

OPTORE-PCI16 STANDARD

EDV-No.: A-422200

16 Optocoupler Isolated Digital Inputs
16 Reedrelay Outputs

wasco[®]

User's Guide

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Protective Circuit Contact

1. Description

The **wasco**[®]-Interfacecard OPTORE-PCI16_{STANDARD} provides 16 digital input channels and 16 output channels, each galvanical isolated. Inputs are electrically isolated by 16 high power optocoupler with integrated schmitt trigger funktion, outputs by 16 reedrelays. Additionally the inputs are fitted out with protection diodes against harmful voltage peaks.

You can adjust two different input voltage ranges by resistor arrays easily to change and plug in. Output reedrelays manage a maximum switching current of 500 mA.

The output relays are connected to a 37-pin Sub-D female connector, which is mounted to a slot bracket. The optocoupler inputs are lead to a 40pin male connector on the board. A flat ribbon cable is available to relocate to a 37pin female connector with slot bracket, if required.

Pin assignment and input voltage ranges are identical with ISA card OPTORE-16_{STANDARD}, so you easily can switch to PCI.

2. Installation of OPTORE-PCI16_{STANDARD}

2.1 Installing the Card to your System

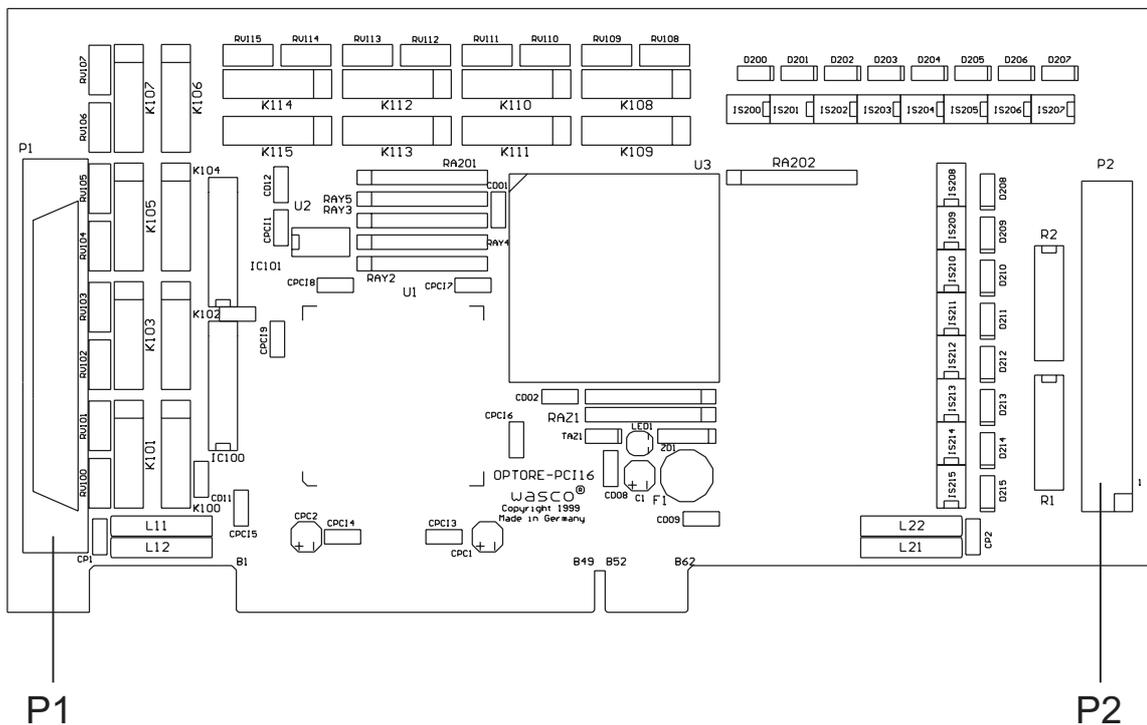
Attention: unplug the power cord before inserting OPTORE-16 or at least make sure that the unit is currentless. Installing the interface card in an operating system may cause damages to the OPTORE-16 and even to other cards of your computer.

The PCI card can be inserted into any free PCI slot of the computer. We refer to use the computer's user manual to avoid any mistakes and risks before you follow the installation procedure.

Select an empty PCI slot and insert the card. Secure the OPTORE-PCI16 by screwing the mounting bracket to the casing of your computer. Otherwise slight movements of the connection cable may cause loose connections.

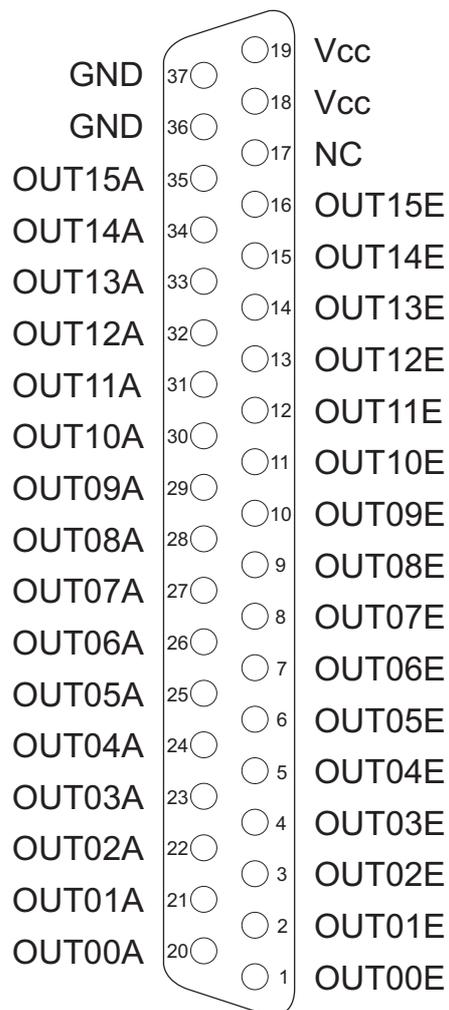
3. Connectors

3.1 Position of Connectors on the Board



- P1: Reedrelay Outputs OUT00...OUT15
- P2: Optocoupler Inputs IN00...IN15

3.2 Pin Assignment of P1



Vcc:

Internal Vcc (+ 5V) (only if a resistor is soldered to L11), **never apply an external voltage across this pin!**

GND:

Ground of computer (only if a resistor is soldered to L12).

NC:

not connected

3.3 Pin Assignment of P2

NC	40	○	○	39	NC
NC	38	○	○	37	Vcc
GND	36	○	○	35	Vcc
GND	34	○	○	33	NC
IN15-	32	○	○	31	IN15+
IN14-	30	○	○	29	IN14+
IN13-	28	○	○	27	IN13+
IN12-	26	○	○	25	IN12+
IN11-	24	○	○	23	IN11+
IN10-	22	○	○	21	IN10+
IN09-	20	○	○	19	IN09+
IN08-	18	○	○	17	IN08+
IN07-	16	○	○	15	IN07+
IN06-	14	○	○	13	IN06+
IN05-	12	○	○	11	IN05+
IN04-	10	○	○	9	IN04+
IN03-	8	○	○	7	IN03+
IN02-	6	○	○	5	IN02+
IN01-	4	○	○	3	IN01+
IN00-	2	○	○	1	IN00+

Vcc:

Internal Vcc (+ 5V) (only if a resistor is soldered to L21), **never apply an external voltage across this pin!**

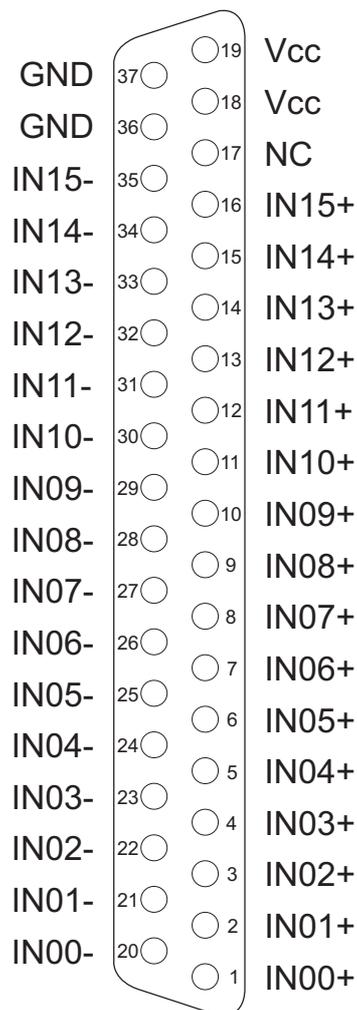
GND:

Ground of computer (only if a resistor is soldered to L22).

NC:

not connected

3.4 Pin Assignment of P2 to DB-37 (Cable not Included)



Vcc:

Internal Vcc (+ 5V) (only if a resistor is soldered to L21), **never apply an external voltage across this pin!**

GND:

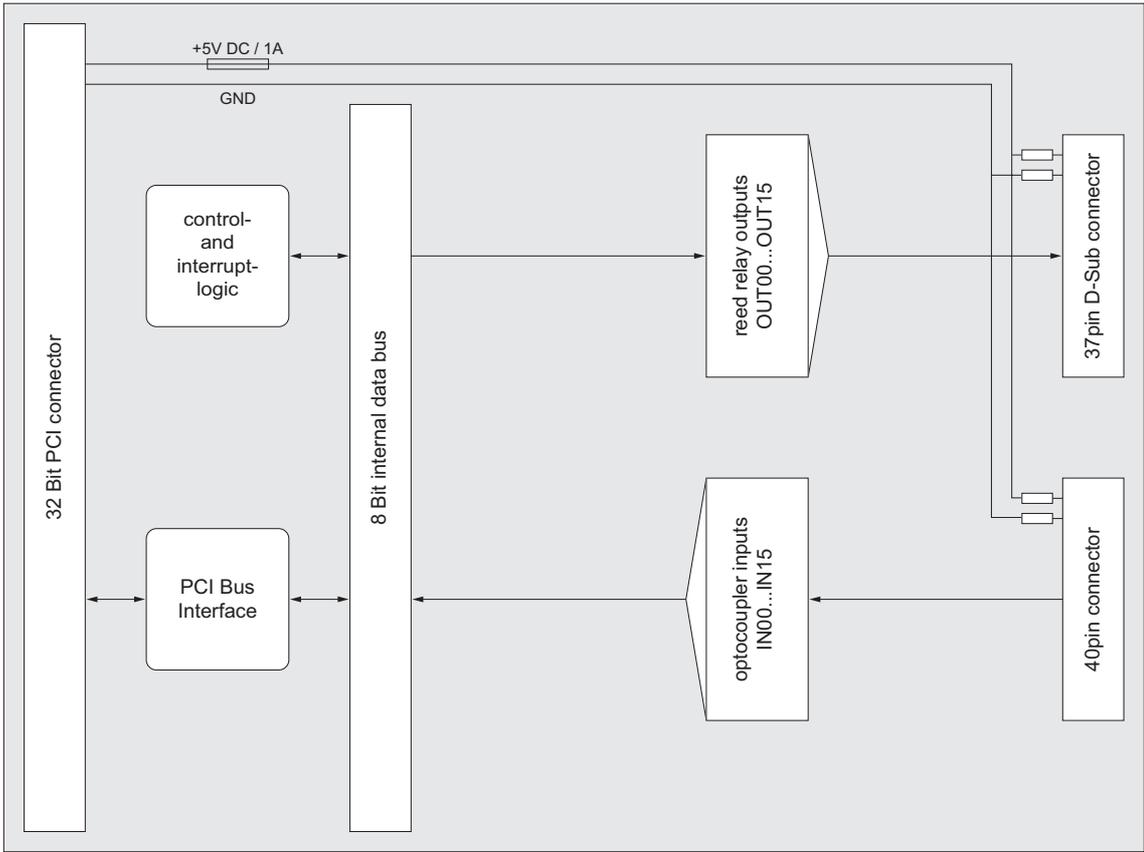
Ground of computer (only if a resistor is soldered to L22).

NC:

not connected

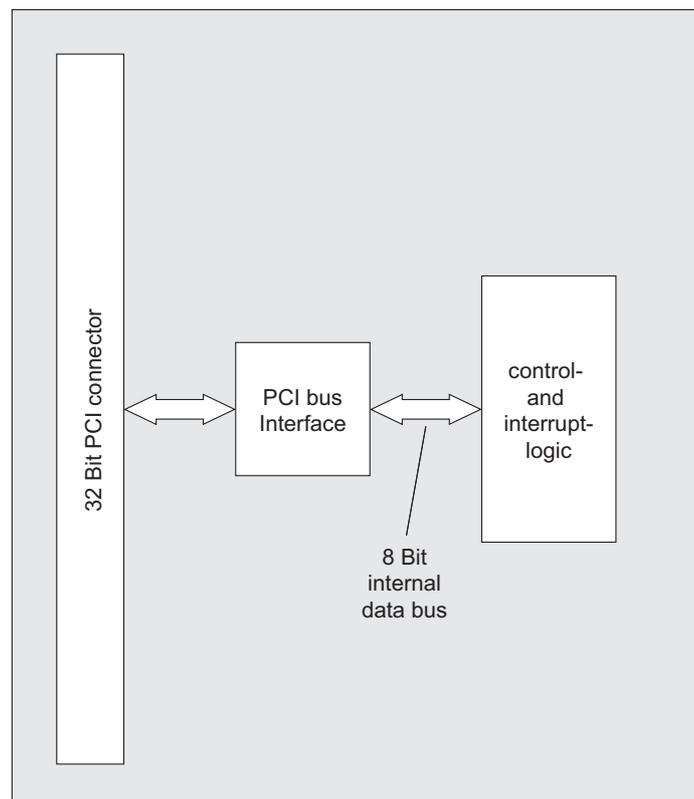
4. System Components

4.1 Block Diagram



4.2 Access to the System Components

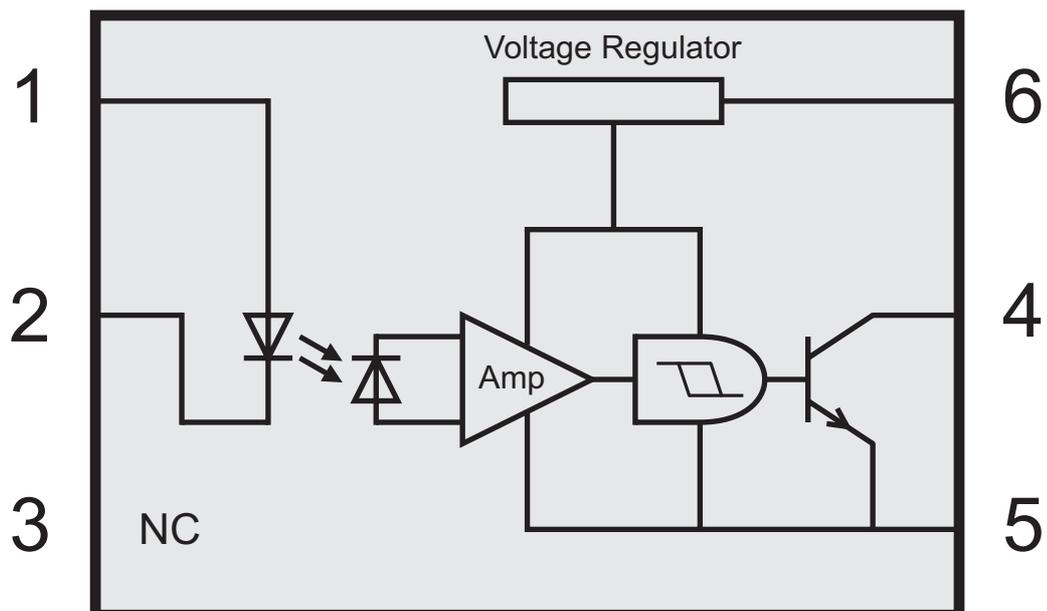
OPTORE-PCI16 hardware components access by reading or writing in port addresses via library functions. The relevant port addresses for the OPTORE-PCI16 result from the basic address, which is assigned by the PCI BIOS. The port access of the OPTORE-PCI16 works exclusively in byte access (8 Bit), word and double-word accesses are not applicable. (Please find more details in the chapter „programming“ and the sample programs on the enclosed CD).



5. 16 Optocoupler Inputs

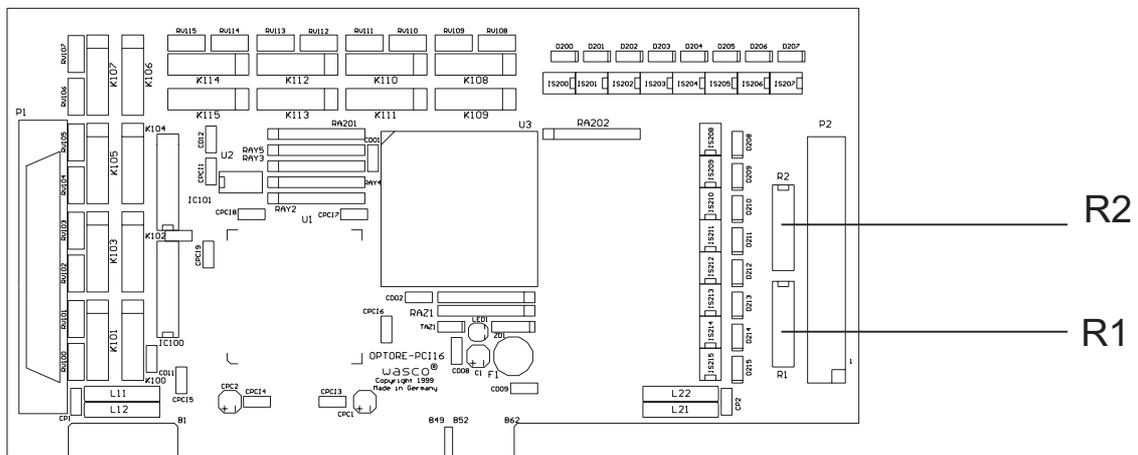
The OPTORE-PCI16_{STANDARD} provides 16 optically isolated input channels. The isolation voltage between GND and the inputs amounts 500 V_{DC}. The isolation voltage within the input channels is limited to 100 V_{DC}.

5.1 Pin Assignment of the Input Optocouplers



5.2 Input Voltage Ranges

Two different input voltage ranges are selectable by interchanging the resistor arrays on R1 and R2.



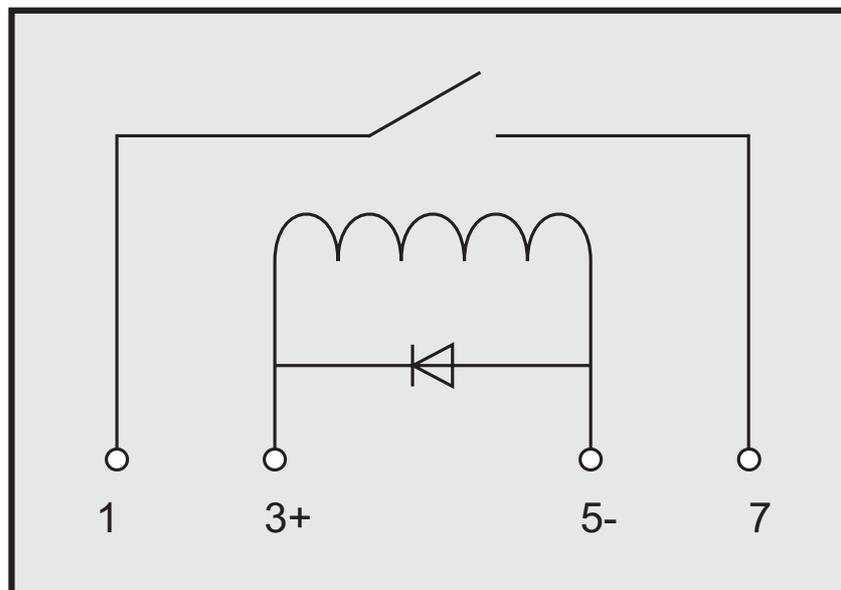
Please see data of the two input voltage ranges in the following table:

Resistor array R1, R2	Identifier	low	high
1,0 KOhm	102	0...1,5 V	2,2...15 V
4,7 KOhm	472	0...4,0 V	7,0...30 V

6. 16 Outputs by Reedrelays

The OPTORE-PCI16_{STANDARD} provides 16 outputs, galvanically isolated by reedrelays. The isolation voltage between GND and the output amounts 500 V_{DC}.

6.1 Pin Assignment of the Reedrelays



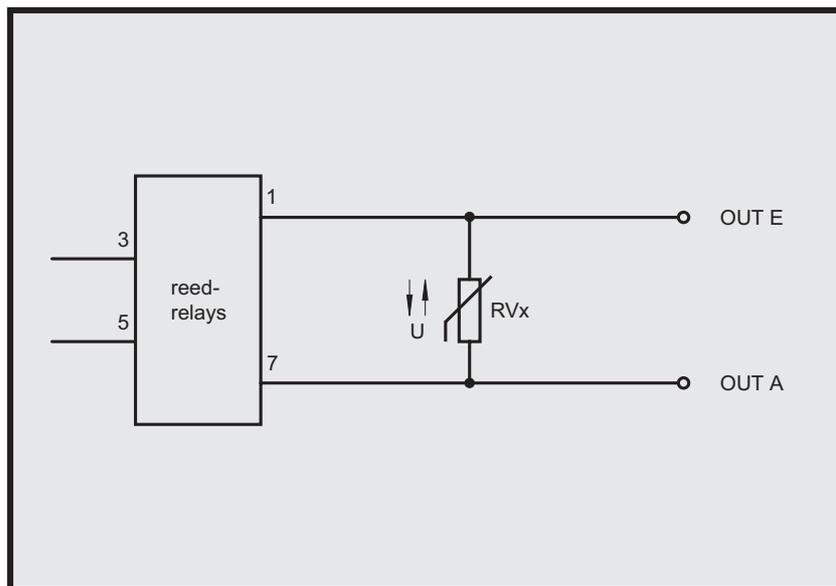
6.2 Data of Reedrelays

Coil voltage:	5 Volt
Coil resistance:	500 Ohm
Coil current:	10 mA
Isolation Voltage: (Coil/contact)	500 Volt AC
Switching voltage:	50 Volt DC max.
Switching current:	0,5 A max.
Switching capacity:	10 Watt
Circuit time (typ):	0,5 ms
Drop-out time:	0,2 ms
Life Expectancy:	100.000.000 cycles at signal loads

6.3 Protective Circuit Contact

Protective varistor RV100-RV115

For switching an inductive load it may be beneficial to set a protective varistor parallel to the relay switching contacts (see figure below). For this user specific additional circuit please use the soldering pads RV100-RV115 of the OPTORE-PCI16^{STANDARD}.



More examples for protective circuit contact you can find in the appendix „protective circuit contact“.

7. Programming under DOS[®]

7.1 Programming

On the enclosed software CD you can find the library functions and sample programs to access to the OPTORE-PCI16 under DOS[®]. The programming of the hardware components of the OPTORE-PCI16 is controlled by the access to the port addresses. This port addresses result from the I/O base address (and the LC base address), which is assigned by the PCI-BIOS for the OPTORE-PCI16. By means of the initialization routines you can detect the I/O base address, the LC base address and the actual port addresses of each single hardware component. Additionally further information is available, such as IRQ number, localisation in bus system or version of the card.

If you are working with a programming language not providing library functions (till now), you can detect the PCI parameter of the OPTORE-PCI16 using the program „ORESCAN“ (-> in directory UTIL).

PCI Parameters:

- I/O base address
- IRQ number
- LC base address
- Bus number
- Device number
- Function number
- OPTORE version

PCI-Identifikation:

Device ID	=	\$9050
Vendor ID	=	\$10B5
Subsystem-Vendor-ID	=	\$10B5
Subsystem ID	=	\$114B

7.2 Arrange the Port Addresses

The port addresses of the each single hardware component result from the I/O Base address (BA) and the LC Base address (LC) as follows:

Port/Register	BA + Offset	RD/WR
Isolated Input Port A (IN00...IN07)	BA + \$0	RD
Isolated Input Port B (IN08...IN15)	BA + \$1	RD
Reedrelay Output Port A (OUT00...OUT07)	BA + \$2	WR
Reedrelay Output Port B (OUT08...OUT15)	BA + \$3	WR

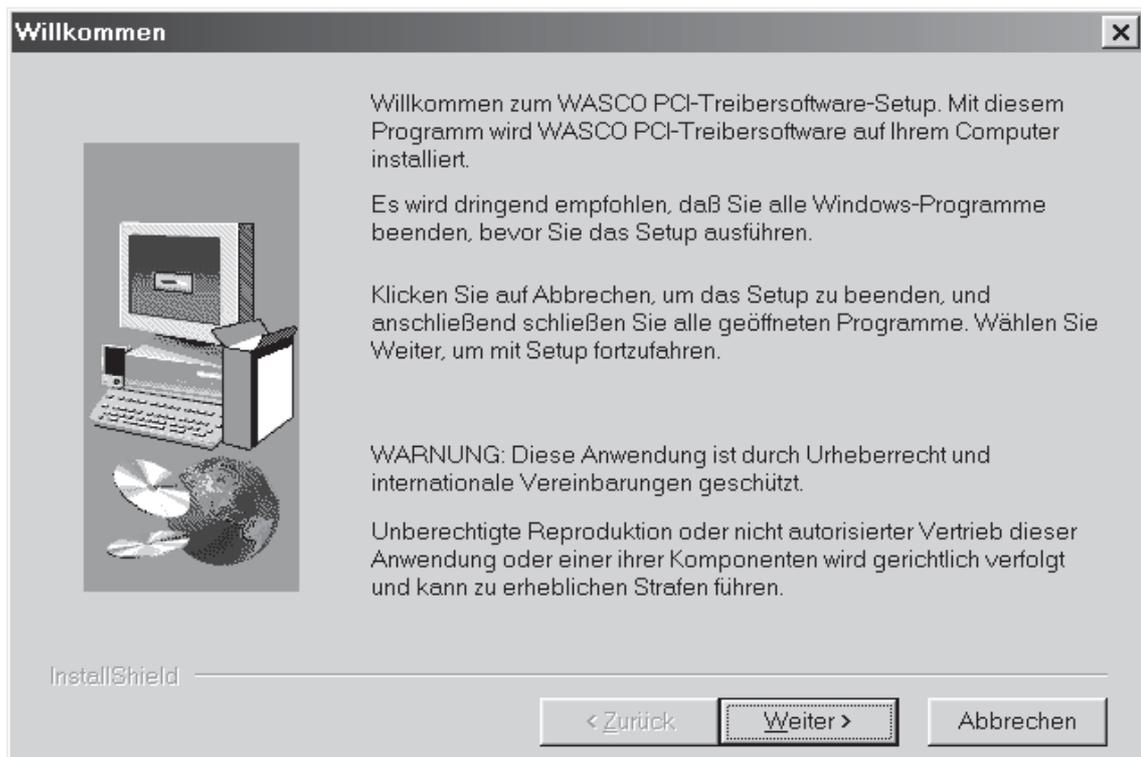
8. Programming under Windows[®]

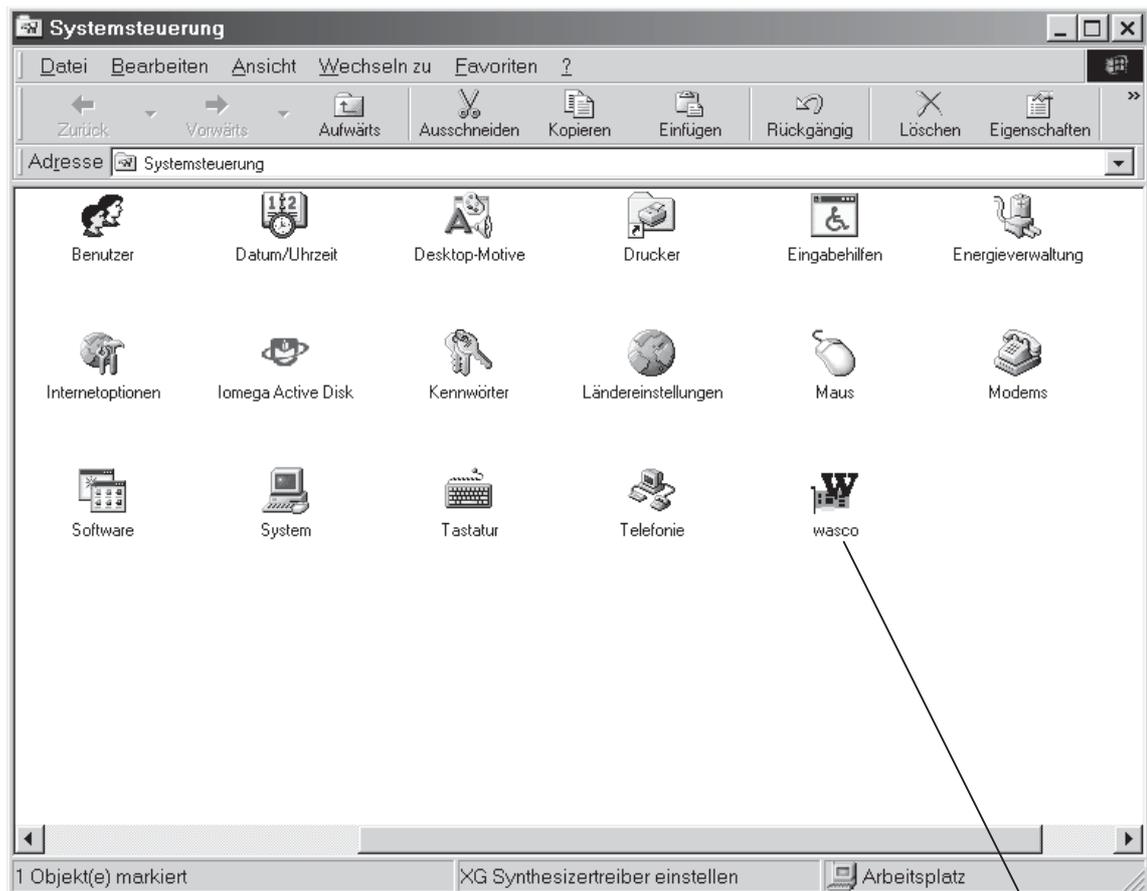
8.1 Programming of OPTORE-PCI16

For the card's application under Windows[®] it is necessary to install a special driver, which enables a port access to the card.

8.2 Installing the Windows[®] Driver

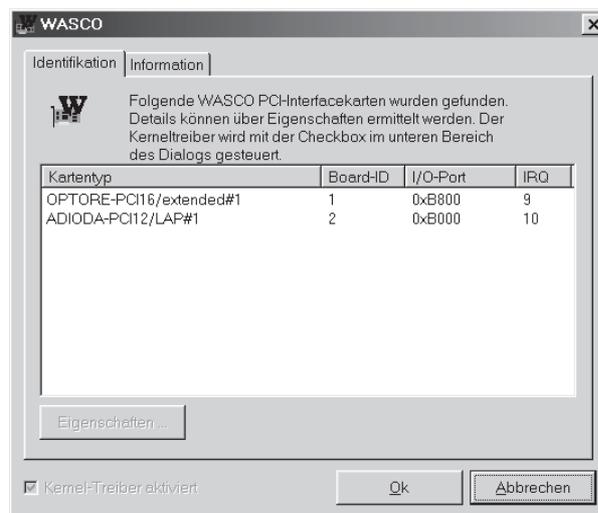
To install the Windows driver please run „Setup.Exe“ in the folder driver on the enclosed CD and follow the installation procedure instructions.





When driver software installation is completed, you can find an Icon in your system control panel for localisation of all **wasco®** PCI cards installed on your computer.

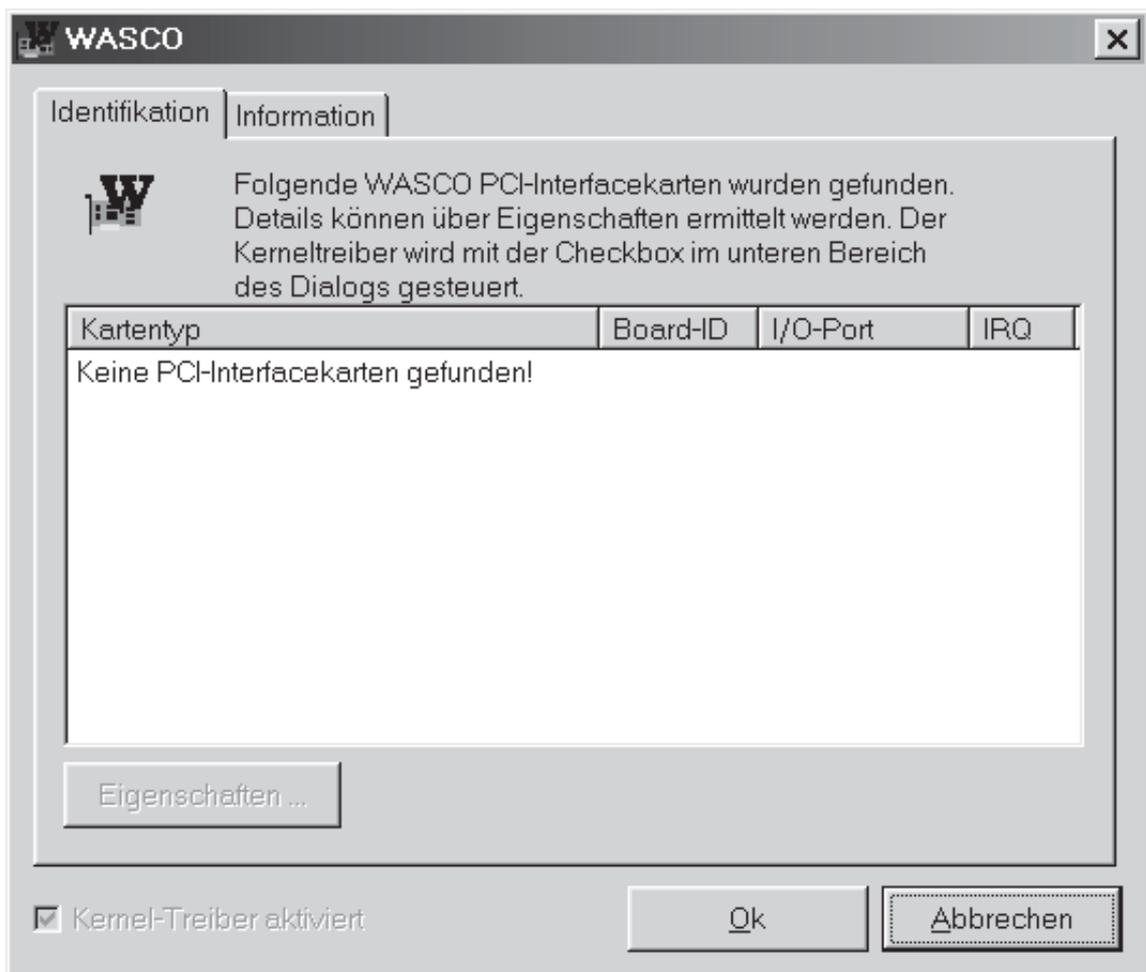
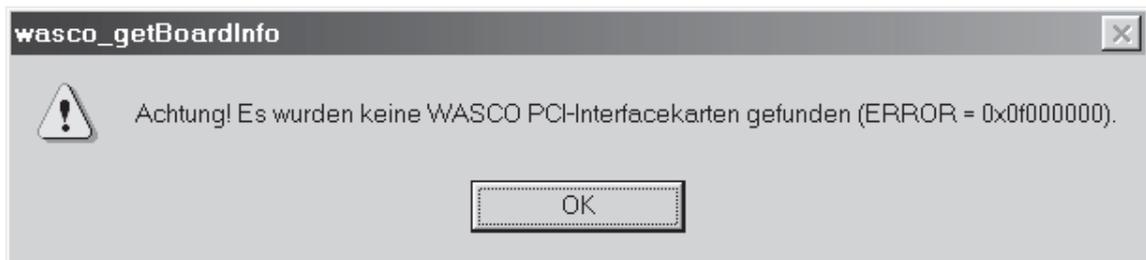
Start card scan by double-clicking the "**wasco**®" Icon.
Following window will pop-up (OPTORE-PCI16 and ADIODA-PCI12 were used as an example):



This window displays card name, Board ID, I/O address and possible interrupt number, if the card was detected correctly. Furthermore you can find information of the driver version or localisation of the driver file clicking the tab „Information“.



If your card was not detected correctly, following error messages may po-up:

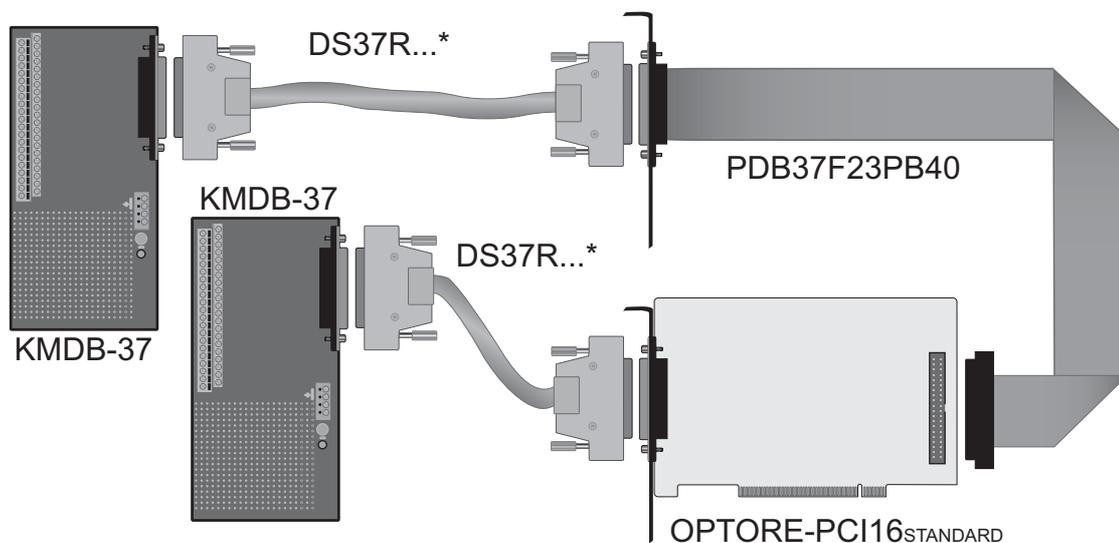


9. Accessories

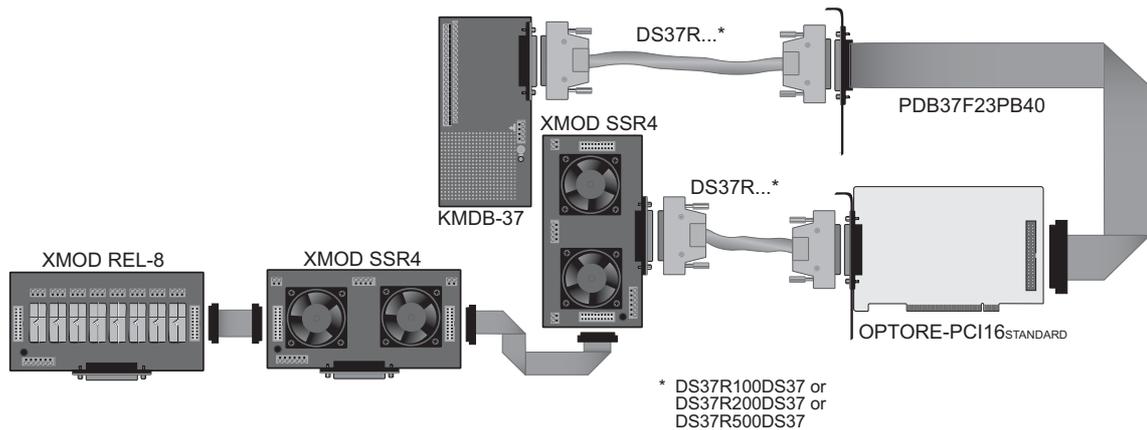
8.1 Fitting **wasco®** Accessories

Connecting Parts	EDV-Nr.
PDB37F23PB40 Flat cable	A-497500
DS37R100DS37 Connecting wire (1 meter)	A-202200
DS37R200DS37 Connecting wire (2 meters)	A-202400
DS37R500DS37 Connecting wire (5 meters)	A-202800
KMDB-37 Connecting board (screw clamp with hole grid for soldering connections)	A-2046
KMDB-37S Connecting board (screw clamp)	A-204910
XMOD SSR-2 Solid-State Relay module	A-3282
XMOD SSR-4 Solid-State Relay module	A-3284
XMOD REL-4 Relay module	A-3264
XMOD REL-8 Relay module	A-3268

9.2 Connecting technique (samples)



* DS37R100DS37 or DS37R200DS37
or DS37R500DS37



8.3 Single Components for Individual Assembly

Connecting Parts	EDV-Nr.
Sub-D-connector 37 pin for solder connection	A-5506
Sub-D-hood 37 pin connector (solder connection)	A-5586
Sub-D-connector 37 pin for flat ribbon wire	A-5526
Sub-D-female connector 37 pin for flat ribbon wire	A-5566
slot bracket with cut-out for 37 pin connector/female connector	A-5754
connector 40 pin for flat ribbon wire	A-5642
flat ribbon wire 37 pin	A-5718
flat ribbon wire 40 pin	A-5720

9. Troubleshooting

Following find a short compilation of the most frequent known failure causes, which may occur during initialization or operation with OPTORE-PCI16.

Please check this list before you contact your dealer or distributor:

1. Is the OPTORE-PCI16 inserted to the PCI slot properly?
2. Are all cable connections all right?
3. Is the fuse F1 blown?
4. Did your system detect the card correctly?
Please therefore check all configurations of your computer or contact your system administrator (As this configurations are part of the BIOS system, we cannot expand on this issue here. We refer to your user's system manual)
5. Did you install the latest driver version of **wasco**[®] driver?

Updates you can find here: <http://www.messcomp.com>
 <http://www.wasco.de>

12. Product Liability Act

Information for Product Liability

The Product Liability Act (Act on Liability for Defective Products - Prod-HaftG) in Germany regulates the manufacturer's liability for damages caused by defective products.

The obligation to pay compensation can be given, if the product's presentation could cause a misconception of safety to a non-commercial end-user and also if the end-user is expected not to observe the necessary safety instructions handling this product.

It must therefore always be shown, that the non-commercial end-user was made familiar with the safety rules.

In the interest of safety, please always advise your non-commercial customer of the following safety instructions:

Safety instructions

The valid VDE-instructions must be observed, when handling products that come in contact with electrical voltage.

Especially the following instructions must be observed:
VDE100; VDE0550/0551; VDE0700; VDE0711; VDE0860.

The instructions are available from:

Vde-Verlag GmbH
Bismarckstr. 33
10625 Berlin

- * unplug the power cord before you open the unit or make sure, there is no current to/in the unit.
- * You only may start up any components, boards or equipment, if they are installed inside a secure touch-protected casing before. During installation there must be no current to the equipment.
- * Make sure that the device is disconnected from the power supply before using any tools on any components, boards or equipment. Any electric charges saved in components in the device are to be discharged prior.
- * Voltaged cables or wires, which are connected with the unit, the components or the boards, must be tested for insulation defects or breaks. In case of any defect the device must be immediately taken out of operation until the defective cables are replaced.
- * When using components or boards you must strictly comply with the characteristic data for electrical sizes shown in the corresponding description
- * As a non-commercial end-user, if it is not clear whether the electrical characteristic data given in the provided description are valid for a component you must consult a specialist.

The compliance with building and safety instructions of all kinds (VDE, TÜV, industrial injuries corporation, etc.) are entirely the responsibility of the user/customer.

13. CE Confirmation

This is to certify, that the product

OPTORE-PCI16_{STANDARD}
EDV-Number A-422200

comply with the requirements of the EC directives. This declaration will lose its validity, if the instructions given in this manual for the intended use of the products are not fully complied with.

EN 5502 Klasse B
IEC 801-2
IEC 801-3
IEC 801-4
EN 50082-1
EN 60555-2
EN 60555-3

The following manufacturer is responsible for this declaration:

Messcomp Datentechnik GmbH
Neudecker Str. 11
83512 Wasserburg

given by

Dipl.Ing.(FH) Hans Schnellhammer
(Execution Board)

Wasserburg, 30.05.2006



Reference System for Intended Use

The PC extension card is not stand-alone device. The CE-conformity only can be assessed when using additional computer components simultaneously. Thus the CE conformity only can be confirmed when using the following reference system for the intended use of the multi functional modules:

Control Cabinet:	Vero IMRAK 3400	804-530061C 802-563424J 802-561589J
19" Casing:	Vero PC-Casing	145-010108L
19" Casing:	Additional Electronic	519-112111C
Motherboard:	GA-586HX	PIV 1.55
Floppy-Controller:	on Motherboard	
Floppy:	TEAC	FD-235HF
Grafic Card:	Advantech	PCA-6443
PC Card:	OPTORE-PCI16 _{STANDARD}	A-422200

Protective Circuit Contact

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2. Circuit Example RC Element
3. Circuit Example Diode
4. Circuit Example Diode and Zener-Diode
5. Circuit Example Varistor

1. Overview

It is always recommended to use a protective circuit contact, because this will extend the electrical life cycle of the relays. However, incorrect application could cause reverse effects, such as prolongation of relay drop-out time.

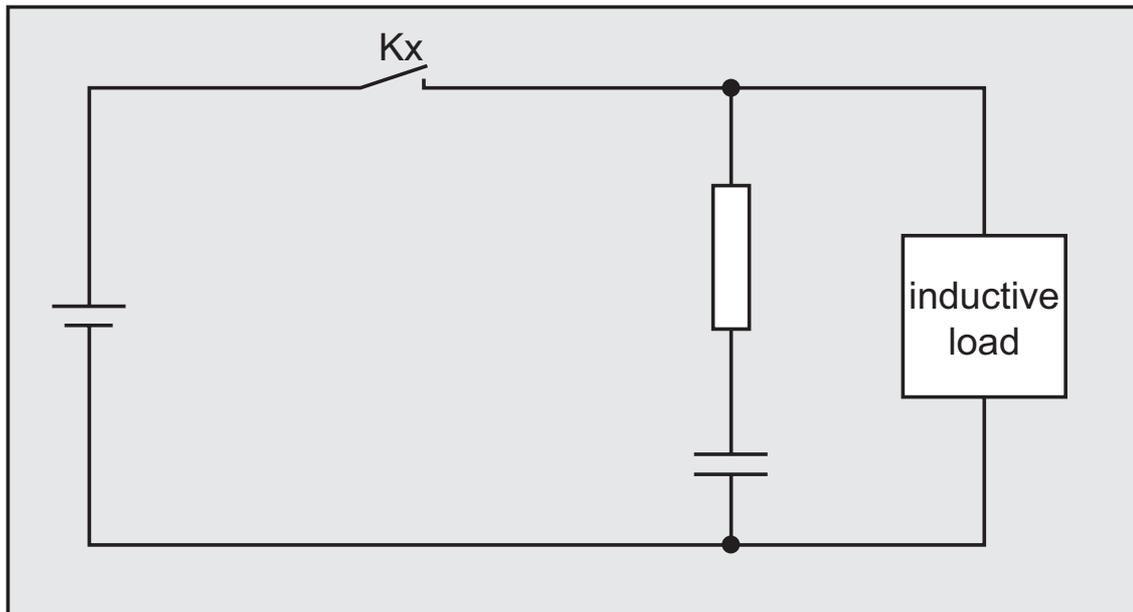
Following you can find some general circuit examples, which you can apply according to the use cases.

Notice:

The circuit examples compiled in the following serve as a source of information of a general scope. That means, they are not specially developed for **wasco**[®]-products, but they are also applicable for connected periphery on **wasco**[®]-cards. Please notice, that not all protective circuit contacts are suitable for **wasco**[®]-cards and **XMOD**[®]-modules, because the suitability depends on each use case and the connected periphery.

Please pay attention to the relevant VDE-Instructions!

2. Circuit Example RC Element

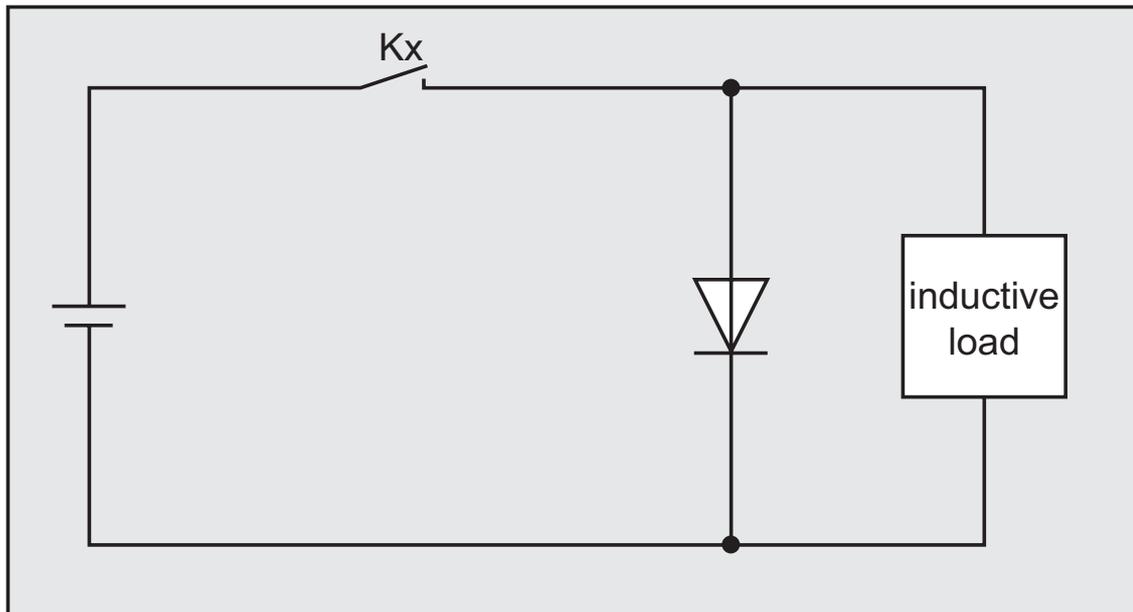


Usability

A/C voltage: good
D/C voltage: good

Applying a load, for example in the form of a relay, the drop-out time of the contacts will retard. This circuit is effective when connecting the load in a system voltage between 24 and 48 Volt. A system voltage between 100 and 240 Volt requires a connection parallel to the contacts.

3. Circuit Example Diode



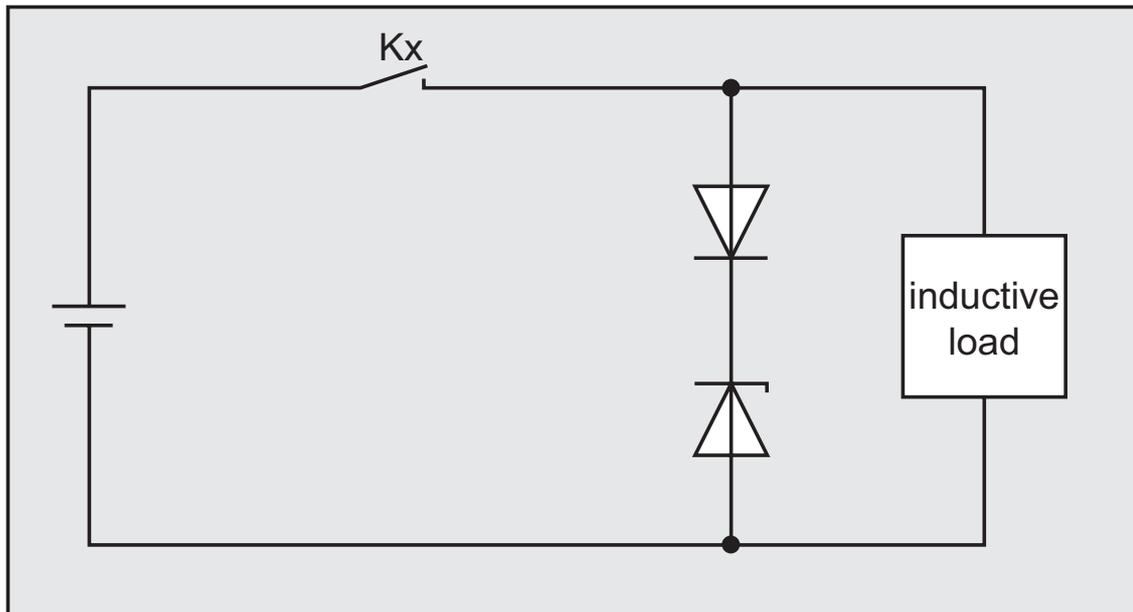
Usability

A/C voltage: poor
D/C voltage: good

At switch-off the energy (inductive load) stored in a coil generates a current flow via the diode connected parallel to the coil. The current will flow through the resistor of the inductive load. This connection will retard the drop-out time more than an RC connection will do.

The used diode has to provide a peak voltage more than 10x the switching voltage, and a conducting state current exceeding the load current.

4. Circuit Example Diode and Zener Diode



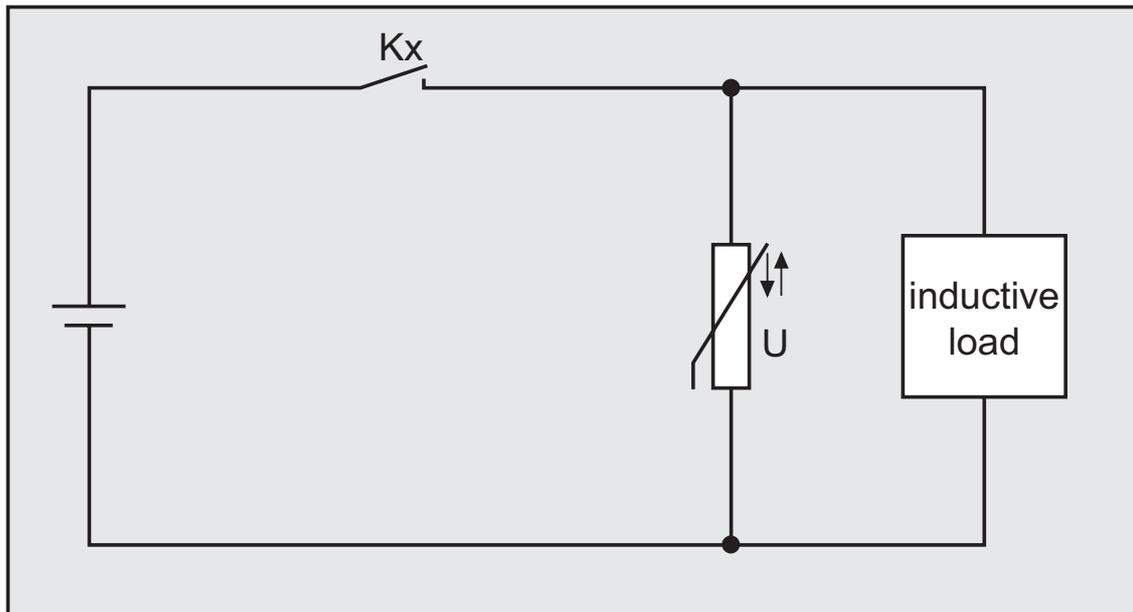
Usability

A/C voltage: poor
D/C voltage: good

If the drop-out time achieved by a diode protective circuit in special applications is too slowly, this connection effectively will reduce the drop-out time.

The cut-off voltage of a Zener diode approximately should correspond to the system voltage.

5. Circuit Example Varistor



Usability:

A/C voltage: good
D/C voltage: good

This connection prevents high voltage across the contacts. The drop-out time of the contacts will be retarded slightly using this connection. A varistor connected parallel to the load will be effective at a system voltage between 24 and 48 Volt. At a system voltage between 100 and 240 Volt the connection has to be connected parallel to the contacts.