PEC-3240

Celeron M 1.0 GHz 4-axis Motion Controller with 32-ch DI/O

User Manual

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This manual is for PEC-3240.

Product Warranty

Advantech warrants to you, the original purchaser, that each of its products will be free from defects in materials and workmanship for one year from the date of purchase.

This warranty does not apply to any products that have been repaired or altered by persons other than repair personnel authorized by Advantech, or which have been subject to misuse, abuse, accident or improper installation. Advantech assumes no liability under the terms of this warranty as a consequence of such events.

Because of Advantech high quality-control standards and rigorous testing, most of our customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced at no charge during the warranty period. For out-of-warranty repairs, you will be billed according to the cost of replacement materials, service time and freight. Please consult your dealer for more details. If you think you have a defective product, follow these steps:

Step 1. Collect all the information about the problem encountered. (For example, CPU speed, Advantech products used, other hardware and software used, etc.) Note anything abnormal and list any on-screen messages you get when the problem occurs.

Step 2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.

Step 3. If your product is diagnosed as defective, obtain an RMA (return merchandize authorization) number from your dealer. This allows us to process your return more quickly.

Step 4. Carefully pack the defective product, a fully completed Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.

Step 5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

Declaration of Conformity

CE

This product has passed the CE test for environmental specifications when shielded cables are used for external wiring. We recommend the use of shielded cables. This kind of cable is available from Advantech. Please contact your local supplier for ordering information.

FCC Class A

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Technical Support and Assistance

Step 1. Visit the Advantech web site at **www.advantech.com/support** where you can find the latest information about the product.

Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before you call:
- Product name and serial number
- Description of your peripheral attachments
- Description of your software (operating system, version, application software, etc.)
- A complete description of the problem
- The exact wording of any error messages

Contents

Overview

This chapter provides an overview of PEC-3240's specifications.

Sections include:

- Introduction
- Hardware specification
- Safety precautions
- Chassis dimensions

Chapter 1 Overview

1.1 Introduction

PEC-3240 is an embedded Application Ready Platform (ARP) that can shorten your development time and offers rich networking interfaces to fulfill extensive needs in different projects. The PEC-3240 is designed to be a total solution for network enabled Application Ready Platforms.

Leveraging field-approved and worldwide approved real-time OS technology, Advantech's PEC-3240 provides a Windows XP Embedded ready solution, and supports several standard networking interfaces, such as Ethernet, Wireless LAN, RS-232 and so on. The PCI-1240U and PCI-1750 also provide 4-axis motion and 32-ch DI/O control, which can fulfill diversified automation applications.

1.2 Hardware Specifications

- **CPU:** Celeron M 1 GHZ
- **Memory:** 512MB on board
- **VGA/Keyboard/Mouse:** DB-15 VGA Connector, PS/2 kb & mouse
- **Serial Ports:** 2 × RS-232
- **Serial Speeds:** 50~115.2 kbps
- **LAN:** Two 10/100 Base-T RJ-45 Ports
- **USB interface:** Two USB ports, USB EHCI, Rev. 2.0 compliant
- **SSD:** Two internal Type I / Type II CompactFlash card slot
- **LEDs:** Power, IDE
- **Anti-Shock:** 50 G @ Wall mounting, IEC 68 2-27, half sine, 11ms w/CF
- **Anti-Vibration:**

    2 Grms w/CF @IEC 68 section 2-64, random, 5 ~ 500 Hz

    1 Oct./min, 1 hr/axis

Pulse Type Motion Control
- **Motor Driver Support:** Pulse-type servo/stepping
- **Number of Axes:** 4
- **Interpolation:** 2-axis linear, 3-axis linear, 2-axis circular

- **Max. Output Speed:** 4 Mpps
- **Step Count Range:** ±2, 147, 483, 646
- **Pulse Output Type:** Pulse/direction (1-pulse, 1-direction type) or CW/ CCW (2-pulse type)
- **Position Counters:** Range of command and actual position
- **Velocity Profiles:** T-Curve, S-Curve
- **Local I/O:** PEL x 4, MEL x 4, ORG x 4, ALM x 4, INP x 4, CMP x 4
- **General Inputs:** 12 (IN0 ~ 2 of each axis)
- **General Outputs:** 16 (OUT4 ~ 7 of each axis)

Encoder Interface
- **Input Type:** Quadrature (x1, x2, x4 A/B phase) or CW/CCW
- **Input Range:** 5 ~ 25 V
- **Isolation Protection:** 1,000 V
- **Max. Input Frequency:** 1 MHz

Isolated Digital Input
- **Channels:** 16
- **Input Voltage:** Logic 0: 2 V max.; Logic 1: 5 V min. (24 V max.)
- **Isolation Protection:** 1,000 V

Isolated Digital Output
- **Channels:** 16
- **Output Type:** Sink Type (NPN)
- **Output Voltage:** 5~40 V max.
- **Sink Current:** 200 mA max. per channel
- **Isolation Protection:** 1,000 V

- **Power Requirement:** Min.48 W ($10 \sim 30$ V_{DC}) (+24 V @ 2 A) (AT)

- **Power Consumption:** 24W (Typical)

- **Operating Temperature:** -10~65° C (14~149° F)

- **Storage Temperature**: -20~80° C (-4~176° F)

- **Relative humidity:** 95% @ 40°C

- **Weight:** 2.4 kg

- **Chassis size (W × L × H):** 255 x 152 x 59 mm (10"× 6.0"× 2.36")

- **OS:** Windows 2000/XP, WinXP Embedded

- **Certifications**: CE, FCC Class A

1.3 Safety Precautions

The following sections tell how to make each connection. In most cases, you will simply need to connect a standard cable.

Warning! *Always disconnect the power cord from your chassis whenever you are working on it. Do not connect while the power is on. A sudden rush of power can damage sensitive electronic components. Only experienced electronics personnel should open the chassis.*

Caution! *Always ground yourself to remove any static electric charge before touching PEC-3240. Modern electronic devices are very sensitive to static electric charges. Use a grounding wrist strap at all times. Place all electronic components on a static-dissipative surface or in a static-shielded bag.*

1.4 Chassis Dimensions
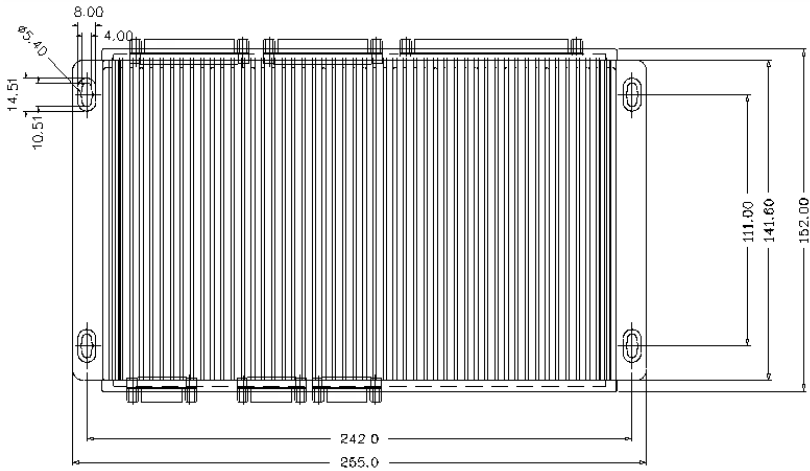
Figure 1.1: Chassis Dimensions 1
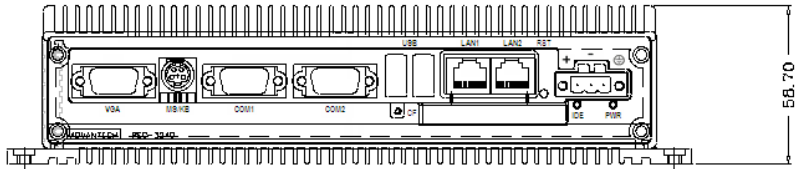
Figure 1.2: Chassis Dimensions 2
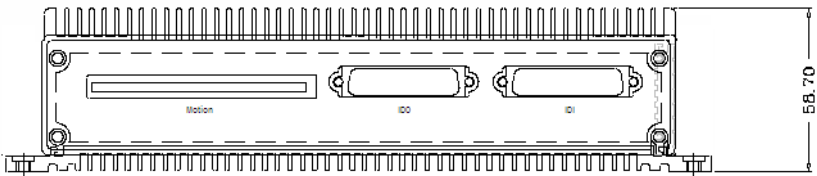
Figure 1.3: Chassis Dimensions 3

Hardware Functionality

This chapter shows how to setup the PEC-3240's hardware functions, including connecting peripherals, setting switches and indicators.

Sections include:

- Peripherals
- RS-232 Interface
- LAN / Ethernet Connector
- Power Connector
- PS/2 Mouse and Keyboard Connector
- USB Connector
- VGA Display Connector
- Reset Button

Chapter 2 Hardware Functionality

2.1 Introduction

The following two figures show the connectors on PEC-3240. The following sections give you detailed information about function of each peripheral.
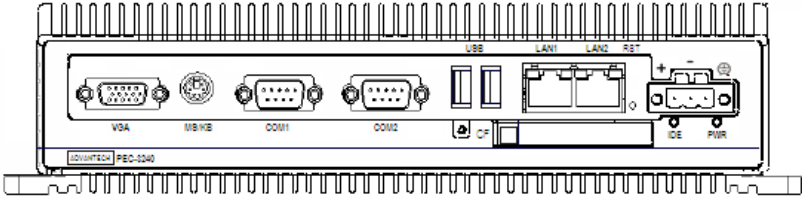
Figure 2.1: PEC-3240 Front Panel
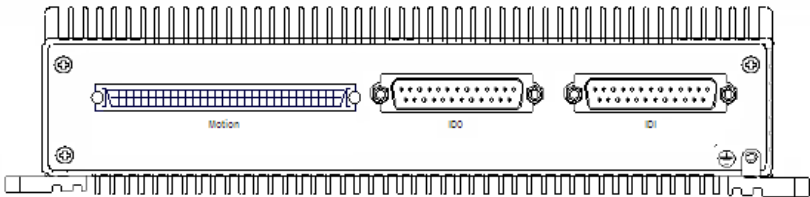
Figure 2.2: PEC-3240 Rear Panel

2.2 RS-232 Interface (COM1~COM2)

The PEC-3240 offers two standard RS-232 serial communication interface ports: COM1 and COM2. Please refer to A.3 for their pin assignments.

IRQ and Address Setting

The IRQ and I/O address range of COM1 and COM2 are listed below:

COM1: 3F8H, IRQ4

COM2: 2F8H, IRQ3

2.3 LAN: Ethernet Connector

The PEC-3240 is equipped with a Realtek RTL8139DL Ethernet LAN controller that is fully compliant with IEEE 802.3u 10/100Base-T CSMA/CD standards. The Ethernet port provides a standard RJ-45 jack on board, and LED indicators on the front side to show its Link (Green LED) and Active (Yellow LED) status.

2.4 Power Connector

The PEC-3240 comes with a Phoenix connector that carries 10~30 VDC external power input, and features reversed wiring protection. Therefore, it will not cause any damage to the system by reversed wiring of ground line and power line.

2.5 PS/2 Keyboard and Mouse Connector

The PEC-3240 provides a PS/2 keyboard and PS/2 mouse connector. A 6-pin mini-DIN connector is located on the rear panel of the PEC-3240. The PEC-3240 comes with an adapter to convert from the 6-pin mini-DIN connector to two 6-pin mini-DIN connectors for PS/2 keyboard and PS/2 mouse connection. Please refer to Appendix A.7 for its pin assignments.

2.6 USB Connector

The USB connector is used for connecting any device that conforms to the USB interface. The USB interface supports Plug and Play, which enables you to connect or disconnect a device without turning off the computer. The PEC-3240 provides two connectors of USB interfaces, which gives complete Plug & Play and hot swapping for up to 127 external devices. The USB interface complies with USB EHCI, Rev. 2.0 compliant. One USB port comes with a lockable USB connection allowing Advantech's USB hub module and USB I/O modules to be connected to extend the I/O numbers for industrial applications.

2.7 VGA Display Connector

The PEC-3240 provides a VGA controller (Intel 855/852 GME, supports a single 1.5V accelerated graphics port interface) for a high resolution VGA interface. It supports CRT Mode: 1280 x 1024 @ 32bpp (60Hz), 1024x768@32bpp (85Hz); LCD/Simultaneous Modes: 1280x1024@ 16bpp (60Hz), 1024x768@16bpp(60Hz) and up to 32MB shared memory.

2.8 Reset Button

The "RST" button is located between LAN2 and the power connector. When the button is pressed, the system will be reset.

Initial Setup

This chapter introduces how to initial-
ize the PEC-3240.

Sections include:

- Chassis Grounding
- Inserting a CompactFlash Card
- Connecting Power
- BIOS Setup and System Assignments
- Driver Installation

Chapter 3 Initial Setup

3.1 Chassis Grounding

The aluminum made PEC-3240 provides good EMI protection and a stable grounding base. There is an easy-to-connect chassis grounding point for you to use. Please connect chassis ground of PEC-3240 with "EARTH" as ground.
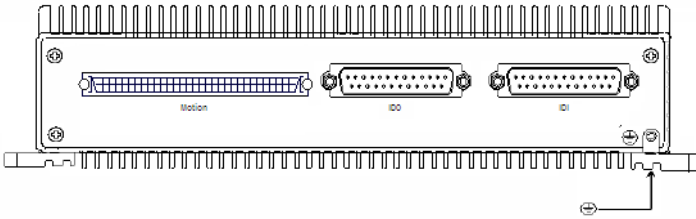
Figure 3.1: Chassis Grounding Connection

3.2 Inserting a CompactFlash Card

The procedure for installing a CompactFlash card into the PEC-3240 is detailed below, please follow these steps carefully.

1. Remove the power cord.
2. Unscrew the six screws from the down storage panel.
3. Remove the storage panel.
4. Plug a CompactFlash card with your OS and application program into a CompactFlash card slot on board. (CN8)
5. Screw back the rear panel with six screws

Note *CN8 is Primary*

CN18 is secondary

Please do not use CN8 and CN18 at the same time.

If your OS is build in CF card and program,application and data are save in HDD, please install CF in CN10 and connect HDD in CN8.

3.3 Connecting Power

Connect the PEC-3240 to a 10~30VDC power source. The power source can either be from a power adapter or an in-house power source.

3.4 BIOS Setup and System Assignments

PEC-3240 adopts Advantech's SOM-4486 CPU module. Further information about the SOM-4486 CPU module, can be found in SOM-4486 user's manual. You can find this manual on the PEC-3240's driver and utility CD-ROM.

Please note that you can try to "LOAD BIOS DEFAULTS" from the BIOS Setup manual if the PEC-3240 does not work properly.

3.5 Driver Installation

The motion, DI/O, LAN and other necessary drivers are included on the companion CD-ROM that is shipped with your PEC-3240 product package. For motion operation, you can install driver on the following path:

CD\Drivers\Motion

For further information on driver-related issues, an online version of Software Manual is available by accessing the following path:

Start\Programs\Advantech Automation\Motion\PCI-1240

The example source codes could be found under the corresponding installation folder such as the default installation path:

\Program Files\Advantech\Motion\PCI-1240\Examples

For digital input/output operation, you can install Advantech Device Manager and PCI-1750 driver on the following path:

CD\Drivers\DIO

After installation, you can test digital input/output functions by running the Device Manager program (by accessing *Start\Programs\Advantech Automation\Device Manager\Advantech Device Manager).*

DI/O examples are also included in: *CD\Drivers\DIO\Examples\.*

For more detailed information, please refer to Chapter 2 of the Device Drivers Manual.

Pin Assignments

Appendix A Pin Assignments

A.1 Board Connectors and Jumpers

There are several connectors and jumpers on the PEC-3240 board. The following sections tell you how to configure the PEC-3240 hardware setting. Below you will see the locations of PEC-3240's connectors and jumpers.
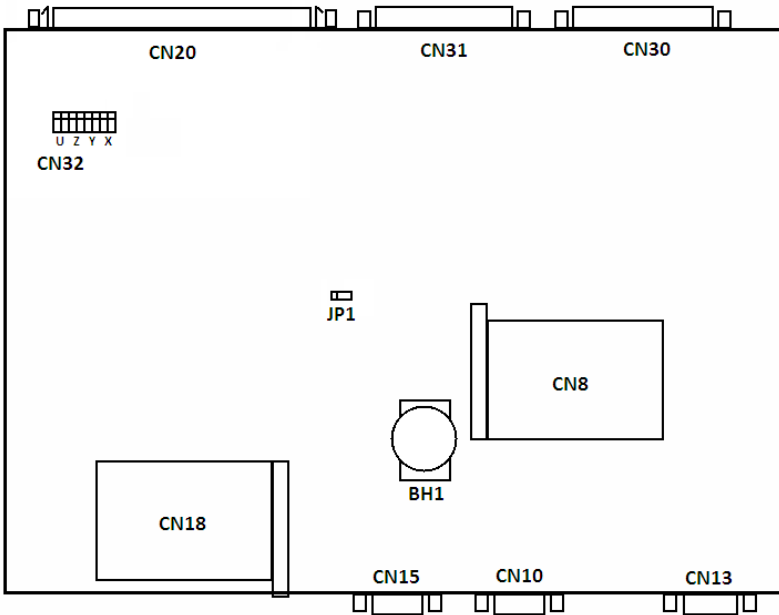
Figure A.1: Connectors & Jumpers (backside)

Table A.1: Connectors and Jumpers

Label	Function
CN1	Phoenix power connector
CN34	Ethernet port 1
CN35	Ethernet port 2
CN10	COM1 RS-232 serial port
CN15	COM2 RS-232 serial port
CN16	USB connector
CN17	USB connector
CN6	PS/2 keyboard and mouse connector
CN8	Primary IDE connector
CN18	Secondary IDE connector
CN13	VGA DB15 display connector
CN20	Motion connector
CN30	IDI connector
CN31	IDO connector
CN32	5V/DIFF of motion
SW1	Reset button
BH1	Battery for RTC

A.2 RS-232 Standard Serial Port (COM1~COM2)
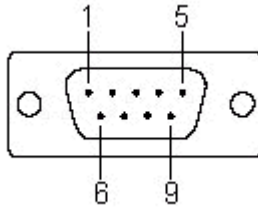
Table A.2: RS-232 standard serial port pin assignments

Pin	RS-232 Signal Name
1	DCD
2	RxD
3	TxD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

A.3 Ethernet RJ-45 Connector (LAN1~LAN2)

Table A.3: Ethernet RJ-45 connector pin assignments

Pin	10/100Base-T Signal Name
1	XMT+
2	XMT-
3	RCV+
4	NC
5	NC
6	RCV-
7	NC
8	NC

A.4 Phoenix Power Connector (PWR)
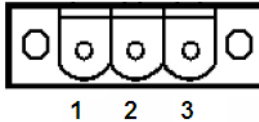
Table A.4: Power Connector Pin Assignments

Pin	Signal Name
1	+10~30 VDC
2	GND
3	Field Ground

A.5 PS/2 Keyboard and Mouse Connector
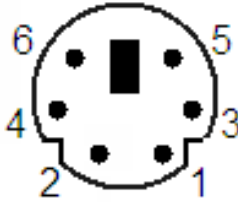
Table A.5: Keyboard and Mouse connector pin assignments

Pin	Signal Name
1	KB DATA
2	MS DATA
3	GND
4	VCC
5	KB Clock
6	MS Clock

A.6 USB Connector (USB1~USB2)

Table A.6: USB connector pin assignments

Pin	Signal Name	Cable Color
1	VCC	Red
2	DATA+	White
3	DATA-	Green
4	GND	Black

A.7 VGA Display Connector
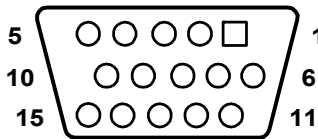
Table A.7: VGA adaptor cable pin assignment

Pin	Signal Name
1	Red
2	Green
3	Blue
4	NC
5	GND
6	GND
7	GND
8	GND
9	NC
10	GND
11	NC
12	NC
13	H-SYNC
14	V-SYNC
15	NC

A.8 Output Pulse Definition

The output pulse for 4 axes can be single-ended or differential. The default output mode is differential output. For single-ended (+5V) output use, user can change jumpers on CN32 to output external +5V to external device.

Table A.8: Output Signal Jumper Table

Jumper	UP-P	UP+P	ZP-P	ZP+P	YP-P	YP+P	XP-P	XP+P
IC Output (Line Output)				Pin 2 and Pin 3 Short (Default)				
+5V Output				Pin 1 and Pin 2 Short				

A.9 Motion Connector

YP-N	50	100	UP-N
YP-P	49	99	UP-P
YP+N	48	98	UP+N
YP+P	47	97	UP+P
YOUT7	46	96	UOUT7
YOUT6	48	95	UOUT6
YOUT5	44	94	UOUT5
YOUT4	43	93	UOUT4
GND	42	92	GND
XP-N	41	91	ZP-N
XP-P	40	90	ZP-P
XP+N	39	89	ZP+N
XP+P	38	88	ZP+P
XOUT7	37	87	ZOUT7
XOUT6	36	86	ZOUT6
XOUT5	35	85	ZOUT5
XOUT4	34	84	ZOUT4
GND	33	83	GND
YEXOP-	32	82	UEXOP-
YEXOP+	31	81	UEXOP+
XEXOP-	30	80	ZEXOP-
XEXOP+	29	79	ZEXOP+
YINON	28	78	UINON
YINOP	27	77	UINOP
YECBN	26	76	UECBN
YECBP	25	75	UECBP
YECAN	24	74	UECAN
YECAP	23	73	UECAP
Y_ALARM	22	72	U_ALARM
Y_INPOS	21	71	U_INPOS
XINON	20	70	ZINON
XINOP	19	69	ZINOP
XECBN	18	68	ZECBN
XECBP	17	67	ZECBP
XECAN	16	66	ZECAN
XECAP	15	65	ZECAP
X_ALARM	14	64	Z_ALARM
X_INPOS	13	63	Z_INPOS
Y_IN3	12	62	U_IN3
Y_IN2	11	61	U_IN2
Y_IN1	10	60	U_IN1
YLMT-	9	59	ULMT-
YLMT+	8	58	ULMT+
X_IN3	7	57	Z_IN3
X_IN2	6	56	Z_IN2
X_IN1	5	55	Z_IN1
XLMT-	4	54	ZLMT-
XLMT+	3	53	ZLMT+
EMG	2	52	NC
VEX	1	51	VEX

Table A.9: Motion Connector Signal Description (Part 1)

Signal Name	Reference	Direction	Description
VEX	-	Input	External Power (12~24VDC)
EMG	-	Input	Emergency Stop (for all axes)
XLMT+	-	Input	+ Direction Limit at X axis
XLMT-	-	Input	- Direction Limit at X axis
XIN1	-	Input	Deceleration/Instant Stop at X axis
XIN2	-	Input	Deceleration/Instant Stop at X axis
XIN3	-	Input	Deceleration/Instant Stop at X axis
YLMT+	-	Input	+ Direction Limit at Y axis
YLMT-	-	Input	- Direction Limit at Y axis
YIN1	-	Input	Deceleration/Instant Stop at Y axis
YIN2	-	Input	Deceleration/Instant Stop at Y axis
YIN3	-	Input	Deceleration/Instant Stop at Y axis
XINPOS	-	Input	In-Position input at X axis
XALARM	-	Input	Servo Error at X axis
XECAP	-	Input	Encoder Phase A at X axis
XECAN	-	Input	Encoder Phase A at X axis
XECBP	-	Input	Encoder Phase B at X axis
XECBN	-	Input	Encoder Phase B at X axis
XINOP	-	Input	Encoder Phase Z at X axis
XINON	-	Input	Encoder Phase Z at X axis
YINPOS	-	Input	In-Position input at Y axis
YALARM	-	Input	Servo Error at Y axis
YECAP	-	Input	Encoder Phase A at Y axis
YECAN	-	Input	Encoder Phase A at Y axis
YECBP	-	Input	Encoder Phase B at Y axis
YECBN	-	Input	Encoder Phase B at Y axis
YINOP	-	Input	Input Encoder Phase Z at Y axis
YINON	-	Input	Encoder Phase Z at Y axis
XEXOP+	-	Input	Jog at the + Direction of X axis
XEXOP-	-	Input	Jog at the - Direction of X axis
YEXOP+	-	Input	Jog at the + Direction of Y axis
YEXOP-	-	Input	Jog at the - Direction of Y axis
GND	-	-	Ground
XOUT4	GND	Output	General Output at X axis (CMP)
XOUT5	GND	Output	General Output at X axis

Table A.9: Motion Connector Signal Description (Part 2)

Signal Name	Ref.	Direction	Description
XOUT6	GND	Output	General Output at X axis (Server on)
XOUT7	GND	Output	General Output at X axis (Reset)
XP+P	GND	Output	Output pulse CW/Pulse+ of X-axis
XP+N	GND	Output	Output pulse CW/ Pulse- of X-axis
XP-P	GND	Output	Output pulse CCW/DIR+ of X-axis
XP-N	GND	Output	Output pulse CCW/DIR- of X-axis
GND	-	-	Ground
YOUT4	GND	Output	General Output at Y axis (CMP)
YOUT5	GND	Output	General Output at Y axis
YOUT6	GND	Output	General Output at Y axis (Server on)
YOUT7	GND	Output	General Output at Y axis (Reset)
YP+P	GND	Output	Output pulse CW/Pulse+ of Y-axis
YP+N	GND	Output	Output pulse CW/ Pulse- of Y-axis
YP-P	GND	Output	Output pulse CCW/DIR+ of Y-axis
YP-N	GND	Output	Output pulse CCW/DIR- of Y-axis
VEX	-	Input	External Power (DC12~24V)
ZLMT+	-	Input	+ Direction Limit at Z axis
ZLMT-	-	Input	- Direction Limit at Z axis
ZIN1	-	Input	Deceleration/Instant Stop at Z axis
ZIN2	-	Input	Deceleration/Instant Stop at Z axis
ZIN3	-	Input	Deceleration/Instant Stop at Z axis
ULMT+	-	Input	+ Direction Limit at U axis
ULMT-	-	Input	- Direction Limit at U axis
UIN1	-	Input	Deceleration/Instant Stop at U axis
UIN2	-	Input	Deceleration/Instant Stop at U axis
UIN3	-	Input	Deceleration/Instant Stop at U axis
ZINPOS	-	Input	In-Position input at Z axis
ZALARM	-	Input	Servo Error at Z axis
ZECAP	-	Input	Encoder Phase A at Z axis
ZECAN	-	Input	Encoder Phase A at Z axis
ZECBP	-	Input	Encoder Phase B at Z axis
ZECBN	-	Input	Encoder Phase B at Z axis
ZINOP	-	Input	Input Encoder Phase Z at Z axis
ZINON	-	Input	Input Encoder Phase Z at Z axis
UINPOS	-	Input	In-Position input at U axis

Table A.9: Motion Connector Signal Description (Part 3)

| Signal Name	Reference	Direction	Description
UALARM	-	Input	Servo Error at U axis
UECAP	-	Input	Encoder Phase A at U axis
UECAN	-	Input	Encoder Phase A at U axis
UECBP	-	Input	Encoder Phase B at U axis
UECBN	-	Input	Encoder Phase B at U axis
UINOP	-	Input	Input Encoder Phase Z at U axis
UINON	-	Input	Input Encoder Phase Z at U axis
ZEXOP+	-	Input	Jog at the + Direction of Z axis
ZEXOP-	-	Input	Jog at the - Direction of Z axis
UEXOP+	-	Input	Jog at the + Direction of U axis
UEXOP-	-	Input	Jog at the - Direction of U axis
GND	-	-	Ground
ZOUT4	GND	Output	General Output at Z axis (CMP)
ZOUT5	GND	Output	General Output at Z axis
ZOUT6	GND	Output	General Output at Z axis (Server on)
ZOUT7	GND	Output	General Output at Z axis (Reset)
ZP+P	GND	Output	Output pulse CW/Pulse+ of Z-axis
ZP+N	GND	Output	Output pulse CW/ Pulse- of Z-axis
ZP-P	GND	Output	Output pulse CCW/DIR+ of Z-axis
ZP-N	GND	Output	Output pulse CCW/DIR- of Z-axis
GND	-	-	Ground
UOUT4	GND	Output	General Output at U axis (CMP)
UOUT5	GND	Output	General Output at U axis
UOUT6	GND	Output	General Output at U axis (Server on)
UOUT7	GND	Output	General Output at U axis (Reset)
UP+P	GND	Output	Output pulse CW/Pulse+ of U-axis
UP+N	GND	Output	Output pulse CW/ Pulse- of U-axis
UP-P	GND	Output	Output pulse CCW/DIR+ of U-axis
UP-N	GND	Output	Output pulse CCW/DIR- of U-axis

A.10 DI/O Connector

IDO Connector   IDI Connector
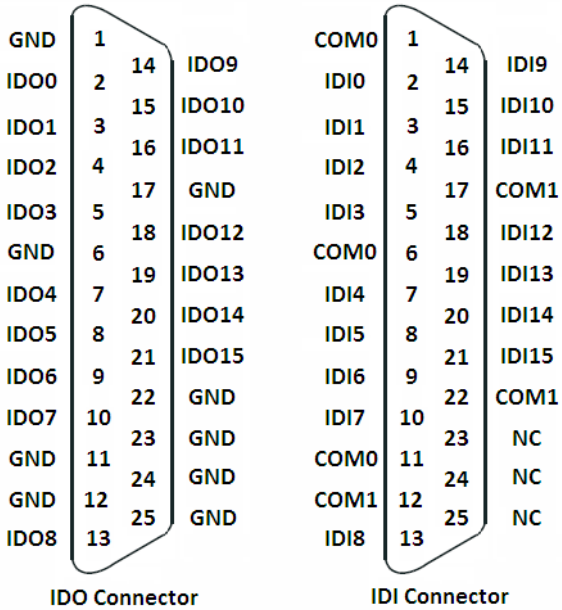
Table A.10: DI/O Connector Signal Description

Signal Name	Description
IDOn (n=0 ~ 15)	Isolated Digital Output
GND	External Ground for IDO
IDIn (n=0 ~ 15)	Isolated Digital Input
COM0	External common Vcc/GND of IDI0~IDI7
COM1	External common Vcc/GND of IDI8~IDI15
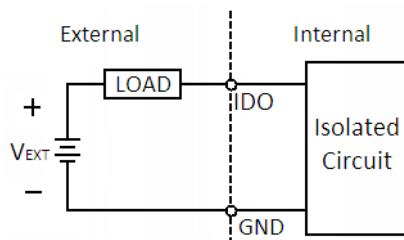
Isolated DO Connection
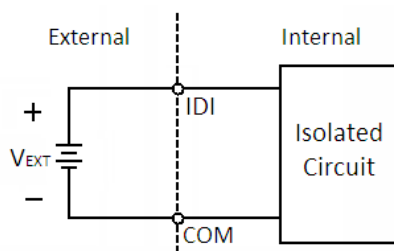
Isolated DI Connection

B

Programming the Watchdog Timer

Appendix B Programming the Watchdog Timer

Below are samples of code for controlling the Watchdog Timer function.

```
--------------------------------------------------------------------------------
Enter the extended function mode, interruptible double-write |
--------------------------------------------------------------------------------
MOV DX,2EH
MOV AL,87H OUT DX,AL OUT DX,AL
--------------------------------------------------------------------------
Configured logical device 8, configuration register CRF6 |
--------------------------------------------------------------------------
MOV DX,2EH
MOV AL,2BH OUT DX,AL MOV DX,2FH IN AL,DX
AND AL.OEFH;Setbit 4=0 Pin 89=WDTO OUT DX,AL
MOV DX,2EH
MOV AL,07H; point to Logical Device Number Reg. OUT DX,AL
MOV DX,2FH
MOV AL,08H; select logical device 8
OUT DX,AL; MOV DX,2EH
MOV AL,30H;Set watch dog activate or inactivate
OUT DX,AL MOV DX,2FH
MOV AL,01H; 01:activate 00:inactivate
OUT DX,AL; MOV DX,2EH
MOV AL,F5H; Setting counter unit is second
OUT DX,AL MOV DX,2FH MOV AL,00H OUT DX,AL; MOV
DX,2EH MOV AL,F6H OUT DX,AL MOV DX,2FH
MOV AL,05H; Set 5 seconds
OUT DX,AL
;-----------------------------------------
; Exit extended function mode |
;-----------------------------------------
MOV DX,2EH
MOV AL,AAH OUT DX,AL
```