PCI 762/763/769
&
PC104PLUS 69

PCI PnP DIO Board
User's Manual

Eagle Technology – Cape Town, South Africa

www.eagle.co.za

Digital Boards

Data Acquisition and Process Control

31-35 Hout Street • Cape Town • South Africa
Phone +27 21 423 4943 • Fax +27 21 424 4637
Email eagle@eagle.co.za

Product Warranty
Eagle Technology, South Africa, warrants its products from defect in material and workmanship from confirmed date of purchase for a period of one year if the conditions listed below are met. The product warranty will call the Eagle Technology Data Acquisition Device short as **ETDAQD**.

- The warranty does not apply to an **ETDAQD** that has been previously repaired, altered, extended by any other company or individual outside the premises of Eagle Technology.
- That a qualified person configure and install the **ETDAQD**, and damages caused to a device during installation shall make the warranty void and null.
- The warranty will not apply to conditions where the **ETDAQD** has been operated in a manner exceeding its specifications.

Eagle Technology, South Africa, does not take responsibility or liability of consequential damages, project delays, damaging of equipment or capital loss as a result of its products.

Eagle Technology, South Africa, holds the option and final decision to repair or replace any **ETDAQD.** Proof of purchase must be supplied when requesting a repair.

TABLE OF CONTENTS

Table of Tables

1. Introduction

The PCI-762/763/769 data acquisition boards have 32-bit PCI bus architecture. This new range of boards is available in three versions. All the boards contain one 16-bit digital input and one 16-bit digital output port. The number of OPTO isolated input and reed relay output channels are the main difference between the three boards.

Features

This range of PCI boards have some very unique features and are short listed below:

- 32-bit PCI bus Revision 2.2 compliant at 33MHz.
- PCI Bus 3.3V or +5V slot compatible.
- The module implements a target only interface.

Applications

These boards can be used in the following applications:

- Automation and test equipment.
- Laboratory training.
- Industrial control systems

Key Specifications

- OPTO isolated inputs.
  - 2500V (max.) Isolation Voltage
  - Up to 24VDC voltage protection for isolation channel
  - Inputs can accept DC & AC
  - Frequency response up to 10kHz
- Reed Relay outputs are 20W 200V switching (DC or peak AC).
  - 4200V (max.) Isolation Voltage
  - Relay switching speed up to 0.5mS
  - Load switching up to 20W
- One sixteen bit digital input channel.
- One sixteen bit digital output channel.

Software Support

The board is supported by EDR Enhanced and comes with an extensive range of examples. The software will help you to get your hardware going very quickly. It also makes it easy to

develop complicated control applications quickly. All operating system drivers, utility and test software are supplied on the Eagle Technology CD-Rom. The latest drivers can also be downloaded from the Eagle Technology website. For further support information see the Contact Details section.

Contact Details

Below are the contact details of Eagle Technology.

Eagle Technology
PO Box 4376
Cape Town
8000
South Africa
Telephone +27 (021) 423 4943
Fax +27 (021) 424 4637
E-Mail eagle@eagle.co.za
Website http://www.eagledaq.com

2

2. Installation

This chapter describes how to install and configure the PCI769 for the first time. Minimal configuration is necessary; almost all settings are done through software. The PCI BIOS or operating system will take care of all resource assignments.

Package

PCI-762/763/769 package will contain the following:

- PCI762, PCI763, or PCI769 board
- IDC40-DB37 extender cables
- Software CD-Rom

Operating System Support

Boards support the following operating systems

Board Type	Revision	Operating Systems	Driver Type
PCI762	Revision 1	Windows 2000/98/ME/XP	WDM PnP
PCI763	Revision 1	Windows 2000/98/ME/XP	WDM PnP
PCI769	Revision 1	Windows 2000/98/ME/XP	WDM PnP

Table 2-1 Operating System Support

Hardware Installation

This section will describe how to install your PCI board into your computer.

- Switch off the computer and disconnect from power socket.

Failure to disconnect all power cables can result in hazardous conditions, as there may be dangerous voltage levels present in externally connected cables.

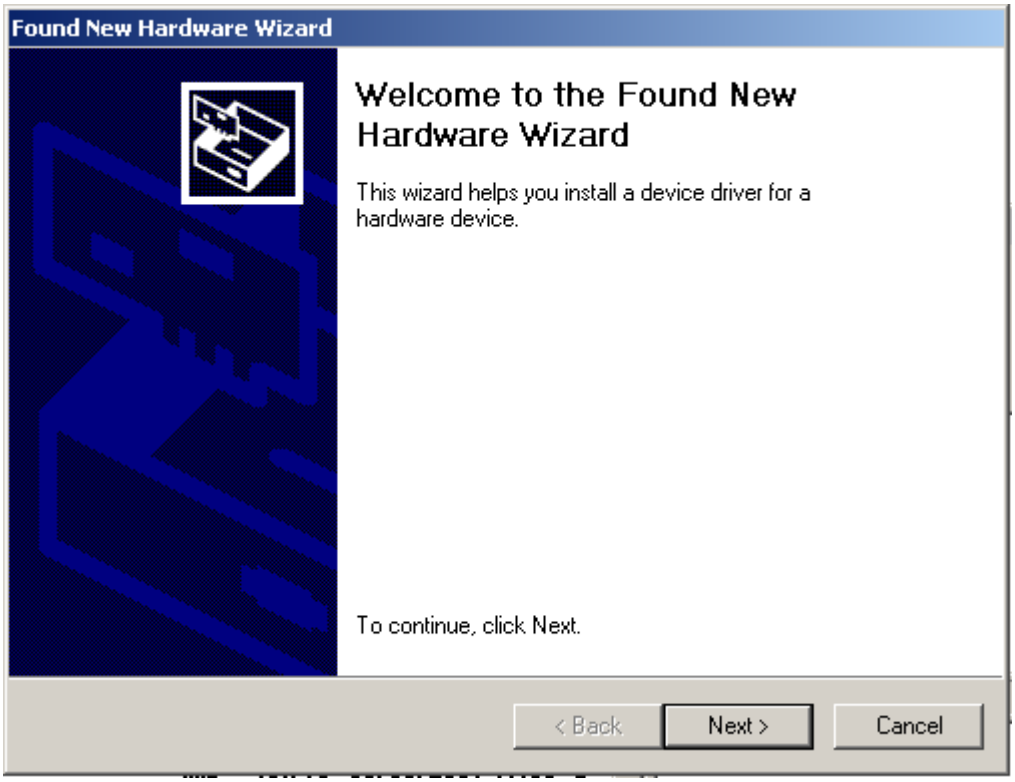
- Remove the cover of the PC.
- Choose any open PCI slot and insert PCI board
- Insert bracket screw and ensure that the board sits firmly in the PCI socket.
- Replace the cover of the PC.
- Reconnect all power cables and switch the power on.
- The hardware installation is now completed.

Software Installation

Windows 98/2000/ME

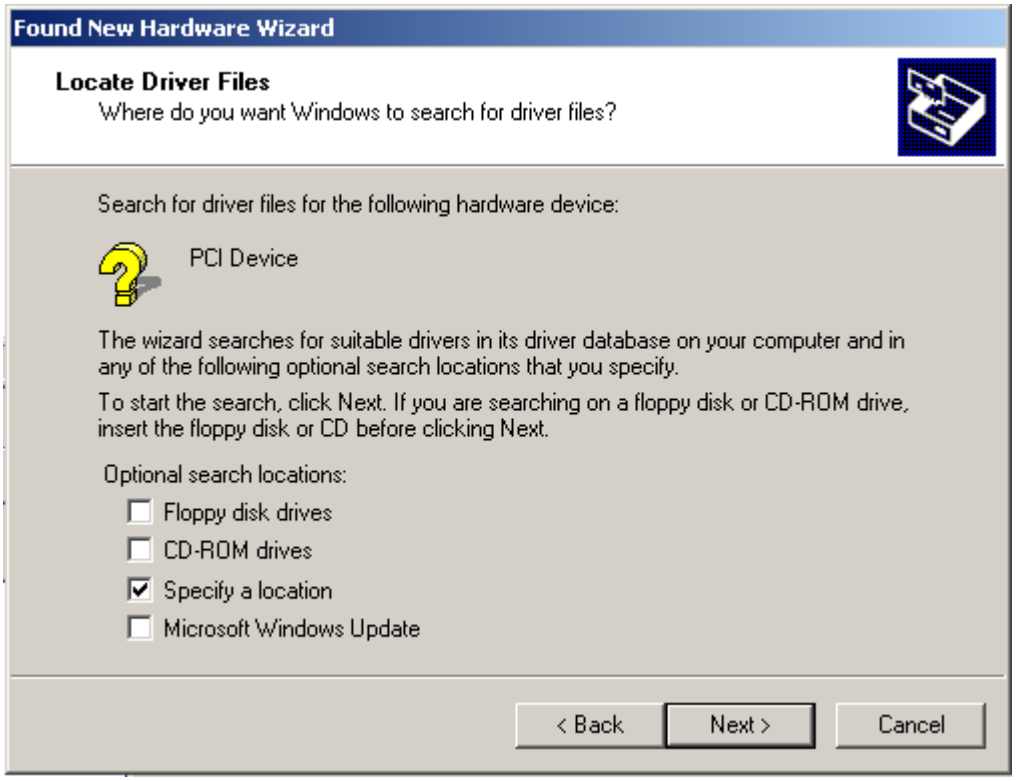
Installing the Windows 98/2000 device driver is a very straightforward task. Because it is plug and play Windows will auto detect the PCI board as soon as it is installed. No setup is necessary. You simply have to supply Windows with a device driver.

Wait until Windows detects the new hardware

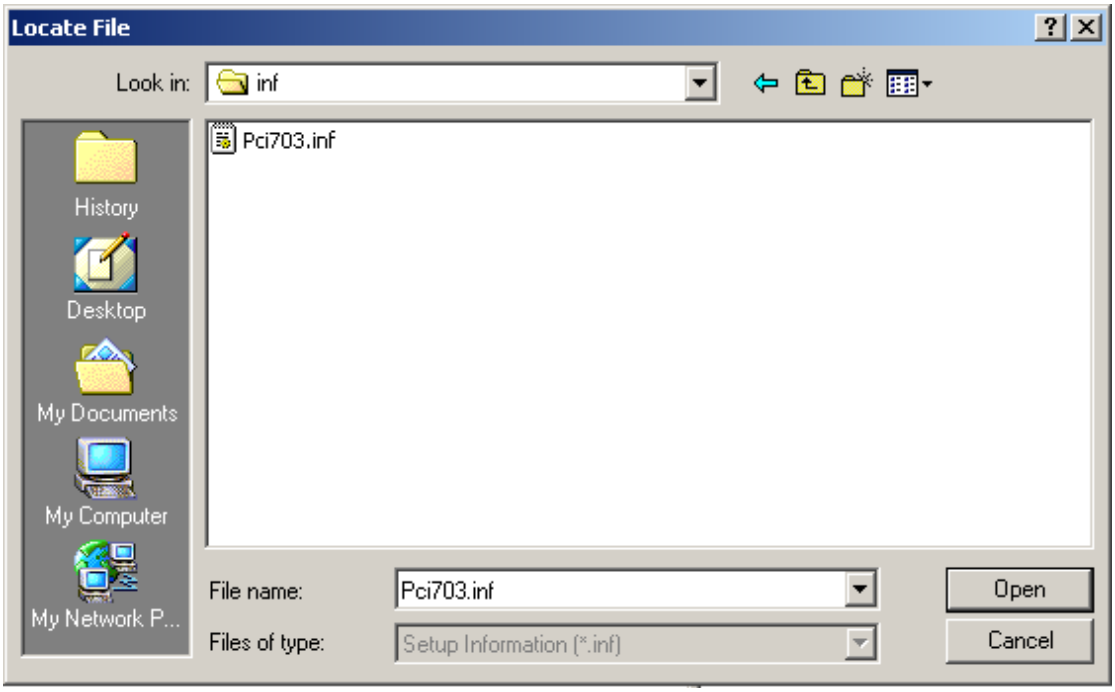


Select Next

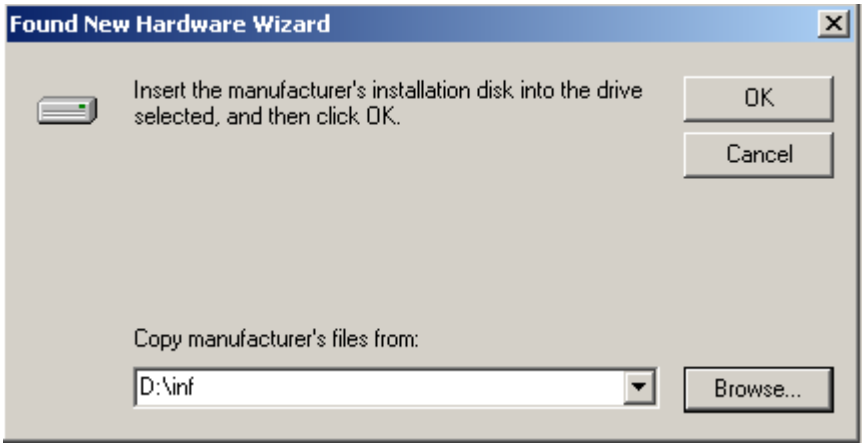
Select "Search for a suitable driver for my device…" and select next



Make sure only "Specify a location" is selected and select next

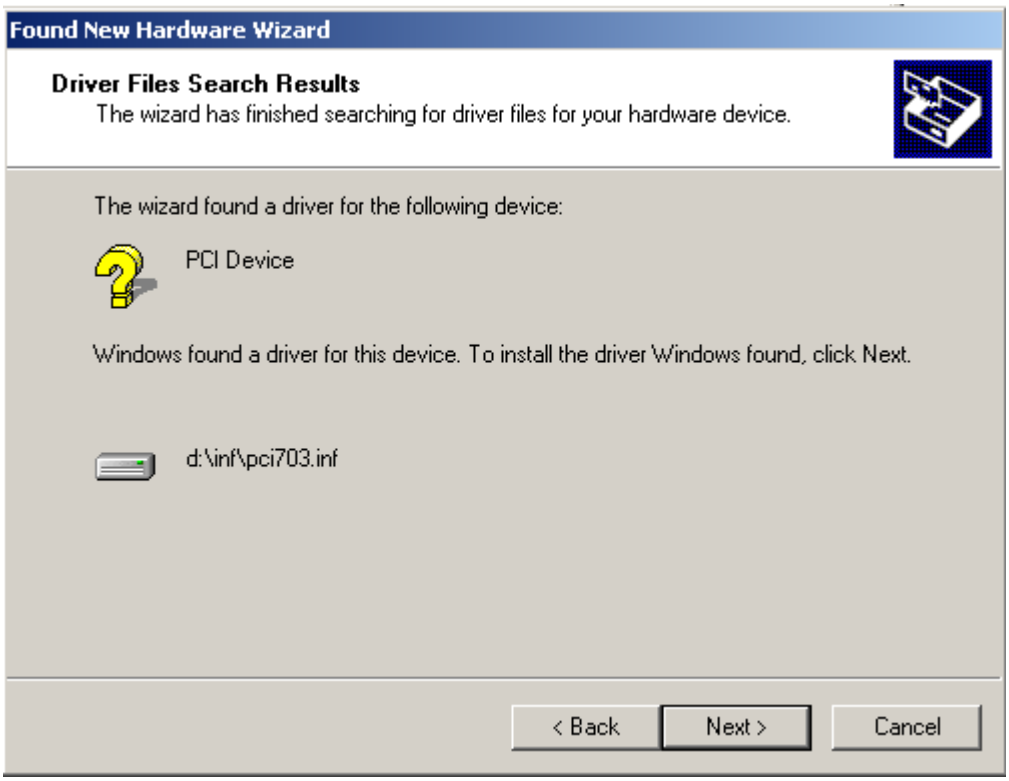


Select the browse button and search for the PCI730.inf file on the Eagle CD-Rom.



The driver is normally located in the <CDROM>:\EDRE\DRIVERS\WDM\PCI730 directory.

Select next when found.



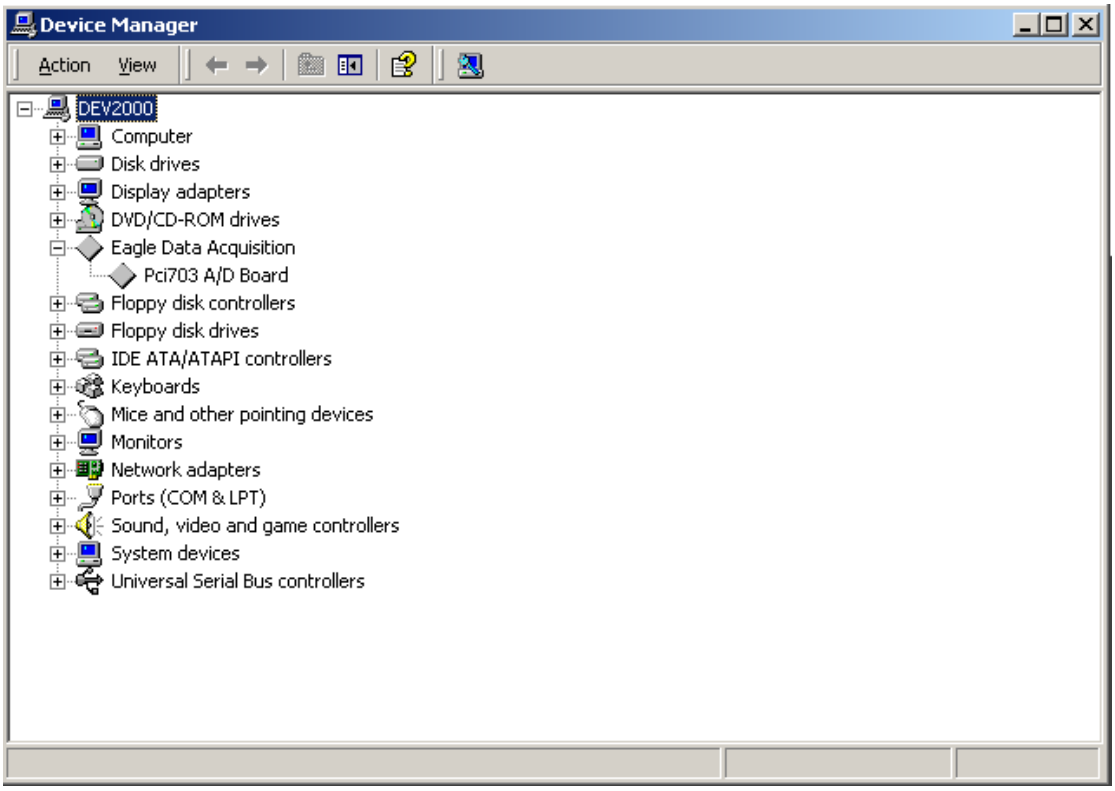
Select next again.

When done you might have to restart your computer.

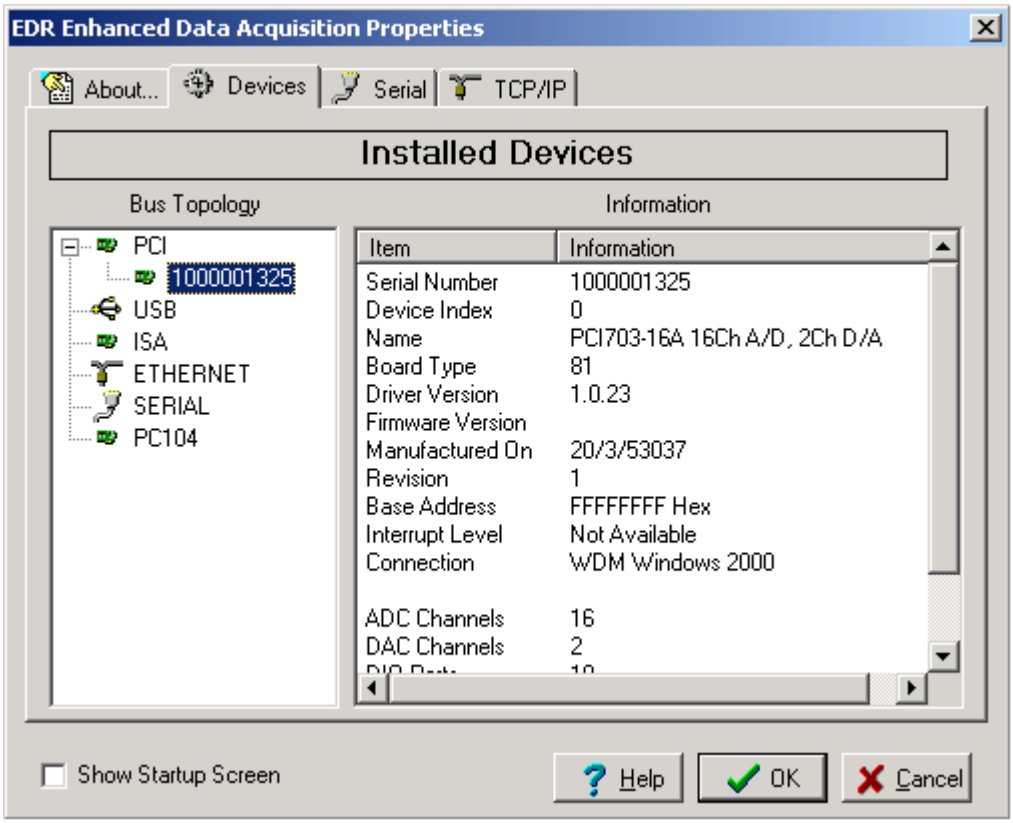
Post installation

When done with the driver installation the device manager can be open to make sure the installation was a success.

- First make sure that the driver is working properly by opening the *Device Manager*.
- Check under the Eagle Data Acquisition list if your board is listed and working properly. See picture below.



- Clearly you can see that the PCI device is listed and working properly.
- Further open the control panel and then the *EagleDAQ* folder. This dialog should list all installed hardware. Verify your board's properties on this dialog. See picture below



Now the first part of your installation has been completed and ready to install the EDR Enhanced Software Development Kit.

- Run ***edreapi.exe*** found on the Eagle CD-Rom and follow the on screen instructions

Accessories

The PCI769 has got a wide variety of accessories that it can be connected too. See the Eagle Technology catalog for more information.

3

3. Interconnections

The PCI769/62/63 has three connectors, two internal IDC40 connectors. And an external connection situated on the card's bracket.

A wide variety of genuine accessories available from Eagle Technology also make interfacing to the PCI769/62/63 very easy. Accessories are available in the form of cables, screw terminals and application modules.

PCI769/62/63

Board	Opto Isolated Ports	Reed Relay Ports	Digital Input Ports	Digital Output Ports
PCI 769	1 x 16 bits	1 x 16 bits	1 x 16 bits	1 x 16 bits
PCI 762-16	1 x 16 bits	0	1 x 16 bits	1 x 16 bits
PCI 762-32	2 x 16 bits	0	1 x 16 bits	1 x 16 bits
PCI 762-48	3 x 16 bits	0	1 x 16 bits	1 x 16 bits
PCI 763-16	0	1 x 16 bits	1 x 16 bits	1 x 16 bits
PCI 763-32	0	2 x 16 bits	1 x 16 bits	1 x 16 bits

Table 3-1 Port assignment

PCI769

Extern Connectors Pin Assignment

Pin	Name	Pin	Name
1	+12V Fused	20	Relay 8
2	Relay 0 RET	21	Relay 8 RET
3	Relay 0	22	Relay 9
4	Relay 1 RET	23	Relay 9 RET
5	Relay 1	24	Relay 10
6	Relay 2 RET	25	Relay 10 RET
7	Relay 2	26	Relay 11
8	Relay 3 RET	27	Relay 11 RET
9	Relay 3	28	Relay 12
10	Relay 4 RET	29	Relay 12 RET
11	Relay 4	30	Relay 13
12	Relay 5 RET	31	Relay 13 RET
13	Relay 5	32	Relay 14
14	Relay 6 RET	33	Relay 14 RET
15	Relay 6	34	Relay 15
16	Relay 7 RET	35	Relay 15 RET
17	Relay 7	36	+5V Fused
18		37	DGND
19			

Table 3-2 Pinouts for PCI769 Reed Relay (External Connector – DB37F)

Extern / Internal Connectors Pin Assignment

Pin	Name	Pin	Name
1	OPTO 0+	20	OPTO 0-
2	OPTO 1+	21	OPTO 1-
3	OPTO 2+	22	OPTO 2-
4	OPTO 3+	23	OPTO 3-
5	OPTO 4+	24	OPTO 4-
6	OPTO 5+	25	OPTO 5-
7	OPTO 6+	26	OPTO 6-
8	OPTO 7+	27	OPTO 7-
9	OPTO 8+	28	OPTO 8-
10	OPTO 9+	29	OPTO 9-
11	OPTO 10+	30	OPTO 10-
12	OPTO 11+	31	OPTO 11-
13	OPTO 12+	32	OPTO12-
14	OPTO 13+	33	OPTO 13-
15	OPTO 14+	34	OPTO 14-
16	OPTO 15+	35	OPTO 15-
17	COM A	36	COM B
18	DGND	37	DGND
19	+5V Fused		

Pin	Name	Pin	Name
1	OPTO 0+	2	OPTO 0-
3	OPTO 1+	4	OPTO 1-
5	OPTO 2+	6	OPTO 2-
7	OPTO 3+	8	OPTO 3-
9	OPTO 4+	10	OPTO 4-
11	OPTO 5+	12	OPTO 5-
13	OPTO 6+	14	OPTO 6-
15	OPTO 7+	16	OPTO 7-
17	OPTO 8+	18	OPTO 8-
19	OPTO 9+	20	OPTO 9-
21	OPTO 10+	22	OPTO 10-
23	OPTO 11+	24	OPTO 11-
25	OPTO 12+	26	OPTO12-
27	OPTO 13+	28	OPTO 13-
29	OPTO 14+	30	OPTO 14-
31	OPTO 15+	32	OPTO 15-
33	COM A	34	COM B
35	DGND	36	DGND
37	+5V Fused	38	DGND
39	+5V Fused	40	DGND

Table 3-3 Pinouts for PCI769 OPTO (External Connector – DB37F or Internal Connector – IDC 40)

Pin	Name	Pin	Name
1	DI0	20	DI1
2	DI2	21	DI3
3	DI4	22	DI5
4	DI6	23	DI7
5	DI8	24	DI9
6	DI10	25	DI11
7	DI12	26	DI13
8	DI14	27	DI15
9	DGND	28	DGND
10	DO0	29	DO1
11	DO2	30	DO3
12	DO4	31	DO5
13	DO6	32	DO7
14	DO8	33	DO9
15	DO10	34	DO11
16	DO12	35	DO13
17	DO14	36	DO15
18	DGND	37	DGND
19	+5V Fused		

Pin	Name	Pin	Name
1	DI0	2	DI1
3	DI2	4	DI3
5	DI4	6	DI5
7	DI6	8	DI7
9	DI8	10	DI9
11	DI10	12	DI11
13	DI12	14	DI13
15	DI14	16	DI15
17	DGND	18	DGND
19	DO0	20	DO1
21	DO2	22	DO3
23	DO4	24	DO5
25	DO6	26	DO7
27	DO8	28	DO9
29	DO10	30	DO11
31	DO12	32	DO13
33	DO14	34	DO15
35	DGND	36	DGND
37	+5V Fused	38	DGND
39	DGND	40	+5V Fused

Table 3-4 Pinout for PCI769 DIO (External Connector – DB37M or Internal Connector – IDC 40)

Signal Definitions

This sections deal with all the signals abbreviations.

Signal	Description
DI0 - 15	Digital Inputs
DO0 - 15	Digital Outputs
OPTO 0+ - 15+	Opto-isolated input positive pin
OPTO 0- - 15-	Opto-isolated input negative return pin
RELAY 0 - 15	Reed Relay input line
RELAY 0 - 15 RET	Reed Relay return line
COM A/C/E	Common Opto-isolated negative return line for channels 0 - 7
COM B/D/F	Common Opto-isolated negative return line for channels 8 - 15
DGND	Digital ground
+5V Fused	+5 Volt FUSED
+12V Fused	+2 Volts FUSED

Table 3-5 Signal definitions

PCI762

Extern Connectors Pin Assignment

Pin	Name	Pin	Name
1	OPTO 0+	20	OPTO 8+
2	OPTO 0-	21	OPTO 8-
3	OPTO 1+	22	OPTO 9+
4	OPTO 1-	23	OPTO 9-
5	OPTO 2+	24	OPTO 10+
6	OPTO 2-	25	OPTO 10-
7	OPTO 3+	26	OPTO 11+
8	OPTO 3-	27	OPTO 11-
9	OPTO 4+	28	OPTO 12+
10	OPTO 4-	29	OPTO 12-
11	OPTO 5+	30	OPTO 13+
12	OPTO 5-	31	OPTO 13-
13	OPTO 6+	32	OPTO 14+
14	OPTO 6-	33	OPTO 14-
15	OPTO 7+	34	OPTO 15+
16	OPTO 7-	35	OPTO 15-
17	COM A	36	COM B
18	+12V Fused	37	DGND
19	+5V Fused		

Table 3-6 Pinouts for PCI762 OPTO (External Connector – DB37F)

Extern / Internal Connectors Pin Assignment

Pin	Name	Pin	Name
1	OPTO 0+	20	OPTO 0-
2	OPTO 1+	21	OPTO 1-
3	OPTO 2+	22	OPTO 2-
4	OPTO 3+	23	OPTO 3-
5	OPTO 4+	24	OPTO 4-
6	OPTO 5+	25	OPTO 5-
7	OPTO 6+	26	OPTO 6-
8	OPTO 7+	27	OPTO 7-
9	OPTO 8+	28	OPTO 8-
10	OPTO 9+	29	OPTO 9-
11	OPTO 10+	30	OPTO 10-
12	OPTO 11+	31	OPTO 11-
13	OPTO 12+	32	OPTO12-
14	OPTO 13+	33	OPTO 13-
15	OPTO 14+	34	OPTO 14-
16	OPTO 15+	35	OPTO 15-
17	COM C/E	36	COM D/F
18	DGND	37	DGND
19	+5V Fused		

Pin	Name	Pin	Name
1	OPTO 0+	2	OPTO 0-
3	OPTO 1+	4	OPTO 1-
5	OPTO 2+	6	OPTO 2-
7	OPTO 3+	8	OPTO 3-
9	OPTO 4+	10	OPTO 4-
11	OPTO 5+	12	OPTO 5-
13	OPTO 6+	14	OPTO 6-
15	OPTO 7+	16	OPTO 7-
17	OPTO 8+	18	OPTO 8-
19	OPTO 9+	20	OPTO 9-
21	OPTO 10+	22	OPTO 10-
23	OPTO 11+	24	OPTO 11-
25	OPTO 12+	26	OPTO12-
27	OPTO 13+	28	OPTO 13-
29	OPTO 14+	30	OPTO 14-
31	OPTO 15+	32	OPTO 15-
33	COM C/E	34	COM D/F
35	DGND	36	DGND
37	+5V Fused	38	DGND
39	+5V Fused	40	DGND

Table 3-7 Pinouts for PCI762 OPTO (External Connector – DB37F or Internal Connector – IDC 40)

Pin	Name	Pin	Name
1	DI0	20	DI1
2	DI2	21	DI3
3	DI4	22	DI5
4	DI6	23	DI7
5	DI8	24	DI9
6	DI10	25	DI11
7	DI12	26	DI13
8	DI14	27	DI15
9	DGND	28	DGND
10	DO0	29	DO1
11	DO2	30	DO3
12	DO4	31	DO5
13	DO6	32	DO7
14	DO8	33	DO9
15	DO10	34	DO11
16	DO12	35	DO13
17	DO14	36	DO15
18	DGND	37	DGND
19	+5V Fused		

Pin	Name	Pin	Name
1	DI0	2	DI1
3	DI2	4	DI3
5	DI4	6	DI5
7	DI6	8	DI7
9	DI8	10	DI9
11	DI10	12	DI11
13	DI12	14	DI13
15	DI14	16	DI15
17	DGND	18	DGND
19	DO0	20	DO1
21	DO2	22	DO3
23	DO4	24	DO5
25	DO6	26	DO7
27	DO8	28	DO9
29	DO10	30	DO11
31	DO12	32	DO13
33	DO14	34	DO15
35	DGND	36	DGND
37	+5V Fused	38	DGND
39	DGND	40	+5V Fused

Table 3-8 Pinout for PCI762 DIO (External Connector – DB37M or Internal Connector – IDC 40)

Signal Definitions

This sections deal with all the signals abbreviations.

Signal	Description
DI0 - 15	Digital Inputs
DO0 - 15	Digital Outputs
OPTO 0+ - 15+	Opto-isolated input positive pin
OPTO 0- - 15-	Opto-isolated input negative return pin
COM A/C/E	Common Opto-isolated negative return line for channels 0 - 7
COM B/D/F	Common Opto-isolated negative return line for channels 8 - 15
DGND	Digital ground
+5V Fused	+5 Volt FUSED
+12V Fused	+2 Volts FUSED

Table 3-9 Signal definitions

PCI763

Extern Connectors Pin Assignment

Pin	Name	Pin	Name
1	+12V Fused	20	Relay 8
2	Relay 0 RET	21	Relay 8 RET
3	Relay 0	22	Relay 9
4	Relay 1 RET	23	Relay 9 RET
5	Relay 1	24	Relay 10
6	Relay 2 RET	25	Relay 10 RET
7	Relay 2	26	Relay 11
8	Relay 3 RET	27	Relay 11 RET
9	Relay 3	28	Relay 12
10	Relay 4 RET	29	Relay 12 RET
11	Relay 4	30	Relay 13
12	Relay 5 RET	31	Relay 13 RET
13	Relay 5	32	Relay 14
14	Relay 6 RET	33	Relay 14 RET
15	Relay 6	34	Relay 15
16	Relay 7 RET	35	Relay 15 RET
17	Relay 7	36	+5V Fused
18		37	DGND
19			

Table 3-10 Pinouts for PCI763 Reed Relay (External Connector – DB37F)

Extern / Internal Connectors Pin Assignment

Pin	Name	Pin	Name
1	Relay 16	20	Relay 16 RET
2	Relay 17	21	Relay 17 RET
3	Relay 18	22	Relay 18 RET
4	Relay 19	23	Relay 19 RET
5	Relay 20	24	Relay 20 RET
6	Relay 21	25	Relay 21 RET
7	Relay 22	26	Relay 22 RET
8	Relay 23	27	Relay 23 RET
9	Relay 24	28	Relay 24 RET
10	Relay 25	29	Relay 25 RET
11	Relay 26	30	Relay 26 RET
12	Relay 27	31	Relay 27 RET
13	Relay 28	32	Relay 28 RET
14	Relay 29	33	Relay 29 RET
15	Relay 30	34	Relay 30 RET
16	Relay 31	35	Relay 31 RET
17	DGND	36	DGND
18	DGND	37	DGND
19	+5V Fused		

Pin	Name	Pin	Name
1	Relay 16	2	Relay 16 RET
3	Relay 17	4	Relay 17 RET
5	Relay 18	6	Relay 18 RET
7	Relay 19	8	Relay 19 RET
9	Relay 20	10	Relay 20 RET
11	Relay 21	12	Relay 21 RET
13	Relay 22	14	Relay 22 RET
15	Relay 23	16	Relay 23 RET
17	Relay 24	18	Relay 24 RET
19	Relay 25	20	Relay 25 RET
21	Relay 26	22	Relay 26 RET
23	Relay 27	24	Relay 27 RET
25	Relay 28	26	Relay 28 RET
27	Relay 29	28	Relay 29 RET
29	Relay 30	30	Relay 30 RET
31	Relay 31	32	Relay 31 RET
33	DGND	34	DGND
35	DGND	36	DGND
37	+5V Fused	38	DGND
39	DGND	40	+5V Fused

Table 3-11 Pinouts for PCI763 Reed Relay (External Connector – DB37F or Internal Connector – IDC 40)

Pin	Name	Pin	Name
1	DI0	20	DI1
2	DI2	21	DI3
3	DI4	22	DI5
4	DI6	23	DI7
5	DI8	24	DI9
6	DI10	25	DI11
7	DI12	26	DI13
8	DI14	27	DI15
9	DGND	28	DGND
10	DO0	29	DO1
11	DO2	30	DO3
12	DO4	31	DO5
13	DO6	32	DO7
14	DO8	33	DO9
15	DO10	34	DO11
16	DO12	35	DO13
17	DO14	36	DO15
18	DGND	37	DGND
19	+5V Fused		

Pin	Name	Pin	Name
1	DI0	2	DI1
3	DI2	4	DI3
5	DI4	6	DI5
7	DI6	8	DI7
9	DI8	10	DI9
11	DI10	12	DI11
13	DI12	14	DI13
15	DI14	16	DI15
17	DGND	18	DGND
19	DO0	20	DO1
21	DO2	22	DO3
23	DO4	24	DO5
25	DO6	26	DO7
27	DO8	28	DO9
29	DO10	30	DO11
31	DO12	32	DO13
33	DO14	34	DO15
35	DGND	36	DGND
37	+5V Fused	38	DGND
39	DGND	40	+5V Fused

Table 3-12 Pinout for PCI763 DIO (External Connector – DB37M or Internal Connector – IDC 40)

Signal Definitions

This sections deal with all the signals abbreviations.

Signal	Description
DI0 - 15	Digital Inputs
DO0 - 15	Digital Outputs
RELAY 0 – 31	Reed Relay input line
RELAY 0 - 31 RET	Reed Relay return line
DGND	Digital ground
+5V Fused	+5 Volt FUSED
+12V Fused	+2 Volts FUSED

Table 3-13 Signal definitions

PC104PLUS-69

Pin Assignment

Pin	Name	Pin	Name
1	RELAY 0	21	RELAY 0 RET
2	RELAY 1	22	RELAY 1 RET
3	RELAY 2	23	RELAY 2 RET
4	RELAY 3	24	RELAY 3 RET
5	RELAY 4	25	RELAY 4 RET
6	RELAY 5	26	RELAY 5 RET
7	RELAY 6	27	RELAY 6 RET
8	RELAY 7	28	RELAY 7 RET
9	RELAY 8	29	RELAY 8 RET
10	RELAY 9	30	RELAY 9 RET
11	RELAY 10	31	RELAY 10 RET
12	RELAY 11	32	RELAY 11 RET
13	RELAY 12	33	RELAY 12 RET
14	RELAY 13	34	RELAY 13 RET
15	RELAY 14	35	RELAY 14 RET
16	RELAY 15	36	RELAY 15 RET
17	DGND	37	DGND
18	DGND	38	DGND
19	+5V_FUSED	39	DGND
20	DGND	40	+5V_FUSED

Table 3-114 Pinout for PC104PLUS-69 Reed Relay (IDC40 2mm pitch)

Pin	Name	Pin	Name
1	OPTO 0+	21	OPTO 0-
2	OPTO 1+	22	OPTO 1-
3	OPTO 2+	23	OPTO 2-
4	OPTO 3+	24	OPTO 3-
5	OPTO 4+	25	OPTO 4-
6	OPTO 5+	26	OPTO 5-
7	OPTO 6+	27	OPTO 6
8	OPTO 7+	28	OPTO 7-
9	OPTO 8+	29	OPTO 8-
10	OPTO 9+	30	OPTO 9-
11	OPTO 10+	31	OPTO 10-
12	OPTO 11+	32	OPTO 11-
13	OPTO 12+	33	OPTO 12-
14	OPTO 13+	34	OPTO 13-
15	OPTO 14+	35	OPTO 14-
16	OPTO 15+	36	OPTO 15-
17	COM A	37	COM B
18	DGND	38	DGND
19	+5V_FUSED	39	DGND
20	+5V_FUSED	40	DGND

Table 3-215 Pinout for PC104PLUS-69 OPTO (IDC40 2mm pitch)

Signal Definitions

This sections deal with all the signals abbreviations.

Signal	Description
OPTO 0+ - 15+	Opto-isolated input positive pin
OPTO 0- - 15-	Opto-isolated input negative return pin
COM A	Common Opto-isolated negative return line for channels 0 - 7
COM B	Common Opto-isolated negative return line for channels 8 - 15
RELAY 0 –15	Reed Relay input line
RELAY 0 – 15RET	Reed Relay return line
DGND	Digital ground
+5V_Fused	+5 Volt FUSED

Table 3-16 Signal definitions

4. Programming Guide

The PCI769/62/63 is supplied with a complete software development kit. EDR Enhanced (EDRE SDK) comes with drivers for many operating systems and a common application program interface (API). The API also serves as a hardware abstraction layer (HAL) between the control application and the hardware. The EDRE API makes it possible to write an application that can be used on all hardware with common sub-systems.

EDR Enhanced API

The EDR Enhanced SDK comes with both ActiveX controls and a Windows DLL API. Examples are provided in many different languages and serve as tutorials. EDRE is also supplied with a software manual and user's guide.

The EDRE API hides the complexity of the hardware and makes it really easy to program the PCI769/62/63. It has got functions for each basic sub-system and is real easy to learn.

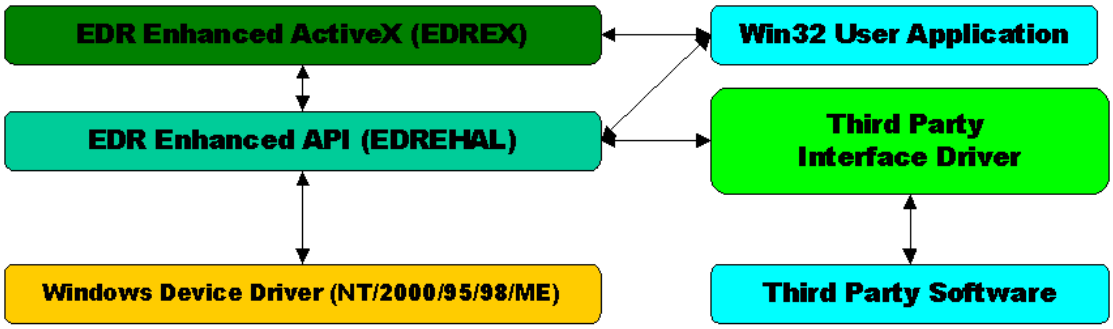


Figure 4-A EDR Enhanced Design

Digital Inputs/Outputs

The PCI769/62/63 has got a variable number of digital, OPTO, and Relay ports. All ports on this series of boards are either input or output and ports are all 16 bits wide. When reading a OPTO isolated port, the reading will be the inverse of the actual input, i.e. if the input is 1 you will read 65534.

Reading the Digital Inputs

A single call is necessary to read a digital input port.

Board	Port Details	
PCI 769	**Assigned Port Number**	**Description**
	0	Digital input
	1	OPTO port A
PCI 762	**Assigned Port Number**	**Description**
	0	Digital input
	1	OPTO port A
	2	OPTO port B
	3	OPTO port C
PCI 763	**Assigned Port Number**	**Description**
	0	Digital input
PC104P69	**Assigned Port Number**	**Description**
	0	OPTO port A

Table 4-1 PCI-769/62/63 and PC104PLUS-69 assigned port numbers

API-CALL

Long EDRE_DioRead(ulng Sn, ulng Port, ulng *Value)

The serial number, port, and a pointer to variable to hold the result must be passed by the calling function. A return code will indicate if any errors occurred.

ACTIVEX CALL

Long EDREDioX.Read(long Port)

Only the port-number needs to be passed and the returned value will either hold an error or the value read. If the value is negative an error did occur.

Writing to the Digital Outputs

A single call is necessary to write to a digital output port.

Board	Port Details	
PCI 769	**Assigned Port Number**	**Description**
	0	Digital Output
	1	RELAY port A
PCI 762	**Assigned Port Number**	**Description**
	0	Digital Output
PCI 763	**Assigned Port Number**	**Description**
	0	Digital Output
	1	RELAY port A
	2	RELAY port B
PC104P69	**Assigned Port Number**	**Description**
	0	RELAY port A

Table 4-2 PCI-769/62/63 and PC104PLUS-69 assigned port numbers

API-CALL

Long EDRE_DioWrite(ulng Sn, ulng Port, ulng Value)

The serial number, port, and a value must be passed by the calling function. A return code will indicate if any errors occurred.

ACTIVEX CALL

Long EDREDioX.Write(long Por, ulng Value)

The port number and value to be written needs to be passed and the returned value holds an error or the value read. If the value is negative an error did occur.

Programming Interrupts

On the PCI769/62/63 all the input channels can be configured to generate an interrupt. Interrupts are fully software configurable, and can enabled and disabled via software as well.

WARNING!

Be careful when programming the interrupt sub-system because it is easy to generate interrupts that is faster than what Windows can service. Don't try and generate interrupt faster than 10KHz. This will not work. Remember this is 10KHz in total, and not per source.
When working with the trigger type set to LEVEL trigger, this can happen very easily.

Configuring the Interrupt sub-system

A single call is necessary to configure the interrupt sub-system.
API-CALL
Long EDREIntX.IntConfigure(long Source, long Mode, long Type)

Parameter	Type	Description				
Source	long	**Source**	**PCI769**	**PCI762**	**PCI763**	**PC104PLUS69**
		0	DI channel 0	DI channel 0	DI channel 0	
		1	DI channel 1	DI channel 1	DI channel 1	
		2	DI channel 2	DI channel 2	DI channel 2	
		3	DI channel 3	DI channel 3	DI channel 3	
		4	DI channel 4	DI channel 4	DI channel 4	
		5	DI channel 5	DI channel 5	DI channel 5	
		6	DI channel 6	DI channel 6	DI channel 6	
		7	DI channel 7	DI channel 7	DI channel 7	
		8	DI channel 8	DI channel 8	DI channel 8	
		9	DI channel 9	DI channel 9	DI channel 9	
		10	DI channel 10	DI channel 10	DI channel 10	
		11	DI channel 11	DI channel 11	DI channel 11	
		12	DI channel 12	DI channel 12	DI channel 12	
		13	DI channel 13	DI channel 13	DI channel 13	
		14	DI channel 14	DI channel 14	DI channel 14	
		15	DI channel 15	DI channel 15	DI channel 15	
		16	OPTO A channel 0	OPTO A channel 0		OPTO A channel 0
		17	OPTO A channel 1	OPTO A channel 1		OPTO A channel 1
		18	OPTO A channel 2	OPTO A channel 2		OPTO A channel 2
		19	OPTO A channel 3	OPTO A channel 3		OPTO A channel 3
		20	OPTO A channel 4	OPTO A channel 4		OPTO A channel 4
		21	OPTO A channel 5	OPTO A channel 5		OPTO A channel 5
		22	OPTO A channel 6	OPTO A channel 6		OPTO A channel 6
		23	OPTO A channel 7	OPTO A channel 7		OPTO A channel 7
		24	OPTO A channel 8	OPTO A channel 8		OPTO A channel 8
		25	OPTO A channel 9	OPTO A channel 9		OPTO A channel 9
		26	OPTO A channel 10	OPTO A channel 10		OPTO A channel 10
		27	OPTO A channel 11	OPTO A channel 11		OPTO A channel 11
		28	OPTO A channel 12	OPTO A channel 12		OPTO A channel 12
		29	OPTO A channel 13	OPTO A channel 13		OPTO A channel 13
		30	OPTO A channel 14	OPTO A channel 14		OPTO A channel 14
		31	OPTO A channel 15	OPTO A channel 15		OPTO A channel 15
		32		OPTO B channel 0		
		33		OPTO B channel 1		
		34		OPTO B channel 2		

		35		OPTO B channel 3		
		36		OPTO B channel 4		
		37		OPTO B channel 5		
		38		OPTO B channel 6		
		39		OPTO B channel 7		
		40		OPTO B channel 8		
		41		OPTO B channel 9		
		42		OPTO B channel 10		
		43		OPTO B channel 11		
		44		OPTO B channel 12		
		45		OPTO B channel 13		
		46		OPTO B channel 14		
		47		OPTO B channel 15		
		48		OPTO C channel 0		
		49		OPTO C channel 1		
		50		OPTO C channel 2		
		51		OPTO C channel 3		
		52		OPTO C channel 4		
		53		OPTO C channel 5		
		54		OPTO C channel 6		
		55		OPTO C channel 7		
		56		OPTO C channel 8		
		57		OPTO C channel 9		
		58		OPTO C channel 10		
		59		OPTO C channel 11		
		60		OPTO C channel 12		
		61		OPTO C channel 13		
		62		OPTO C channel 14		
		63		OPTO C channel 15		
Mode	long	Disable or Enable a source 0: Disable 1: Enable				
Type	long	Select the trigger type 0: Logic LEVEL LOW (0) 1: Logic LEVELHIGH (1) 2: ↓ FALLING EDGE 3: ↑ RISING EDGE				
RETURN	Long	This parameter contains the error code return. If = 0 then no error occurred.				

Table 4-3 EDREIntX.Configure Parameters

Enabling Interrupts

A single call is necessary to enable the interrupt sub-system. This will also enable the global interrupt on the PCI30 and connect it to the PCI Bus.

ACTIVEX-CALL

Long EDREIntX.Enable

A returned error code will contain the status of the call.

Disabling Interrupts

A single call is necessary to disable the interrupt sub-system.

ACTIVEX-CALL

Long EDREIntX.Disable

A returned error code will contain the status of the call.

Interrupt Event

If interrupts are enabled an event will occur on each interrupt. The interrupt control's interrupt event will be triggered. The source of the interrupt will also be passed to the event handler. The value returned to the event handler will be a 16-bit value read from the status register of the device's port that generated the interrupt. To find witch port generated the interrupt a Query function is used.

ACTIVEX-CALL
Interrupt(long Source)
The source is the value read from the interrupt status register of the device's port that generated the interrupt. The sources are binary weighted. See table below.

Source Value	Actual source
1	Channel 0
2	Channel 1
4	Channel 2
8	Channel 3
16	Channel 4
32	Channel 5
64	Channel 6
128	Channel 7
256	Channel 8
512	Channel 9
1024	Channel 10
2048	Channel 11
4096	Channel 12
8192	Channel 13
16384	Channel 14
32768	Channel 15

Table 4-4 Event Source

ACTIVEX-CALL
Long EDREUtlX.Query(ulng QueryCode, ulng Param)

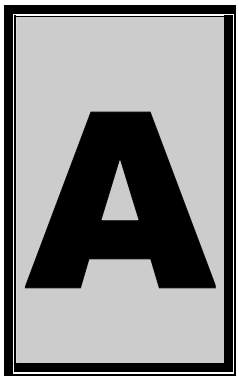
Parameter	Type	Description
QueryCode	Unsigned long	Query code. See appendix Example: INTSTATUS: This will tell you the port number that generated the interrupt.
Param	Unsigned long	Extra parameter.
Return	Long	Returned query code

Query Interrupt Port

ACTIVEX-CALL
Long EDREUtlX.Query(501, 0)
The Query call will return the number of the port that generated the interrupt. See table below.

Return Value	Port
0	DI
1	OPTO A
2	OPTO B
3	OPTO C

Table 4-5 Port Source



A.Specifications

Digital Inputs/Outputs

Interrupt Capability	All inputs can be configured as interrupt source
Digital Logic Levels	High: 2.0V min, 5.3V max Low: 0.0V min, 0.8V max
Current Output	20mA (Open collector outputs)
8255 PPI Support	Mode 0
Frequency Response	20MHz

Reed Relay Characteristics

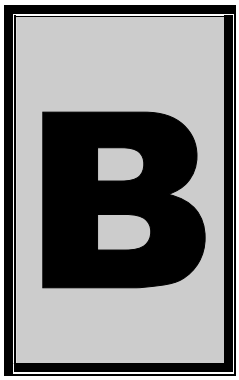
Contact Form	Form a (spst)
Rated Power	20W (max)
Switching Voltage	200VDC (DC or peak AC)
Switching Current	1A (max) (DC or peak AC)
Carry Current	1.25A (DC or peak AC)
Contact Resistance	0.15Ohm (Static); 0.2Ohm (Dynamic)
Breakdown Voltage	320VDC (min) (Across Contacts) 4200VDC (min) (Contact to Coil)
Switching Time	0.5mS
Release Time	0.1mS

OPTO-isolated Characteristics

Interrupt Capability	All inputs can be configured as interrupt source
Frequency Response	Up to 10 kHz
Logic Levels	High: 3.1V min, 24V max Low: 0.0V min, 3.0V max
Isolated Voltage	2500V
Input Current	30mA Continuous 1A Peak (Pulse 300ms, 2% Cycle)
Max forward current [LED]	50mA

Other

Bus Interface	PCI 2.2 Compatible Master & Slave 3.3V or 5V
Power Requirements	+5V (±5%) @ 450mA +5V 200mA (external loads) +12V 200mA (external loads)



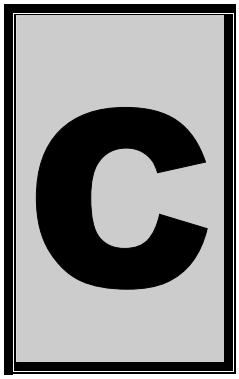
B.Configuration Constants

Query Codes

Name	Value	Description
APIMAJOR	1	Query EDRE API major version number.
APIMINOR	2	Query EDRE API minor version number.
APIBUILD	3	Query EDRE API build version number.
APIOS	4	Query EDRE API OS type.
APINUMDEV	5	Query number of devices installed.
BRDTYPE	10	Query a board's type.
BRDREV	11	Query a board's revision.
BRDYEAR	12	Query a board's manufactured year.
BRDMONTH	13	Query a board's manufactured month.
BRDDAY	14	Query a board's manufactured day.
BRDSERIALNO	15	Query a board's serial number.
DRVMAJOR	20	Query a driver's major version number.
DRVMINOR	21	Query a driver's minor version number.
DRVBUILD	22	Query a driver's build version number.
ADNUMCHAN	100	Query number of ADC channel.
ADNUMSH	101	Query number of samples-and-hold channels.
ADMAXFREQ	102	Query maximum sampling frequency.
ADBUSY	103	Check if ADC system is busy.
ADFIFOSIZE	104	Get ADC hardware FIFO size.
ADFIFOOVER	105	Check for FIFO overrun condition.
ADBUFFSIZE	106	Check software buffer size.
ADBUFFOVER	107	Check for circular buffer overrun.
ADBUFFALLOC	108	Check if software buffer is allocated.
ADUNREAD	109	Get number of samples available.
ADEXTCLK	110	Get status of external clock line – PCI30FG.
ADEXTTRIG	111	Get status of external trigger line – PCI30FG.
ADBURST	112	Check if burst mode is enabled.
ADRANGE	113	Get ADC range.
DANUMCHAN	200	Query number of DAC channels.
DAMAXFREQ	201	Query maximum DAC output frequency.
DABUSY	202	Check if DAC system is busy.
DAFIFOSZ	203	Get DAC FIFO size.
CTNUM	300	Query number of counter-timer channels.
CTBUSY	301	Check if counter-timer system is busy.
DIONUMPORT	400	Query number of digital I/O ports.
DIOQRYPORT	401	Query a specific port for capabilities.
DIOPORTWIDTH	402	Get a specific port's width.
INTNUMSRC	500	Query number of interrupts sources.
INTSTATUS	501	Queries interrupt system's status.
INTBUSCONNECT	502	Connect interrupt system to bus.
INTISAVAILABLE	503	Check if an interrupt is available.
INTNUMTRIG	504	Check number times interrupted

Error Codes

Name	Value	Description
EDRE_OK	0	Function successfully.
EDRE_FAIL	-1	Function call failed.
EDRE_BAD_FN	-2	Invalid function call.
EDRE_BAD_SN	-3	Invalid serial number.
EDRE_BAD_DEVICE	-4	Invalid device.
EDRE_BAD_OS	-5	Function not supported by operating system.
EDRE_EVENT_FAILED	-6	Wait on event failed.
EDRE_EVENT_TIMEOUT	-7	Event timed out.
EDRE_INT_SET	-8	Interrupt in use.
EDRE_DA_BAD_RANGE	-9	DAC value out of range.
EDRE_AD_BAD_CHANLIST	-10	Channel list size out of range.
EDRE_BAD_FREQUECY	-11	Frequency out of range.
EDRE_BAD_BUFFER_SIZE	-12	Data passed by buffer incorrectly sized
EDRE_BAD_PORT	-13	Port value out of range.
EDRE_BAD_PARAMETER	-14	Invalid parameter value specified.
EDRE_BUSY	-15	System busy.
EDRE_IO_FAIL	-16	IO call failed.
EDRE_BAD_ADGAIN	-17	ADC-gain out of range.
EDRE_BAD_QUERY	-18	Query value not supported.
EDRE_BAD_CHAN	-19	Channel number out of range.
EDRE_BAD_VALUE	-20	Configuration value specified out of range.
EDRE_BAD_CT	-21	Counter-timer channel out of range.
EDRE_BAD_CHANLIST	-22	Channel list invalid.
EDRE_BAD_CONFIG	-23	Configuration invalid.
EDRE_BAD_MODE	-24	Mode not valid.
EDRE_HW_ERROR	-25	Hardware error occurred.
EDRE_HW_BUSY	-26	Hardware busy.
EDRE_BAD_BUFFER	-27	Buffer invalid.
EDRE_REG_ERROR	-28	Registry error occurred.
EDRE_OUT_RES	-29	Out of resources.
EDRE_IO_PENDING	-30	Waiting on I/O completion



C.Ordering Information

For ordering information please contact Eagle Technology directly or visit our website www.eagledaq.com. They can also be emailed at eagle@eagle.co.za.

Board	Description
PCI-769	16 Channel Opto-isolated, Reed relay, DI, & DO Board
PCI-762 / 16	16 Channel Opto-isolated & 16 Channel DI, & DO Board
PCI-762 / 32	32 Channel Opto-isolated & 16 Channel DI, & DO Board
PCI-762 / 48	48 Channel Opto-isolated & 16 Channel DI, & DO Board
PCI-763 / 16	16 Channel Reed relay & 16 Channel DI, & DO Board
PCI-763 / 32	32 Channel Reed relay & 16 Channel DI, & DO Board
PC104PLUS-69	16 Channel Opto-isolated and Reed relay Board

Table C-1 Ordering Information

Please visit our website to have a look at our wide variety of data acquisition products and accessories.