY

par2=maximum frequency [Full-step / s] - related to full-step frequency - (maximum value=5000)

Set Parameter-Accelerationslope
par1=DAPI_STEPPER_MOTORCHAR_PAR_ACCELERATIONSLOPE
par2=Acceleration slope [Full-step / 10ms] - (maximum value=1000)

Set Parameter-Decelerationslope
par1=DAPI_STEPPER_MOTORCHAR_PAR_DECELERATIONSLOPE
par2=Deceleration slope [Full-step / 10ms] - (maximum value=1000)

Set Parameter-Phasecurrent
par1=DAPI_STEPPER_MOTORCHAR_PAR_PHASECURRENT
par2=Phase current [mA] - (maximum value=1500)

Set Parameter-Hold-Phasecurrent
par1=DAPI_STEPPER_MOTORCHAR_PAR_HOLDPHASECURRENT
par2=Phase current at motor hold [mA] - (maximum value=1500)

Set Parameter-Hold-Time
par1=DAPI_STEPPER_MOTORCHAR_PAR_HOLDTIME
par2=Time in that the hold goes to motorstop [ms]
par2=-1 / FFFF hex / 65535 dez (endless time)

Set Parameter-Status-LED-Mode
par1=DAPI_STEPPER_MOTORCHAR_PAR_STATUSLEDMODE
par2=Mode of the Status-LED
par2=0 (MOVE - LED is on if the stepper moves)
par2=1 (HALT - LED is on if the stepper stands still)
par2=2 (ENDSW1 - LED is on if the end switch1 is closed)
par2=3 (ENDSW2 - LED is on if the end switch2 is closed)
par2=4 (REFSW1 - LED is on if the Reference switch1 is closed)
par2=5 (REFSW2 - LED is on if the Reference switch2 is closed)

Set Parameter-Invert-END-Switch1
par1=DAPI_STEPPER_MOTORCHAR_PAR_INVERT_ENDSW1
par2=Endswitch1 is being inverted (0=normal / 1=inverted)

Set Parameter-Invert-END-Switch2

par1=DAPI_STEPPER_MOTORCHAR_PAR_INVERT_ENDSW2

par2=Endswitch2 is being inverted (0=normal / 1=inverted)

Set Parameter-Invert-Ref-Switch1

par1=DAPI_STEPPER_MOTORCHAR_PAR_INVERT_REFSW1

par2=Referenzswitch1 is being inverted (0=normal / 1=inverted)

Set Parameter-Invert-Ref-Switch2

par1=DAPI_STEPPER_MOTORCHAR_PAR_INVERT_REFSW2

par2=Referenzswitch2 is being inverted (0=normal / 1=inverted)

Set Parameter-Invert-direction

par1=DAPI_STEPPER_MOTORCHAR_PAR_INVERT_DIRECTION

par2=invert all direction details (0=normal / 1=inverted)

Set Parameter-Endswitch-Stopmode

par1= DAPI_STEPPER_MOTORCHAR_PAR_ENDSWITCH_STOPMODE

par2=setting of the stop behaviour (0=Fullstop / 1=Stop)

Set Parameter-GoReferenceFrequency (WARNING: This parameter will not be supported anymore)

par1=DAPI_STEPPER_MOTORCHAR_PAR_GOREFERENCEFREQUENCY

Remark: This parameter is replaced completely by the following three parameters.

Set Parameter-GoReferenceFrequnecyToEndSwitch

par1=DAPI_STEPPER_MOTORCHAR_PAR_GOREFERENCEFREQUENCY_TOENDSWITCH

par2=frequency [Full-step / s] - (maximum value=5000)

Set Parameter-GoReferenceFrequencyAfterEndSwitch

par1=DAPI_STEPPER_MOTORCHAR_PAR_GOREFERENCEFREQUENCY_AFTERENDSWITCH

par2=frequency [Full-step / s] - (maximum value=5000)

Set Parameter-GoReferenceFrequencyToOffSet

par1=DAPI_STEPPER_MOTORCHAR_PAR_GOREFERENCEFREQUENCY_TO OFFSET

par2=frequency [Full-step / s] - (maximum value=5000)

Example program

```
DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_STEPMODE, 4,0,0);
// Schrittmode (Voll-, Halb-, Viertel-, Achtel-, Sechszehntelschritt)

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_GOFREQUENCY, 1000,0,0);
// Schrittmode (Voll-, Halb-, Viertel-, Achtel-, Sechszehntelschritt)

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_STARTFREQUENCY, 100,0,0);
// Startfrequenz [Vollschritt / s]

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_STOPFREQUENCY, 100,0,0);
// Stopfrequenz [Vollschritt / s]

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_MAXFREQUENCY, 3500,0,0);
// maximale Frequenz [Vollschritt / s]

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_ACCELERATIONSLOPE, 20,0,0);
// Beschleunigun in [Vollschritten / ms]

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_DECELERATIONSLOPE, 20,0,0);
// Bremsung in [Vollschritten / ms]

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_PHASECURRENT, 750,0,0);
// Phasenstrom [mA]

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_HOLDPHASECURRENT, 500,0,0);
// Phasenstrom bei Motorstillstand [mA]

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_HOLDTIME, 15000,0,0);
// Zeit in der der Haltestrom fließt nach Motorstop [s]

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_STATUSLEDMODE, 0,0,0);
// Betriebsart der Status-LED

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_INVERT_ENDSW1, 0,0,0);
// invertiere Funktion des Endschalter1
```

```
DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_INVERT_ENDSW2, 0,0,0);
// invertiere Funktion des Endschalter2

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_INVERT_REFSW1, 0,0,0);
// invertiere Funktion des Referenzschalterschalter1

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_INVERT_REFSW2, 0,0,0);
// invertiere Funktion des Referenzschalterschalter2

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_INVERT_DIRECTION, 0,0,0);
// invertiere alle Richtungsangaben

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_ENDSWITCH_STOPMODE, 0,0,0);
// einstellen des Stopverhaltens

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_GOREFERENCEFREQUENCY_TOENDSWITCH, 100,0,0);
// Einstellung der Geschwindigkeit, mit der zum Endschalter angefahren wird.

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_GOREFERENCEFREQUENCY_AFTERENDSWITCH , 200,0,0);
// Einstellung der Geschwindigkeit, mit der vom Endschalter abgefahren wird.

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_GOREFERENCEFREQUENCY_TOOFFSET, 300,0,0);
// Einstellung der Geschwindigkeit, mit der zum optionalen Offset angefahren
wird.
```

4.7.1.11. DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC

Description

With this command, motor specific parameter can be read. This command may be used everytime. It is splitted in sub commands, that are analog to the parameters of the DAPI_STEPPER_CMD_SET_MOTORCHARATERISTIC.

Definition

DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC, par1, 0, 0, 0);

Parameters

Get Parameter-Stepmode

par1=DAPI_STEPPER_MOTORCHAR_PAR_STEPMODE

Get Parameter-GO-Frequency

par1=DAPI_STEPPER_MOTORCHAR_PAR_GOFREQUENCY

Get Parameter-Start-Frequency

par1=DAPI_STEPPER_MOTORCHAR_PAR_STARTFREQUENCY

Get Parameter-Stop-Frequency

par1=DAPI_STEPPER_MOTORCHAR_PAR_STOPFREQUENCY

Get Parameter-Max-Frequency

par1=DAPI_STEPPER_MOTORCHAR_PAR_MAXFREQUENCY

Get Parameter-Accelerationslope

par1=DAPI_STEPPER_MOTORCHAR_PAR_ACCELERATIONSLOPE

Get Parameter-Decelerationslope

par1=DAPI_STEPPER_MOTORCHAR_PAR_DECELERATIONSLOPE

Get Parameter-Phasecurrent

par1=DAPI_STEPPER_MOTORCHAR_PAR_PHASECURRENT

Get Parameter-Hold-Phasecurrent
par1=DAPI_STEPPER_MOTORCHAR_PAR_HOLDPHASECURRENT

Get Parameter-Hold-Time
par1=DAPI_STEPPER_MOTORCHAR_PAR_HOLDTIME

Get Parameter-Status-LED-Mode
par1=DAPI_STEPPER_MOTORCHAR_PAR_STATUSLEDMODE

Get Parameter-Invert-END-Switch1
par1=DAPI_STEPPER_MOTORCHAR_PAR_INVERT_ENDSW1

Get Parameter-Invert-END-Switch2
par1=DAPI_STEPPER_MOTORCHAR_PAR_INVERT_ENDSW2

Get Parameter-Invert-Ref-Switch1
par1=DAPI_STEPPER_MOTORCHAR_PAR_INVERT_REFSW1

Get Parameter-Invert-Ref-Switch2
par1=DAPI_STEPPER_MOTORCHAR_PAR_INVERT_REFSW2

Get Parameter-Invert-direction
par1=DAPI_STEPPER_MOTORCHAR_PAR_INVERT_DIRECTION

Get Parameter-Endswitch-Stopmode
par1= DAPI_STEPPER_MOTORCHAR_PAR_ENDSWITCH_STOPMODE

Get Parameter-GoReferenceFrequency (WARNING: This parameter will not be supported anymore)
par1=DAPI_STEPPER_MOTORCHAR_PAR_GOREFERENCEFREQUENCY - (maximum value=5000)
Remark: This parameter is replaced completely by the following three parameters.

Get Parameter-GoReferenceFrequnecyToEndSwitch
par1=DAPI_STEPPER_MOTORCHAR_PAR_GOREFERENCEFREQUENCY_TOENDSWITCH

Get Parameter-GoReferenceFrequencyAfterEndSwitch

par1=DAPI_STEPPER_MOTORCHAR_PAR_GOREFERENCEFREQUENCY_AFTERENDSWITCH

Get Parameter-GoReferenceFrequencyToOffSet

par1=DAPI_STEPPER_MOTORCHAR_PAR_GOREFERENCEFREQUENCY_TOOFFSET

Return value

Parameter-Stepmode

par1=DAPI_STEPPER_MOTORCHAR_PAR_STEPMODE
return=0 (Full-step)
return=1 (1/2-step)
return=2 (1/4-step)
return=3 (1/8-step)
return=4 (1/16-step)

Parameter-GO-Frequency

par1=DAPI_STEPPER_MOTORCHAR_PAR_GOFREQUENCY
return=Speed [Full-step / s] - related to full-step

Parameter-Start-Frequency

par1=DAPI_STEPPER_MOTORCHAR_PAR_STARTFREQUENCY
return=Startfrequency [Full-step / s]

Parameter-Stop-Frequency

par1=DAPI_STEPPER_MOTORCHAR_PAR_STOPFREQUENCY
return=Stopfrequency [Full-step / s]

Parameter-Max-Frequency

par1=DAPI_STEPPER_MOTORCHAR_PAR_MAXFREQUENCY
return=maximum frequency [Full-step / s]

Parameter-Accelerationslope

par1=DAPI_STEPPER_MOTORCHAR_PAR_ACCELERATIONSLOPE
return=Acceleration slope [Full-step / 10ms]

Parameter-Decelerationslope

par1=DAPI_STEPPER_MOTORCHAR_PAR_DECELERATIONSLOPE
return=Deceleration slope [Full-step / 10ms]

Parameter-Phasecurrent
par1=DAPI_STEPPER_MOTORCHAR_PAR_PHASECURRENT
return=Phase current [mA]

Parameter-Hold-Phasecurrent
par1=DAPI_STEPPER_MOTORCHAR_PAR_HOLDPHASECURRENT
return=Phase current for motor hold [mA]

Parameter-Hold-Time
par1=DAPI_STEPPER_MOTORCHAR_PAR_HOLDTIME
return=Time in that the hold goes to motorstop [ms]
return=-1 / FFFF hex / 65535 dez (endless time)

Parameter-Status-LED-Mode
par1=DAPI_STEPPER_MOTORCHAR_PAR_STATUSLEDMODE
return=Mode of the Status-LED
return=0 (MOVE - LED is on if the stepper moves)
return=1 (HALT - LED is on if the stepper stands still)
return=2 (ENDSW1 - LED is on if the end switch1 is closed)
return=3 (ENDSW2 - LED is on if the end switch2 is closed)
return=4 (REFSW1 - LED is on if the Reference switch1 is closed)
return=5 (REFSW2 - LED is on if the Reference switch2 is closed)

Parameter-Invert-END-Switch1
par1=DAPI_STEPPER_MOTORCHAR_PAR_INVERT_ENDSW1
return=invert endswitch1 (0=normal / 1=inverted)

Parameter-Invert-END-Switch2
par1=DAPI_STEPPER_MOTORCHAR_PAR_INVERT_ENDSW2
return=invert endswitch2 (0=normal / 1=inverted)

Parameter-Invert-Ref-Switch1
par1=DAPI_STEPPER_MOTORCHAR_PAR_INVERT_REFSW1
return=invert referenceswitch1 (0=normal / 1=inverted)

Parameter-Invert-Ref-Switch2

par1=DAPI_STEPPER_MOTORCHAR_PAR_INVERT_REFSW2

return=invert referenceswitch2 (0=normal / 1=inverted)

Parameter-Invert-direction

par1=DAPI_STEPPER_MOTORCHAR_PAR_INVERT_DIRECTION

return=invert all direction details (0=normal / 1=inverted)

Parameter-Endswitch-Stopmode

par1= DAPI_STEPPER_MOTORCHAR_PAR_ENDSWITCH_STOPMODE

return=setting of the stop behaviour (0=Fullstop / 1=Stop)

Parameter-GoReferenceFrequnecyToEndSwitch

par1=DAPI_STEPPER_MOTORCHAR_PAR_GOREFERENCEFREQUENCY_TOENDSWITCH

return=frequency [Full-step / s]

Parameter-GoReferenceFrequencyAfterEndSwitch

par1=DAPI_STEPPER_MOTORCHAR_PAR_GOREFERENCEFREQUENCY_AFTERENDSWITCH

return=frequency [Full-step / s]

Parameter-GoReferenceFrequencyToOffSet

par1=DAPI_STEPPER_MOTORCHAR_PAR_GOREFERENCEFREQUENCY_TOOFFSET

return=frequency [Full-step / s]

Example program

```
value = DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC, DAPI_STEPPER_MOTORCHAR_PAR_STEPMODE,
0, 0, 0);
// Schrittmode (Voll-, Halb-, Viertel-, Achtel-, Sechszehntelschritt)

value = DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_GOFREQUENCY, 0, 0, 0);
// Schrittmode bei Motorstop (Voll-, Halb-, Viertel-, Achtel-,
Sechszehntelschritt)

value = DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC,
```

```
DAPI_STEPPER_MOTORCHAR_PAR_STARTFREQUENCY, 0, 0, 0);
// Startfrequenz [Vollschritt / s]

value = DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_STOPFREQUENCY, 0, 0, 0);
// Stopfrequenz [Vollschritt / s]

value = DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_MAXFREQUENCY, 0, 0, 0);
// maximale Frequenz [Vollschritt / s]

value = DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_ACCELERATIONSLOPE, 0, 0, 0);
// Beschleunigun in [Vollschritten / ms]

value = DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_DECELERATIONSLOPE, 0, 0, 0);
// Bremsung in [Vollschritten / ms]

value = DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_PHASECURRENT, 0, 0, 0);
// Phasenstrom [mA]

value = DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_HOLDPHASECURRENT, 0, 0, 0);
// Phasenstrom bei Motorstillstand [mA]

value = DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC, DAPI_STEPPER_MOTORCHAR_PAR_HOLDTIME,
0, 0, 0);
// Zeit in der der Haltestrom fließt nach Motorstop [s]

value = DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_STATUSLEDMODE, 0, 0, 0);
// Betriebsart der Status-LED

value = DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_INVERT_ENDSW1, 0, 0, 0);
// invertiere Funktion des Endschalter1

value = DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_INVERT_ENDSW2, 0, 0, 0);
// invertiere Funktion des Endschalter12

value = DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_INVERT_REFSW1, 0, 0, 0);
```

```
// invertiere Funktion des Referenzschalterschalter1

value = DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_INVERT_REFSW2, 0, 0, 0);
// invertiere Funktion des Referenzschalterschalter2

value = DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_INVERT_DIRECTION, 0, 0, 0);
// invertiere alle Richtungsangaben

value = DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_ENDSWITCH_STOPMODE, 0, 0, 0);
// einstellen des Stopverhaltens

value = DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_GOREFERENCEFREQUENCY_TOENDSWITCH, 0,0,0);
// Abfrage der Geschwindigkeit, mit der der Endschalter angefahren wird.

value = DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_GOREFERENCEFREQUENCY_AFTERENDSWITCH, 0,0,0);
// Abfrage der Geschwindigkeit, mit der vom Endschalter abgefahren wird.

value = DapiStepperCommand(handle, motor,
DAPI_STEPPER_CMD_GET_MOTORCHARACTERISTIC,
DAPI_STEPPER_MOTORCHAR_PAR_GOREFERENCEFREQUENCY_TOOFFSET, 0,0,0);
// Abfrage der Geschwindigkeit, mit der der optionale Offset angefahren wird.
```

4.7.1.12. DAPI_STEPPER_CMD_MOTORCHARACTERISTIC_EEPROM_SAVE

Description

The current motor characteristic will be stored in the EEPROM.

Definition

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_MOTORCHARACTERISTIC_EEPROM_SAVE, 0, 0, 0, 0);

4.7.1.13. DAPI_STEPPER_CMD_MOTORCHARACTERISTIC_EEPROM_LOAD

Description

The motor characteristic can be loaded from the EEPROM.

Definition

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_MOTORCHARACTERISTIC_EEPROM_LOAD, 0, 0, 0, 0);

4.7.1.14. DAPI_STEPPER_CMD_MOTORCHARACTERISTIC_LOAD_DEFAULT

Description

The characteristic of the motor is set back to default.

Definition

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_MOTORCHARACTERISTIC_LOAD_DEFAULT, 0, 0, 0, 0);

Remarks

The default values are:

- Stepmode: Full-step
- Step frequency at GoPosition [Full-step / s]: 1000 Hz
- Start frequency [Full-step / s]: 200Hz
- Stop frequency [Full-step / s]: 200Hz
- Maximal step frequency [Full-step / s]: 3000Hz
- Acceleration slope [Hz/10ms]: 10Hz/10ms
- Deceleration slope [Hz/10ms]: 10Hz/10ms
- Phase current 0..1,5A [1mA]: 750mA
- Hold current 0..1,5A [1mA]: 500mA
- Hold time 0..infinite [ms]: 15000ms
- Status_LED-function: Move
- Function of the Endswitch1: not inverted
- Function of the Endswitch2: not inverted
- Function of the Referenceswitch1: not inverted
- Function of the Referenceswitch2: not inverted
- Function of all direction details: not inverted
- Endswitchmode: Fullstop
- Step frequency at GoReference [Full-step / s]: 1000 Hz

4.7.1.15. DAPI_STEPPER_CMD_GO_REFSWITCH

Description

The motor goes to the referece position.

Definition

DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_GO_REFSWITCH, par1, par2, par3, 0);

Parameters

Values for par1: (if multiple are needed, the individual must be added)
DAPI_STEPPER_GO_REFSWITCH_PAR_REF1
DAPI_STEPPER_GO_REFSWITCH_PAR_REF2
DAPI_STEPPER_GO_REFSWITCH_PAR_REF_LEFT
DAPI_STEPPER_GO_REFSWITCH_PAR_REF_RIGHT
DAPI_STEPPER_GO_REFSWITCH_PAR_REF_GO_POSITIVE
DAPI_STEPPER_GO_REFSWITCH_PAR_REF_GO_NEGATIVE
DAPI_STEPPER_GO_REFSWITCH_PAR_SET_POS_0
par2=Motorpositionsoffset (1/16 Full-step)
par3=Timeout [ms]

Remarks

At first the motor goes to referenceposition 1 or 2 (see par1). Therefor the speed GOREFERENCEFREQUENCY_TOENDSWITCH is used for (see DapiStepperCommand_SetMotorcharacteristic). After this the motor goes with the speed GOREFERENCEFREQUENCY_AFTERENDSWITCH out of the Referenceposition.

If there is declaration of an offset as parameter (par2), the motor will go to this offset with the speed GOREFERENCEFREQUENCY_TOOFFSET

Example program

```
DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_GO_REFSWITCH,
DAPI_STEPPER_GO_REFSWITCH_PAR_REF1 + DAPI_STEPPER_GO_REFSWITCH_PAR_REF_LEFT +
DAPI_STEPPER_GO_REFSWITCH_PAR_REF_GO_POSITIVE +
DAPI_STEPPER_GO_REFSWITCH_PAR_SET_POS_0, 0, 15000, 0);
```

4.7.1.16. DAPI_STEPPER_CMD_GET_CPU_TEMP

Description

The temperature of the CPU can be read.

Definition

ULONG DapiStepperCommand(handle, motor, DAPI_STEPPER_CMD_GET_CPU_TEMP);

Parameters

cmd=DAPI_STEPPER_CMD_GET_CPU_TEMP

Return value

temperature [°C]

4.7.1.17. DAPI_STEPPER_CMD_GET_MOTOR_SUPPLY_VOLTAGE

Description

The voltage supply of the CPU can be read.

Definition

DapiStepperCommand(handle, motor,
DAPI_STEPPER_GET_MOTOR_SUPPLY_VOLTAGE, 0, 0, 0, 0);

Parameters

cmd=DAPI_STEPPER_CMD_GET_MOTOR_SUPPLY_VOLTAGE

Return value

Motor voltage supply in [mV]

4.7.2. DapiStepperGetStatus

4.7.2.1. DAPI_STEPPER_STATUS_GET_ACTIVITY

Description

With this command, some status informations (e.g. activity of the motor phase current) can be read.

Definition

ULONG DapiStepperGetStatus(handle, motor, DAPI_STEPPER_STATUS_GET_ACTIVITY);

Parameters

handle=This is the handle of an opened module

motor=Number of addressed motor (1,2 ..)

Return value

Bit	Command	Description
0	DISABLE	Motor is disabled
1	MOTORSTROMACTIV	Motor phase current is active
2	HALTESTROMACTIV	Hold phase current is active
3	GOPOSITIONACTIV	GoPosition is active
4	GOPOSITIONBREMSEN	GoPosition deceleration is active
5	GOREFERENZACTIV	GoReference is active

Example program

```
ret = DapiStepperGetStatus(handle, motor, DAPI_STEPPER_STATUS_GET_ACTIVITY);
```

4.7.2.2. DAPI_STEPPER_STATUS_GET_POSITION

Description

With this command, the motor position can be read.

Definition

ULONG DapiStepperGetStatus(handle, motor, cmd);

Parameters

cmd=DAPI_STEPPER_STATUS_GET_POSITION

Return value

The current motor position in 1/16 step-units can be read back

Example program

```
value = DapiStepperGetStatus(handle, motor, DAPI_STEPPER_STATUS_GET_POSITION);
```

4.7.2.3. DAPI_STEPPER_STATUS_GET_SWITCH

Description

With this command, the status of the switches can be read.

Definition

ULONG DapiStepperGetStatus(handle, motor, cmd);

Parameters

cmd=DAPI_STEPPER_STATUS_GET_SWITCH

Return value

Status of the switches will be delivered back
Bit0: ENDSWITCH1; 1 = Endswitch1 is closed
Bit1: ENDSWITCH2; 1 = Endswitch2 is closed
Bit2: REFSWITCH1; 1 = Referenceswitch1 is closed
Bit3: REFSWITCH2; 1 = Referenceswitch2 is closed

Example program

```
pos = DapiStepperGetStatus(handle, motor, DAPI_STEPPER_STATUS_GET_SWITCH);
```

4.7.3. DapiStepperCommandEx

Description

This extended command controls stepper motors.

Definition

ULONG DapiStepperCommandEx(ULONG handle, ULONG motor, ULONG cmd, ULONG par1, ULONG par2, ULONG par3, ULONG par4, ULONG par5, ULONG par6, ULONG par7);

Parameters

handle=This is the handle of an opened module

motor=Number of addressed motor (1,2 ..)

cmd=Extended command

par1..7=Extended command-depedent parameter (see remarks)

Remarks

See delib.h for the extended commands and parameters.

4.8. Output timeout management

4.8.1. DapiSpecialCMDTimeout

Description
This command serves to set the timeout time

Definition
DapiSpecialCommand(handle, DAPI_SPECIAL_CMD_TIMEOUT, cmd, par1, par2);

Parameters
handle=This is the handle of an opened module

Set timeout time
cmd=DAPI_SPECIAL_CMD_TIMEOUT_SET_VALUE_SEC
par1=Seconds [s]
par2=Milliseconds [100ms] (value 6 stands for 600ms)

Activate timeout
cmd=DAPI_SPECIAL_CMD_TIMEOUT_ACTIVATE

Deactivate timeout
cmd=DAPI_SPECIAL_CMD_TIMEOUT_DEACTIVATE

Return value
None

Example program

```
DapiSpecialCommand(handle, DAPI_SPECIAL_CMD_TIMEOUT,
DAPI_SPECIAL_TIMEOUT_SET_VALUE_SEC, 3, 7);
//Die Zeit des Timeouts wird auf 3,7sek gesetzt.
DapiSpecialCommand(handle, DAPI_SPECIAL_CMD_TIMEOUT,
DAPI_SPECIAL_TIMEOUT_ACTIVATE, 0, 0);
//Der Timeout wird aktiviert.
DapiSpecialCommand(handle, DAPI_SPECIAL_CMD_TIMEOUT,
DAPI_SPECIAL_TIMEOUT_DEACTIVATE, 0, 0);
//Der Timeout wird deaktiviert.
```

4.8.2. DapiSpecialCMDTimeoutGetStatus

Description

This command reads the timeout status.

Definition

ULONG DapiSpecialCommand(handle, DAPI_SPECIAL_CMD_TIMEOUT, DAPI_SPECIAL_TIMEOUT_GET_STATUS, 0, 0);

Parameters

handle=This is the handle of an opened module

Return value

Return=0 (timeout is deactivated)

Return=1 (timeout is activated)

Return=2 (timeout has occurred)

Example program

```
status = DapiSpecialCommand(handle, DAPI_SPECIAL_CMD_TIMEOUT,
DAPI_SPECIAL_TIMEOUT_GET_STATUS, 0, 0);    //Abfrage des Timeout-Status.
```

4.9. Test functions

4.9.1. DapiPing

Description
This command checks the connection of an opened module.

Definition
ULONG DapiPing(ULONG handle, ULONG value);

Parameters
handle=This is the handle of an opened module
value=Given test value to the module

Return value
The given test-value “value“ is also the return value

4.10. Example program

```
// ******************************************************************************
// ******************************************************************************
// ******************************************************************************
// ******************************************************************************
// ******************************************************************************
//
// (c) DEDITEC GmbH, 2009
//
// web: http://www.deditec.de
//
// mail: vertrieb@deditec.de
//
//
//
// dtapi_prog_beispiel_input_output.cpp
//
//
// ******************************************************************************
// ******************************************************************************
// ******************************************************************************
// ******************************************************************************
// ******************************************************************************
//
//
// Folgende Bibliotheken beim Linken mit einbinden: delib.lib
// Dies bitte in den Projekteinstellungen (Projekt/Einstellungen/Linker(Objekt-
Bibliothek-Module) .. letzter Eintrag konfigurieren
#include <windows.h>
#include <stdio.h>
#include "conio.h"
#include "delib.h"
// ------------------------------------------------------------------------------
// ------------------------------------------------------------------------------
// ------------------------------------------------------------------------------
// ------------------------------------------------------------------------------
// ------------------------------------------------------------------------------

void main(void)
{
unsigned long handle;
unsigned long data;
unsigned long anz;
unsigned long i;
unsigned long chan;
// ----------------------------------------------------
// USB-Modul öffnen
handle = DapiOpenModule(USB_Interface8,0);
printf("USB_Interface8 handle = %x\n", handle);
if (handle==0)
{
// USB Modul wurde nicht gefunden
printf("Modul konnte nicht geöffnet werden\n");
printf("TASTE für weiter\n");
getch();
```

```
return;
}
// Zum Testen - ein Ping senden
// -----------------------------------------------------
printf("PING\n");
anz=10;
for(i=0;i!=anz;++i)
{
data=DapiPing(handle, i);
if(i==data)
{
// OK
printf(".");
}
else
{
// No answer
printf("E");
}
}
printf("\n");

// -----------------------------------------------------
// Einen Wert auf die Ausgänge schreiben
data = 255;
DapiWriteByte(handle, 0, data);
printf("Schreibe auf Adresse=0 daten=0x%x\n", data);
// -----------------------------------------------------
// Einen Wert auf die Ausgänge schreiben
data = 255;
DapiWriteByte(handle, 1, data);
printf("Schreibe auf Adresse=0 daten=0x%x\n", data);
// -----------------------------------------------------
// Einen Wert auf die Ausgänge schreiben
data = 255;
DapiWriteByte(handle, 2, data);
printf("Schreibe auf Adresse=2 daten=0x%x\n", data);
// -----------------------------------------------------
// Einen Wert von den Eingängen lesen
data = (unsigned long) DapiReadByte(handle, 0);
printf("Gelesene Daten = 0x%x\n", data);
// -----------------------------------------------------
// Einen A/D Wert lesen
chan=11; // read chan. 11
data = DapiReadWord(handle, 0xff010000 + chan*2);
printf("Adress=%x, ret=%x volt=%f\n", chan, data, ((float) data) / 1024*5);//
Bei 5 Volt Ref
// -----------------------------------------------------
// Modul wieder schliessen
DapiCloseModule(handle);
printf("TASTE für weiter\n");
getch();
return ;
}
```

Appendix

5. Appendix

5.1. Revisions

Rev 1.00	First issue
Rev 1.01	Added flexible connector system Revision of the block diagrams
Rev 1.1	Software installation
Rev 1.2	Added RO-AD16_ISO
Rev 1.3	Modification in configuration serial / CAN
Rev 1.4	Added Chapter stepper
Rev 1.5	Modification of section CAN interface settings
Rev 1.6	Modification of chapter 2.2.2.3
Rev 1.7	Added Ethernet-Interface
Rev 2.00	Design change
Rev 2.01	New stepper command "DAPI_STEPPER_CMD_GO_POSITION_RELATIVE" Supplement of return value for command "DAPI_STEPPER_STATUS_GET_ACTIVITY" Supplement of parameter hold-time (endless time) for command "DAPI_STEPPER_CMD_SET_MOTORCHARACTERISTIC"

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