

**4 axes controller board for PCI Bus**  
**MCI- 0410**

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**【User's manual】**

**myCOM**

変 更 履 歴

変更日付	記号	変 更 内 容
2001/04/19		QT31-01003A を取説 QT32-04005 にする。
2001/05/09	A	付属品個数変更。 Z相論理設定間違い修正。 出荷設定変更。 原点サーチ説明のニア原点エッジ必要削除。

# Attention on Safety

Please read this user's manual carefully before using this device.



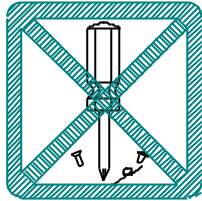
## Warning

Please keep the followings and use safely to avoid a fatal accident.

**Do not use or leave it unattended after disassembling or damaging this unit.**

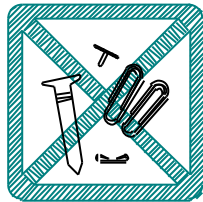
The above might cause an electrical shock or an accident.

We will not be responsible for repair if the unit is disassembled by the customer.



**Avoid having metals and other foreign objects enter into the device.**

The above might cause fire, electric shock or accidents.



**Do not touch the unit with wet hand.**

The above might cause electric shock or accidents.



## Warning on Using

Please read this Handling Manual before using this unit for safety's sake and to prevent accidents.



## WARNING

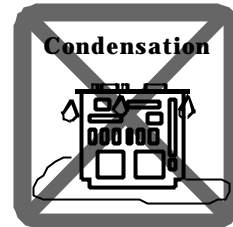
### Avoid using or storing this unit where air is dusty.

This unit is not made dust proof. Thus, it may cause accidents if it is used in a dusty area.



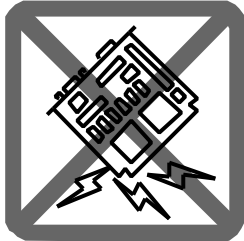
### Avoid dews to form.

Avoid moving this unit to a place of high humidity or causing dews to form by a sudden change of temperature.



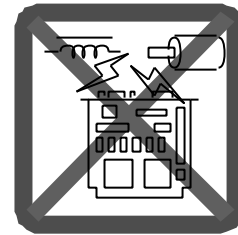
### Do not give a large shock.

Since this is a precision unit, do not drop or give shock to it. They may cause malfunctions.



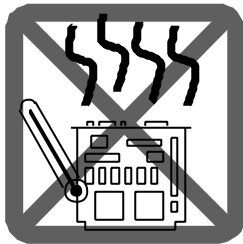
### Take measures against noise. Noise may cause malfunctions.

Be supplied from the power source which does not connect with noise source.

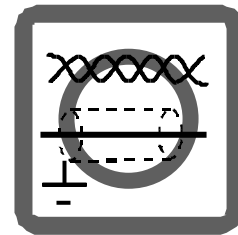


### Avoid using or storing this unit where temperature may rise too high or too low.

The operating temperature range is 0°C~40°C and the storage temperature is 0°C~50°C. Avoid extreme temperature changes. Using and storing the unit outside the range will cause malfunctions.

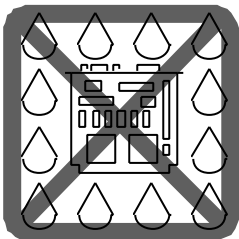


Use shielded wires for wiring. Keep wiring the shortest possible. Use twisted pair line for the clock output.



### Void using or storing the unit in a place of extreme high or low humidity.

The range of operating humidity is 30%~80%. The range of storage humidity is 20%~90%. Please observe them. Using and storing outside of the above ranges will cause malfunctions.



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# 1. Foreword

Model Name: MCI-0410

The products and company names mentioned in this user's manual may be the trademarks of their respective owners.

Thank you for using our MCI-0400, this time.

Incorrect use of this product will not only result in poor performance of this product but also may cause unexpected breakdowns and shorten the life of this product. Please read this User's Manual carefully and handle this product properly.

MCI-0410 includes the following main product and accessories. Please check them. If some accessories are missing, though we checked carefully, please contact our agencies or our main offices.

Main product	MCI-0410	Reference
Accessory 1	1 Connector set for CN1	
Accessory 2	1 Connector set for CN2	
Accessory 3	Shorting sockets	36 pcs. are installed in the board.
Accessory 4	1 User's manual	

**Table 1-1. Confirmation on receipt**

## 1.1 Operating circumstance

MC-0410 board is used putting on PCI bus slot

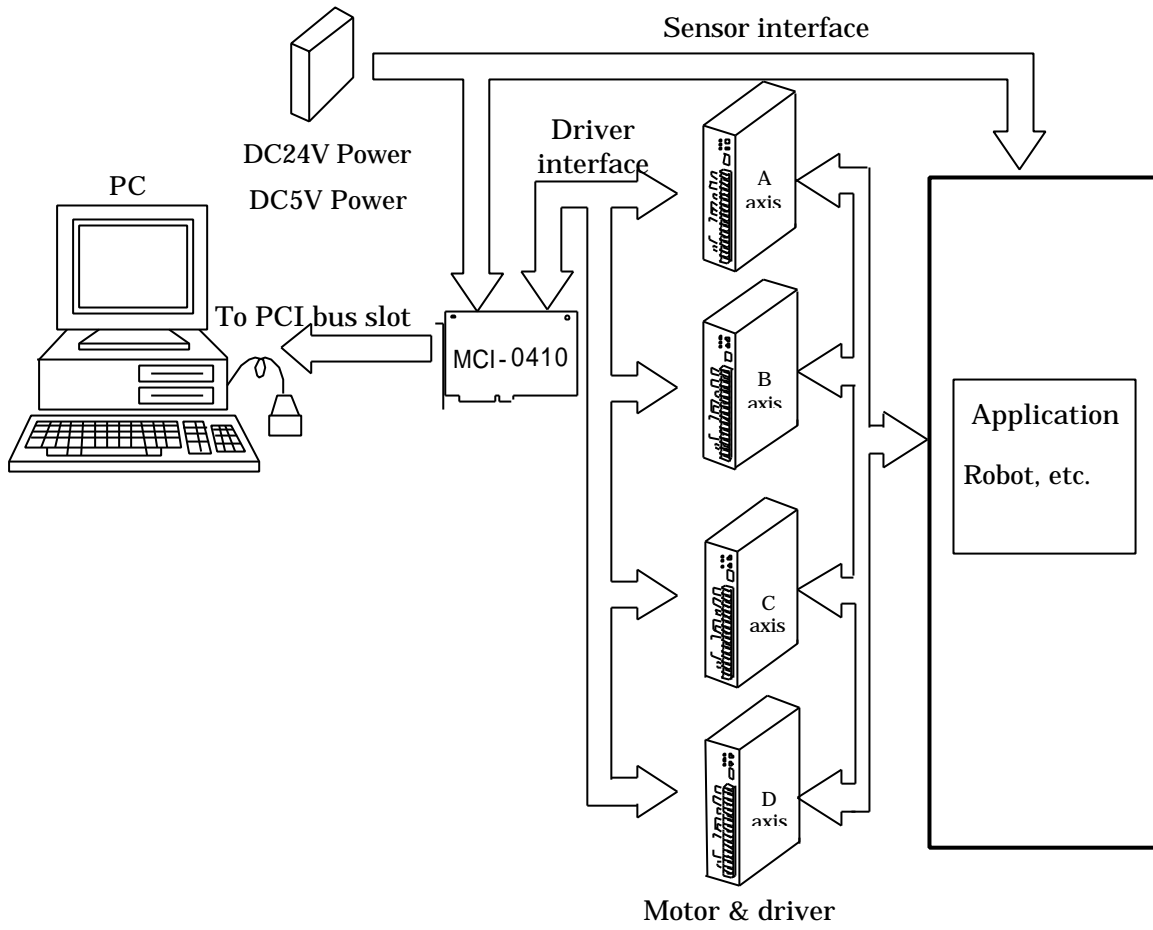
Please confirm that PC has circumstance which can put the board.

## 2. Outline

MCI-0410 is a short size high performance 4 axes motor controller module with PCI-bus interface. The pulse train which controls motors is generated by sending commands directly from the bus to the pulse generator LSI(MPG2031). This controller module has the 3 point sensor encoder (A/B/Z phases) inputs, 3 point driver control outputs and 3 point driver control inputs for each axis and controls stepping motor or pulse train input servo motor. Please refer to MPG2031 user's manual for the details of MPG2031.

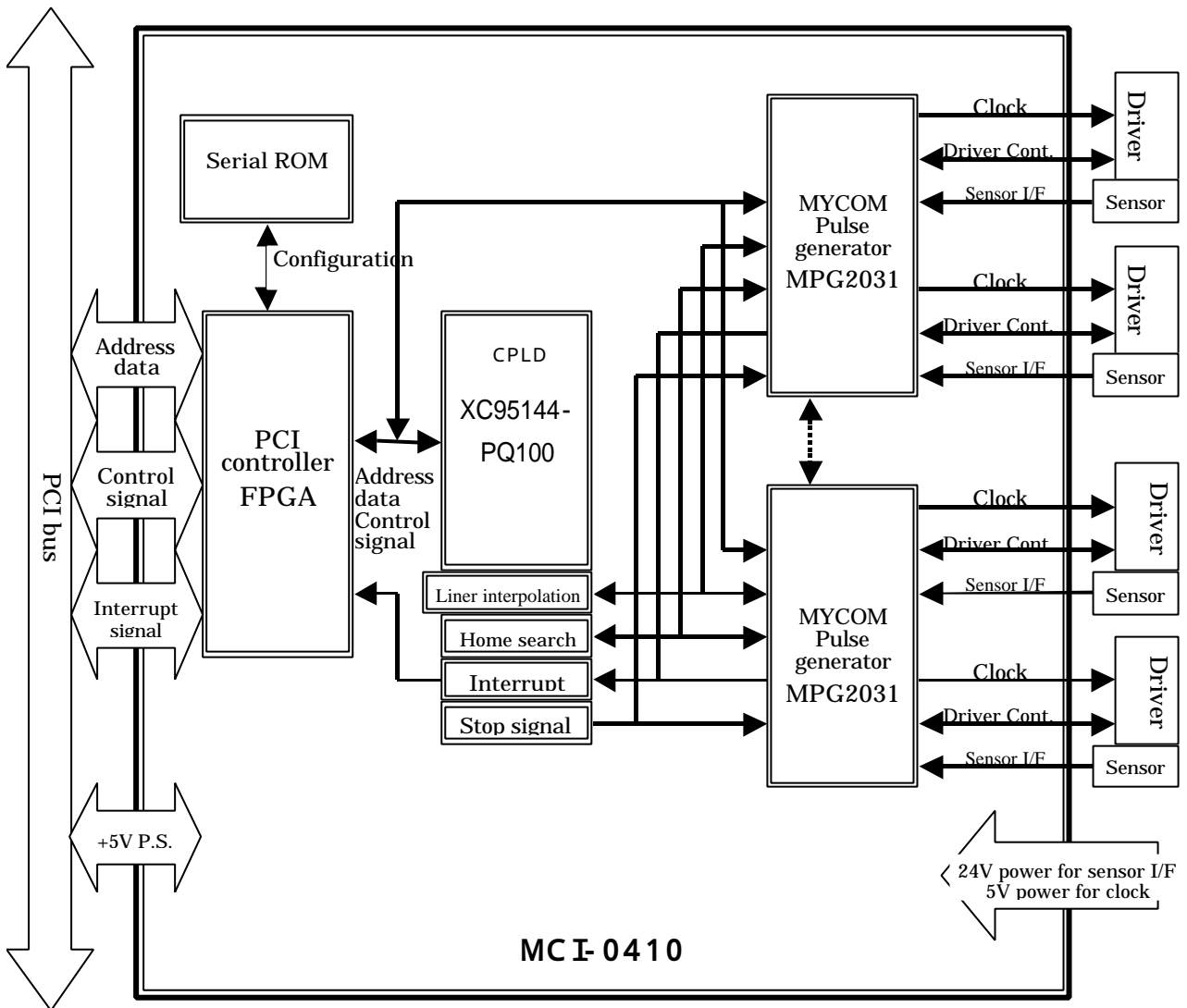
### 3. Configuration

The control system configuration using MCI-0410 is shown below.



**Fig. 3-1 System configuration**

The configuration of MCI-0410 is shown below.



**Fig. 3-2. Configuration of MCI-0410**

## 4. Specification

The specifications of MCI-0410 are shown below.

Item	Description	
Control system	Custom LSI MPG2031 Commands system	
Bus specification	PCI bus Vendor ID:1453H, Device ID:0004H, Revision ID:00H, ClassCode:050000H	
Number of axes controlled	Four axes (Named A, B, C and D)	
Applicable motors	Stepping motor and/or servo motor for positioning	
Standard clock	3.2768MHz.	
Output pulse rate	About 0.1 to about 1,638,400.0 Hz.	
Accel/decel slope	About 4.9 to 81,900,000.0 Hz./sec.	
Number of pulses set	0 to 16,777,215 pulses	
Output pulses	Output pulse format	1 pulse(clock) or 2 pulses(clock) setting
	Direction of CW clock	Forward or reverse set
	Output signal	Photocoupler output or line driver output setting
	Logic	Positive logic or negative logic set
Accel/decel system	Proportional accel/decel driving or liner accel/decel driving set	
Functions	Point to Point(PTP) positioning Liner interpolation positioning (possible to interpolate 2 to 4 axes) Home search (Z phase counting function, Deviation counter reset signal automatic output) Position interrupt function on the way of encoder input signal. Each axis can mix to set proportional accel/decel driving, triangle driving and trapezoidal driving	
Driver control output	Signal contents	Excitation OFF, Servo on/off and Deviation counter reset
	Output circuit	Photo coupler output
	Control capacity	10mA or less, Voltage resistance: 35V
Driver control input	Signal contents	Driver alarm and in-position. Logic can be set.
	Input circuit	Photo coupler input
	Control capacity	Maximum 10mA, External 24V power supply is used.
Encoder input	Signal contents	A/B/Z phases
	Input circuit	Photo coupler input (Line receiver can set)
	Control capacity	Maximum 10mA

Sensor input	Signal contents	Possible to set both ends overrun and Near home. Logic can be set.	
	Input circuit	Photo coupler input	
	Control capacity	Maximum 10mA, External 24V power supply is used.	
External input	Signal contents	External emergency stop (Logic can be set.), One general purpose input for each axis.	
	Input circuit	Photo coupler input	
	Control capacity	Maximum 10mA, External 24V power supply is used.	
Resources used by PC.	Memory space	64K byte(10000H) are occupied from base address which is assigned by PCI configuration.	
	Interrupt I/F	One of IRQ, which is assigned by PCI configuration, is used.	
	Board selection	Setting automatically by PCI configuration.	
Power supply	Bus logic power supply	DC+5V ± 5%	1.0A or less
	Sensor I/F power supply	DC+24V(External)	0.5A or less
	Driver control power supply	DC+5V(External)	0.5A or less
Dimension of PCB	174.63 x 106.68 x 20.0 mm		
Weight	About 130g		

**Table 4-1. List of specification**



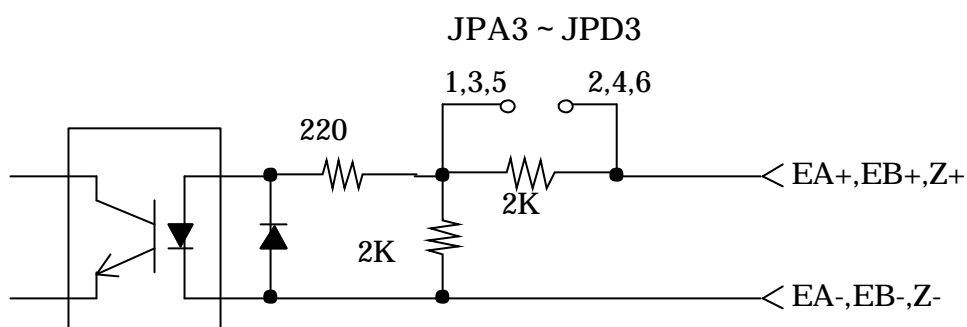


## 6.2 Jumper for encoder input setting

This sets encoder input as photo coupler input or line receiver input.

Axis name	Jumper name	Corresponding input terminal	Photo coupler setting	Line receiver setting
A axis	JPA 3	A phase input	Open between 1-2	Short between 1-2
		B phase input	Open between 3-4	Short between 3-4
		Z phase input	Open between 5-6	Short between 5-6
B axis	JPB 3	A phase input	Open between 1-2	Short between 1-2
		B phase input	Open between 3-4	Short between 3-4
		Z phase input	Open between 5-6	Short between 5-6
C axis	JPC 3	A phase input	Open between 1-2	Short between 1-2
		B phase input	Open between 3-4	Short between 3-4
		Z phase input	Open between 5-6	Short between 5-6
D axis	JPD 3	A phase input	Open between 1-2	Short between 1-2
		B phase input	Open between 3-4	Short between 3-4
		Z phase input	Open between 5-6	Short between 5-6

**Table 6-2. Encoder input setting**



**Fig. 6-2. Encoder input setting**

## 6.3 Interrupt setting jumper

This jumper sets use or no-use of interrupt signal.

Jumper name	Use interrupt	No-use interrupt
JP4	Open	Short

**Fig. 6-3. Interrupt setting**

## 7. Address map

The address map of this module is shown below.

A axis	B axis	C axis	D axis	MPG	Read out mode		Write in mode	
0000	1000	2000	3000		Accel/decel memory data		Accel/decel memory data	
0100	1100	2100	3100	00	Command 1		Command 1	
0101	1101	2101	3101	01	Command 2		Command 2	
0102	1102	2102	3102	02	Command 3		Command 3	
0103	1103	2103	3103	03	Status 1		Undefined	
0104	1104	2104	3104	04	Status 2		Undefined	
0105	1105	2105	3105	05	Status 3		Undefined	
0106	1106	2106	3106	06	Command 4		Command 4	
0107	1107	2107	3107	07	Command 5		Command 5	
010C	110C	210C	310C	0C	P register	Lower pos.	P register	Lower pos.
010D	110D	210D	310D	0D		Middle pos.		Middle pos.
010E	110E	210E	310E	0E		Upper pos.		Upper pos.
0114	1114	2114	3114	14	D register	Lower pos.	D register	Lower pos.
0115	1115	2115	3115	15		Middle pos.		Middle pos.
0116	1116	2116	3116	16		Upper pos.		Upper pos.
011C	111C	211C	311C	1C	A register	Lower pos.	A register	Lower pos.
011D	111D	211D	311D	1D		Middle pos.		Middle pos.
011E	111E	211E	311E	1E		Upper pos.		Upper pos.
0124	1124	2124	3124	24	S register	Lower pos.	S register	Lower pos.
0125	1125	2125	3125	25		Upper pos.		Upper pos.
0126	1126	2126	3126	26	M register	Lower pos.	M register	Lower pos.
0127	1127	2127	3127	27		Upper pos.		Upper pos.
012C	112C	212C	312C	2C	G1 register	Lower pos.	G1 register	Lower pos.
012D	112D	212D	312D	2D		Upper pos.		Upper pos.
012E	112E	212E	312E	2E	G2 register	Lower pos.	G2 register	Lower pos.
012F	112F	212F	312F	2F		Upper pos.		Upper pos.
0134	1134	2134	3134	34	C register	Lower pos.	C register	Lower pos.
0135	1135	2135	3135	35		Middle pos.		Middle pos.
0136	1136	2136	3136	36		Upper pos.		Upper pos.
013C	113C	213C	313C	3C	N register		N register	
0144	1144	2144	3144	44	O register	Lower pos.	O register	Lower pos.
0145	1145	2145	3145	45		Middle pos.		Middle pos.
0146	1146	2146	3146	46		Upper pos.		Upper pos.
014C	114C	214C	314C	4C	Encoder counter	Lower pos.	Encoder counter	Lower pos.
014D	114D	214D	314D	4D				
014E	114E	214E	314E	4E				
014F	114F	214F	314F	4F		Upper pos.		Upper pos.
0154	1154	2154	3154	54	The numbers of output pulses	Lower pos.	Undefined	
0155	1155	2155	3155	55		Middle pos.	Undefined	
0156	1156	2156	3156	56		Upper pos.	Undefined	
015C	115C	215C	315C	5C	Frequency monitor	Lower pos.	Undefined	
015D	115D	215D	315D	5D		Upper pos.	Undefined	

**Table 7-1. Address map (1)**

A axis	B axis	C axis	D axis	MPG	Read out mode		Write in mode	
0164	1164	2164	3164	64	EC command 1		EC command 1	
0165	1165	2165	3165	65	EC status		Undefined	
0166	1166	2166	3166	66	EC command 2		EC command 2	
016C	116C	216C	316C	6C	EP0 register	Lower pos.	EP0 register	Lower pos.
016D	116D	216D	316D	6D				
016E	116E	216E	316E	6E				
016F	116F	216F	316F	6F		Upper pos.		Upper pos.
0174	1174	2174	3174	74	EP1 register	Lower pos.	EP1 register	Lower pos.
0175	1175	2175	3175	75				
0176	1176	2176	3176	76				
0177	1177	2177	3177	77		Upper pos.		Upper pos.
017C	117C	217C	317C	7C	EP2 register	Lower pos.	EP2 register	Lower pos.
017D	117D	217D	317D	7D				
017E	117E	217E	317E	7E				
017F	117F	217F	317F	7F		Upper pos.		Upper pos.
4000H					A axis control register		A axis control register	
4001H					B axis control register		B axis control register	
4002H					C axis control register		C axis control register	
4003H					D axis control register		D axis control register	
4004H					Stop signal register		Stop signal register	
4005H					All axes common register		All axes common register	
4006H					Input register		Input register	
4007H					Interrupt factor register		Interrupt factor register	

**Table 7-2. Address map (2)**

## 7.1 Acceleration / Deceleration Memory Data

This indicates the leading address of proportional acceleration / deceleration memory. Please refer to the handling manual of MPG2031 for details.

## 7.2 A – D axis control register

This register sets Home search and Z phase logic and controls deviation counter reset output of each axis.

Bit	Name	Description	Default
D0	HOMECOUNT0	This sets the numbers of counter of Z phase (Home sensor) for home search sequence. The range of setting is 0 to 15. If the set value is 0, Home search is finished with ON of NEAR signal.	0
D1	HOMECOUNT1		0
D2	HOMECOUNT2		0
D3	HOMECOUNT3		0
D4	HOMERET	This is used when Home search sequence start.	0
D5	ZLOG	This sets the logic of Z phase signal	0
D6	CLR	This outputs the deviation counter reset signal.	0
D7	RSV	Not used	0

**Table 7-3. Register bit assignment of axis A to D**

### 1. HOMECOUNT0 to 3

This is used to stop at certain counted value by counting Z phase of home search sequence.

### 2. HOMERET

Set 1 when home search sequence starts.

After escaping home search sequence on the way, if home search sequence is started again, set this bit 0 once then set 1. Setting 0 initialize home search sequence circuit.

### 3. ZLOG

This sets the logic of Z phase signal.

Setting 0 is A connection input.

Setting 1 is B connection input.

**A**

### 4. CLR

Setting 0 turns the deviation counter reset signal off.

Setting 1 turns the deviation counter reset signal on.

### 7.3 Stop signal register

This outputs decelerated stop and emergency stop signal of each axis.

Bit	Name	Description	Default
D0	SSTP A	A axis decelerated stop command	0
D1	SSTP B	B axis decelerated stop command	0
D2	SSTP C	C axis decelerated stop command	0
D3	SSTP D	D axis decelerated stop command	0
D4	ES A	A axis emergency stop command	0
D5	ES B	B axis emergency stop command	0
D6	ES C	C axis emergency stop command	0
D7	ES D	D axis emergency stop command	0

**Table 7-4. Stop signal register assignment**

#### 1. SSTP

This outputs the decelerated stop signal to each axis.

If 1 is set, the decelerated stop starts.

#### 2. ES2

This outputs the emergency stop signal to each axis.

If 1 is set, the emergency stop starts.

### 7-4. All axes common register

There are sets concerning all axes control.

Bit	Name	Description	Default
D0	AXISSEL0	Setting 0 of main axis	0
D1	AXISSEL1	Setting 1 of main axis	0
D2	PAUSE	Synchronous start	0
D3	ESLOG	Logic setting of emergency stop	0
D4	INTEN	Interrupt permission	0
D5	RSV	Not used	0
D6	RSV	Not used	0
D7	RSV	Not used	0

**Table 7-5. All axes common register bit assignment**

#### 1. AXISSEL0 or 1

This register sets the main axis when linear interpolating. The combination is as below.

Main axis Bit	A axis	B axis	C axis	D axis
AXISSEL0	0	1	0	1
AXISSEL1	0	0	1	1

#### 2. PAUSE

This is synchronous start signal of multiple axes connected all axes.

This connects with PAUS terminal of MPG2031.

#### 3. ESLOG

This sets the logic of emergency stop signal of CN1.

Setting 0 is B connection input.

Setting 1 is A connection input.

#### 4. INTEN

This sets output permission or prohibition of interrupt signal to PCI bus.

Setting 0 does not issue the interrupt.

Setting 1 issues the interrupt.

#### 5. RSV

This bit is not used.

## 7.5 Input register

This register shows the status of general purpose input and Z phase input of each axis.

Bit	Name	Description
D0	IN A	General purpose input of A axis
D1	Z A	Z phase input of A axis
D2	IN B	General purpose input of B axis
D3	Z B	Z phase input of B axis
D4	IN C	General purpose input of C axis
D5	Z C	Z phase input of C axis
D6	IN D	General purpose input of D axis
D7	Z D	Z phase input of D axis

**Table 7-6. Input register bit assignment**

### 1. IN A to D

This bit shows the status of general purpose input of each axis of CN1.  
When the input is ON, 1 is shown.

### 2. Z A to D2

This bit shows the status of Z phase of each axis of CN1.  
HOME of status 1 of MPG2031 is changed into the signal for home search operation.  
Therefore confirm this bit to check the real time status of Z phase signal.

## 7.6 Interrupt factor register

This register shows the interrupt factor issued from each axis.

This bit is issued regardless of INTEN setting of all axes common register.

Bit	Name	Description
D0	INTERR A	Issued A axis INT or ERR interrupt
D1	ECP A	Issued A axis encoder interrupt
D2	INTERR B	Issued B axis INT or ERR interrupt
D3	ECP B	Issued B axis encoder interrupt
D4	INTERR C	Issued C axis INT or ERR interrupt
D5	ECP C	Issued C axis encoder interrupt
D6	INTERR D	Issued D axis INT or ERR interrupt
D7	ECP D	Issued D axis encoder interrupt

**Table 7-7. Interrupt factor register bit assignment**

### 1. INTER A to D

When this bit is 1, it shows that INT interrupt or ERR interrupt of each axis issued.  
It is possible to check whether it is INT interrupt or ERR interrupt by the status of MPG2031.

### 2. ECP A to D

When this bit is 1, it shows that encoder interrupt(ECZR,ECP0 ~ 2) of each axis issued.  
It is possible to check which interrupt issued by the status of MPG2031.

## 7.7 Register of MPG2031

The basic operation of MPG2031 is based on pulse count-up. There is no trouble if the user's manual of MPG2031 is referred.

Here, the setting which is set by hardware of MCI-0410 system is described.

### 7.7.1 MPG2031 command 2

OP0 and OP1 of command 2 of MPG2031 are connected with SERVO and CO outputs of CN1.

Bit	Name	Description
D0	ISRT	Reset of INT interrupt
D1	ERST	Reset of ERR interrupt
D2	CRST	0 clear of encoder counter
D3	HRST	0 clear of encoder counter by HOME terminal of MPG2031.
D4	OP0	SERVO output of CN1
D5	OP1	CO output of CN1
D6	F_M	Invalid ERR interrupt by forward overrun
D7	R_M	Invalid ERR interrupt by reverse overrun

**Table 7-8. Command 2 bit assignment**

### 7.7.2 MPG2031 status 1

HOME of status 1 of MPG2031 is not real time signal of Z phase signal of CN1 because HOME is inputted the signal converted by home search sequence circuit.

Bit	Name	Description
D0	MOVE	The pulse train is being outputted.
D1	UD0	Speed monitor
D2	UD1	Speed monitor
D3	NEAR	Near Home of CN1
D4	HOME	Z phase signal outputted from home search sequence circuit
D5	ERR	The error interrupt is generated.
D6	INT	Pulse output completion interrupt is generated.
D7	END	Normal ending by the set number of pulses counted up.

**Table 7-9. Status 1 bit assignment**

### 7.7.3 MPG2031 Command 4

Command 4 of MPG2031 sets the logic of each signal but in case of MCI-0410, set the as follows.

Bit	Name	Description
D0	LOG_NEAR	The logic of NEAR home is set up.(Setting 0 is A connection; 1 is B connection) If the home search sequence of MCI-0410 is used, set 0. If the home search is not used, any setting is available.
D1	LOG_HOME	Logic of Home is set Set 0 in case of MCI-0410.
D2	LOG_ALM	Logic of Alarm is set.(Setting 0 is A connection; 1 is B connection) Any setting is available in case of MCI-0410.
D3	LOG_ES	Logic of Emergency stop is set. Set 0 in case of MCI-0410.
D4	LOG_COF	Logic of Deviation counter over flow is set. Set 0 in case of MCI-0410.
D5	LOF_OV	Logic of Overrun is set. (Setting 0 is A connection; 1 is B connection) Any setting is available in case of MCI-0410.
D6	LOG_INPS	Logic of In-position is set. (Setting 0 is A connection; 1 is B connection) Any setting is available in case of MCI-0410.
D7	LOG_PLS	Logic of pulse output is set. (Setting 0 is A connection; 1 is B connection) Any setting is available in case of MCI-0410.

**Table 7-10. Command 4 bit assignment**

### 7.7.4 MPG2031 Command 5

Set ICP\_SEL of command 5 of MPG2031 as 0.

Bit	Name	Description
D0	SCW	Set up the direction of rotation
D1	GBM	Set up the pulse output type
D2	STP	Set up motor type
D3	ICP_SEL	Set up liner interpolation mode Set 0 in case of MCI-0410.
D4	NONE	Not used
D5	NONE	Not used
D6	NONE	Not used
D7	NONE	Not used

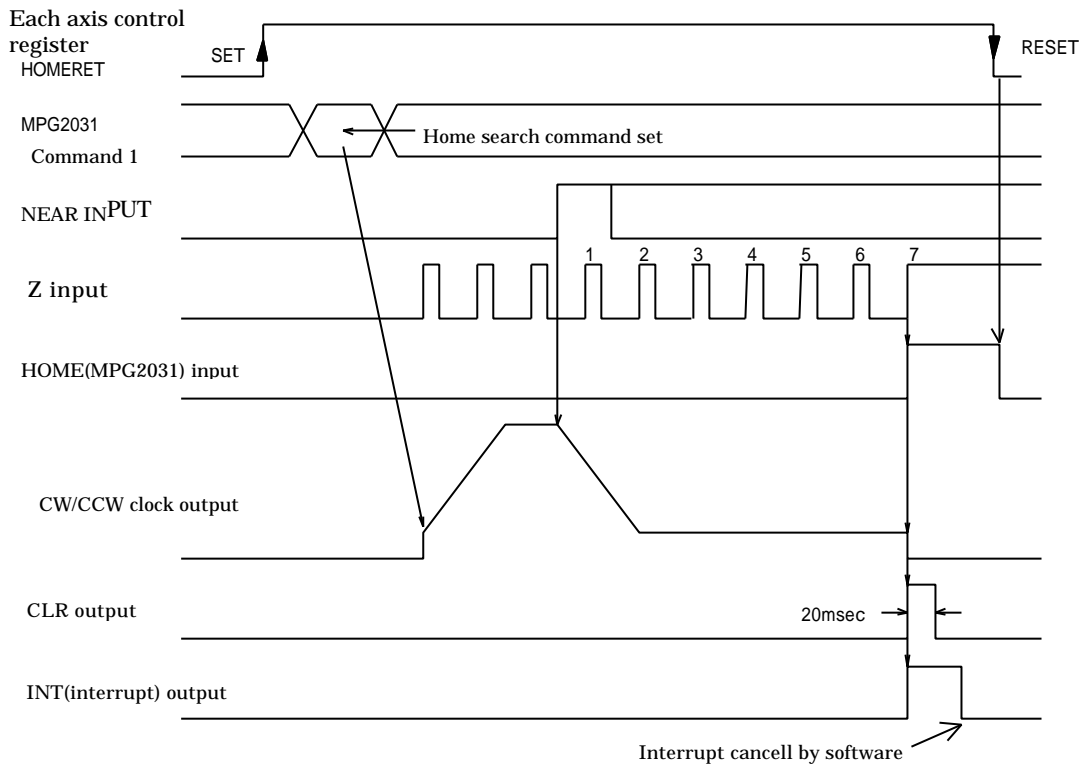
**Table 7-11. Command 5 bit assignment**

## 8. Description of function

### 8.1, Home search function

This module has the function that counts Z phase input when home searching, outputs HOME signal to MPG2031 when the counted value reaches preset value of count, and automatically output the deviation counter reset signal. The operation is described by sample.

“Sample setting”: HOMECOUNT=7(Z phase count is 7)



**Fig. 8-1. Home search sequence**

When HOMERET of each axis control register is 1, this hardware activates. Therefore if this bit keeps 1 and starts home search of MPG2031, normal operation is not guaranteed. Please pay attention carefully.

#### “Outline of movement”

The outline of movement concerning home search function is described as below.

When HOMERET signal is set, the counter value which is set at each control register is loaded into internal counter. Then after NEAR signal goes active, Z phase signal is counted until set counter value.

When the counter becomes set value, HOME signal outputs to MPG2031. At this time, CLR signal is outputted by one-shot for 20msec.

Also NEAR signal is operated by A connection in this home search function. Therefore set this signal logic with A connection without fail.

□B

## **8.2 Liner interpolation**

Set the axis which output most numbers of pulses as main axis at main axis setting in all axes common register.

In case that there are multiple main axes, select one axis of them.

Please refer the detailed description at the chapter of simple liner interpolation in MPG2031 user's manual

## 9. Connector

### 9.1 Bus connector

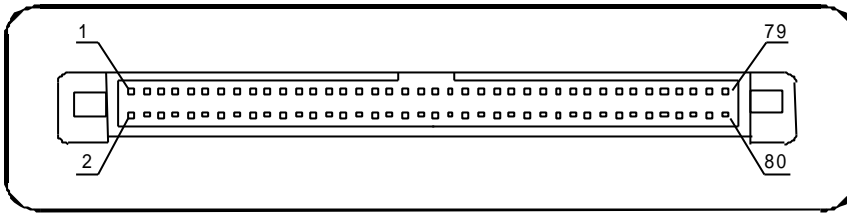
Pin #	Side B	Side A
1	-12V	TRST#
2	TCK	+12V
3	GND	TMS
4	TDO	TDI
5	+5V	+5V
6	+5V	INTA#
7	INTB#	INTC#
8	INTD#	+5V
9	PRSENT1#	-
10	-	+5V
11	PRSENT2#	-
12	GND	GND
13	GND	GND
14	-	-
15	GND	RST#
16	CLK	+5V
17	GND	GNT#
18	REQ#	GND
19	+5V	-
20	AD[31]	AD[30]
21	AD[29]	+3.3V
22	GND	AD[28]
23	AD[27]	AD[26]
24	AD[25]	GND
25	+3.3V	AD[24]
26	C/BE[3]#	IDSEL
27	AD[23]	+3.3V
28	GND	AD[22]
29	AD[21]	AD[20]
30	AD[19]	GND
31	+3.3V	AD[18]
32	AD[17]	AD[16]
33	C/BE[2]#	+3.3V
34	GND	FRAME#
35	INDY#	GND
36	+3.3V	TRDY#
37	DEVSEL#	GND
38	GND	STOP#
39	LOCK#	+3.3V
40	PERR#	SDONE
41	+3.3V	SBO#
42	SERR#	GND
43	+3.3V	PAR
44	C/BE[1]#	AD[15]
45	AD[14]	+3.3V
46	GND	AD[13]
47	AD[12]	AD[11]
48	AD[10]	GND
49	GND	AD[09]

Pin #	Side B	Side A
50		Keyway
51		Keyway
52	AD[08]	C/BE[0]
53	AD[07]	+3.3V
54	+3.3	AD[06]
55	AD[05]	AD[04]
56	AD[03]	GND
57	GND	AD[02]
58	AD[01]	AD[00]
59	+5V	+5V
60	ACK64#	REC64#
61	+5V	+5V
62	+5V	+5V
		Keyway
		Keyway
		Keyway
		Keyway
63	-	GND
64	GND	C/BE[7]#
65	C/BE[6]#	C/BE[5]#
66	C/BE[4]#	+5V
67	GND	PAR64
68	AD[63]	AD[62]
69	AD[61]	GND
70	+5V	AD[60]
71	AD[59]	AD[58]
72	AD[57]	GND
73	+5V	AD[56]
74	AD[55]	AD[54]
75	AD[53]	+5V
76	GND	AD[52]
77	AD[51]	AD[50]
78	AD[49]	GND
79	+5V	AD[48]
80	AD[47]	AD[46]
81	AD[45]	GND
82	GND	AD[44]
83	AD[43]	AD[42]
84	AD[41]	+5V
85	GND	AD[40]
86	AD[39]	AD[38]
87	AD[37]	GND
88	+5V	AD[36]
89	AD[35]	AD[34]
90	AD[33]	GND
91	GND	AD[32]
92	-	-
93	-	GND
94	GND	-

**Table 9-1. J1 Bus pin assignment**

## 9.2 CN1 Driver & Sensor I/O

Items	Model number	Brand	Reference
Right angle header	FCN-215Q080-G/0	Fujitsu	
Socket	FCN-217J080-G/0	Fujitsu	Accessory



**Fig. 9-1. CN1 connector**

Pin	Signal	Contents	I/O	Circuit
1	APCW+	A axis	Output	Circuit 1
3	ADCCW+			
5	ACO		Motor free	
7	ACLR		Reset	
9	AALM	Alarm	Input	Circuit 3
11	AFOR	Forward end		
13	AIN	General input	Input	Circuit 4
14	AEA+	A phase signal +		
16	AEB+	B phase signal +		
18	AZ+	Z phase signal +		
20	BPCW+	B axis	Output	Circuit 1
22	BDCCW+			
24	BCO		Motor free	
26	BCLR		Reset	
28	BALM	Alarm	Input	Circuit 3
30	BFOR	Forward end		
32	BIN	General input	Input	Circuit 4
33	BEA+	A phase signal +		
35	BEB+	B phase signal +		
37	BZ+	Z phase signal +		
39	CPCW+	C axis	Output	Circuit 1
41	CDCCW+			
43	CCO		Motor free	
45	CCLR		Reset	
47	CALM	Alarm	Input	Circuit 3
49	CFOR	Forward end		
51	CIN	General input	Input	Circuit 4
52	CEA+	A phase signal +		
54	CEB+	B phase signal +		
56	CZ+	Z phase signal +		
58	DPCW+	D axis	Output	Circuit 1
60	DDCCW+			
62	DCO		Motor free	
64	DCLR		Reset	
66	DALM	Alarm	Input	Circuit 3
68	DFOR	Forward end		
70	DIN	General input	Input	Circuit 4
71	DEA+	A phase signal +		
73	DEB+	B phase signal +		
75	DZ+	Z phase signal +		
77	ES	Emergency stop	In	Circuit 3
79	GND	Ground		
2	APCW-	A axis	Output	Circuit 1
4	ADCCW-			
6	ASERVO		Servo on / off	
8	AINP		In-position	
10	ANEAR	Near Home	Input	Circuit 3
12	AREV	Reverse end		
15	AEA-	A phase signal -	Input	Circuit 4
17	AEB-	B phase signal -		
19	AZ-	Z phase signal -		
21	BPCW-	CW pulse -		
23	BDCCW-	CCW pulse -	Output	Circuit 1
25	BSERVO	Servo on / off		
27	BINP	In-position	Input	Circuit 3
29	BNEAR	Near Home		
31	BREV	Reverse end	Input	Circuit 4
34	BEA-	A phase signal -		
36	BEB-	B phase signal -		
38	BZ-	Z phase signal -		
40	CPCW-	C axis	Output	Circuit 1
42	CDCCW-			
44	CSERVO		Servo on / off	
46	CINP		In-position	
48	CNEAR	Near Home	Input	Circuit 3
50	CREV	Reverse end		
53	CEA-	A phase signal -	Input	Circuit 4
55	CEB-	B phase signal -		
57	CZ-	Z phase signal -		
59	DPCW-	CW pulse -		
61	DDCCW-	CCW pulse -	Output	Circuit 1
63	DSERVO	Servo on / off		
65	DINP	In-position	Input	Circuit 3
67	DNEAR	Near Home		
69	DREV	Reverse end	Input	Circuit 4
72	DEA-	A phase signal -		
74	DEB-	B phase signal -		
76	DZ-	Z phase signal -		
78	GND	Ground		
80	GND	Ground		

**Table 9-2. CNI1 Pin assignment**

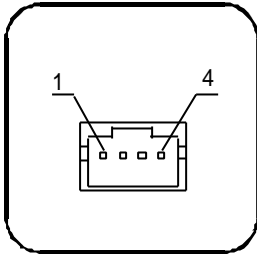
Signal of CN1 is described below.

Signal name	Description of Signal
PCW ± DCCW ±	These terminals are used to output pulses to the driver. The functions of signals differ according to the output modes of the pulses of MPG2031. PCW is either the pulse output or the CW pulse output. DCCW is either the direction output or CCW pulse output. PCW and DCCW connect to PCW and DCCW terminals of MPG2031. It is possible to switch the output circuit between the photocoupler output (Open collector) or the line driver output using the jumpers on the PCB.
CO	This is the motor free output (Current OFF) terminal for the motor driver. It is also possible to use this as a general purpose output port, since this does not depend on the hardware. It is possible to turn this ON/OFF using OP1 of command 2 of MPG2031. The photocoupler output goes ON when this terminal is set "1".
SERVO	This is the servo ON/OFF output terminal for the servo motor driver. It is possible to use this as general purpose output port, since this does not depend on the hardware. It is possible to turn this ON/OFF using OP0 of MPG2031. The photocoupler output goes ON when this terminal is set "1".
CLR	This is the deviation counter reset output terminal for the servo motor driver. It is not possible to use this as general purpose output port because this output is operated when home searching. One shot of 20ms. is output when home search is finished. This output terminal can be also switched ON/OFF by controlling CLR of each axis control register. The photocoupler output goes ON when "1" is set or when output of clearing of home search movement is outputted.
INP	This is the In Position input terminal for the servo motor driver. Its logic can be set using LOG_INPS of command 4 of MPG2031. When STP of command 5 of MPG2031 is set to the servo motor, if this signal is inputted, operation complete sequence commences. If the servo motor is set and if this input is not connected or if the logic is reversed, the operation will not be concluded and will hang-up. Be warned. This is connected to the STUP terminal of MPG2031.
ALM	This is the ALARM input terminal. It is normally connected to the ALARM output of the motor driver. Its logic can be set using LOG_ALM of command 4 of MPG2031. This is connected to the ALM terminal of MPG2031.
NEAR	This is the NEAR home sensor input terminal for the HOME Search. It is A-connection, Normal Open, signal. This is connected to the NEAR terminal of MPG2031.
FOR REV	These are the Overrun limit sensor input terminals of both ends. Its logic can be set using LOG_OV of command 4 of MPG2031. This is connected to the FOR/REV terminal of MPG2031.
IN	This is the general purpose input terminal. It is A-connection, Normal Open, signal. It is possible to use this as general purpose input port, since this does not depend on the hardware.
EA ± EB ±	These are the A/B phase input terminal of encoder. The input circuit is switchable to photocoupler input or line receiver input by the jumper on the board. This is connected to the EA/EB terminal of MPG2031.
Z ±	This is the Z phase input terminal for Home search. The input circuit is switchable to photocoupler input or line receiver input by the jumper on the board. The signal which is generated internally by internal circuit of this board when home search function is operated is connected to HOME terminal of MPG2031. Its logic can be set by ZLOG of each axis control register. Also set LOG_HOME of command 4 of MPG2031 to 0 of positive logic.
ES	This is the Emergency stop input terminal. This input works with all axes. Its logic can be selectable by ESLOG of all axes common register
GND	These are the GND input terminal for the externally supplied power supply or the GND output terminal for the input signal. GND of +5V and +24V are connected internally as explained later.

**Table 9-3. Detailed description of CN1 signal**

### 9.3 CN2 External power of Driver

Item	Model	Brand	Reference
4 poles housing	PHR-4	JST	Accessory
Contact	BPH-002T-P0.5S	JST	Accessory

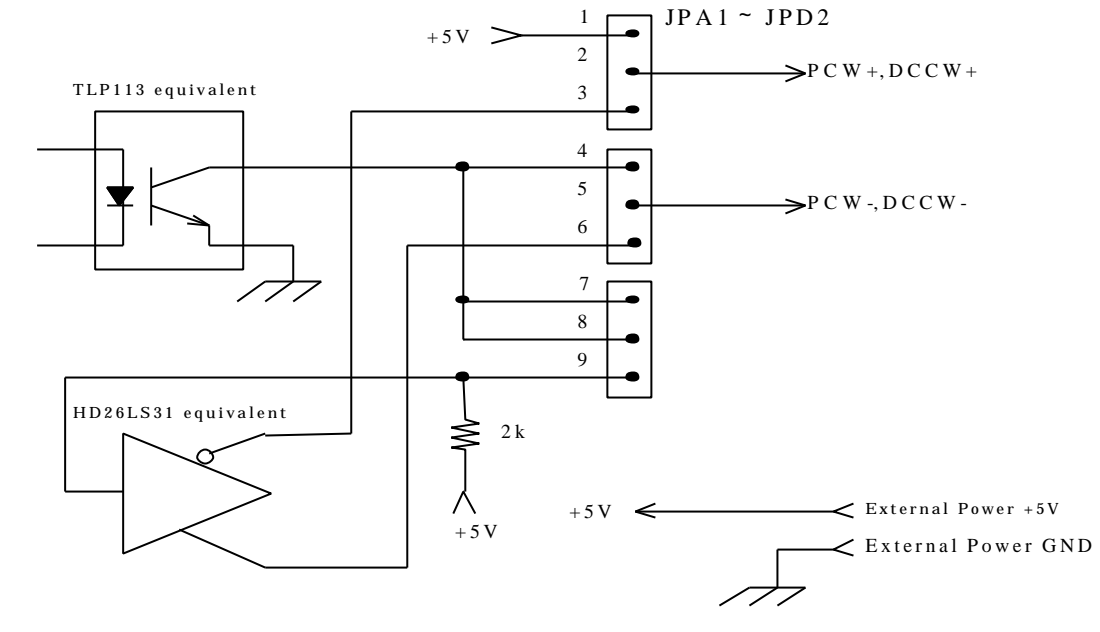


**Fig. 9-2. CN2 connector**

Pin #	Signal	Description	I/O
1 2	GND	This is the GND input terminal for the externally supplied power supply or the GND output terminal for the input signal.	Input
3	+24V	This is the +24V input terminal for the externally supplied power supply. It is used as power supply of sensor input.	
4	+5V	This is the +5V input terminal for the externally supplied power supply. It is used as power supply of clock output.	

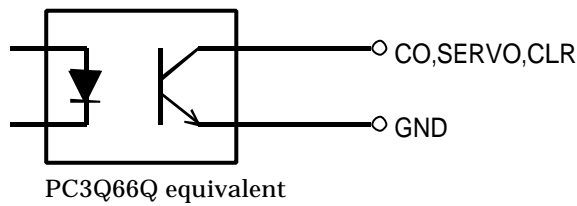
**Table 9-4. CN2 pin assignment**

## 9.4 Circuit

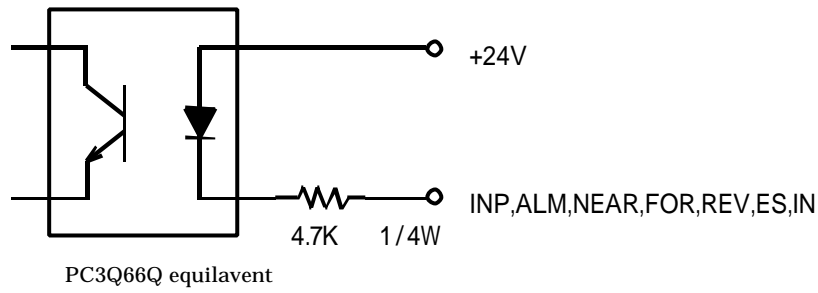


Photocopler(Open collector) output setting	Short between 1-2, 4-5 and 7-8
Line driver output setting	Short between 2-3, 5-6 and 8-9

**Fig. 9-3 Circuit 1**



**Fig. 9-4 Circuit 2**



**Fig 9-5 Circuit 3**

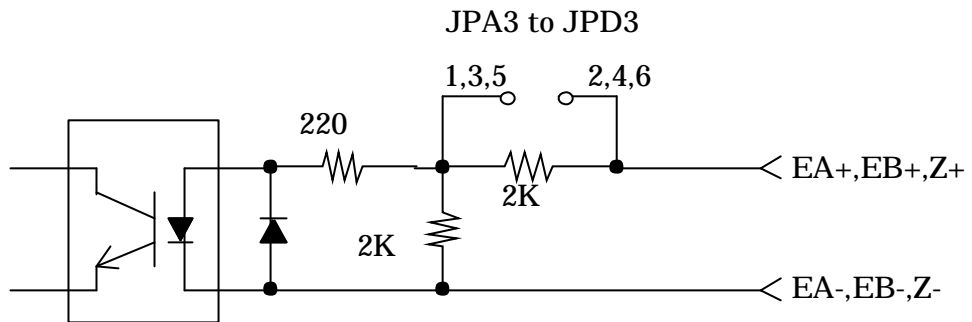


Photo coupler input setting	Open between 1-2, 3-4 and 5-6
Line receiver input setting	Short between 1-2, 3-4 and 5-6

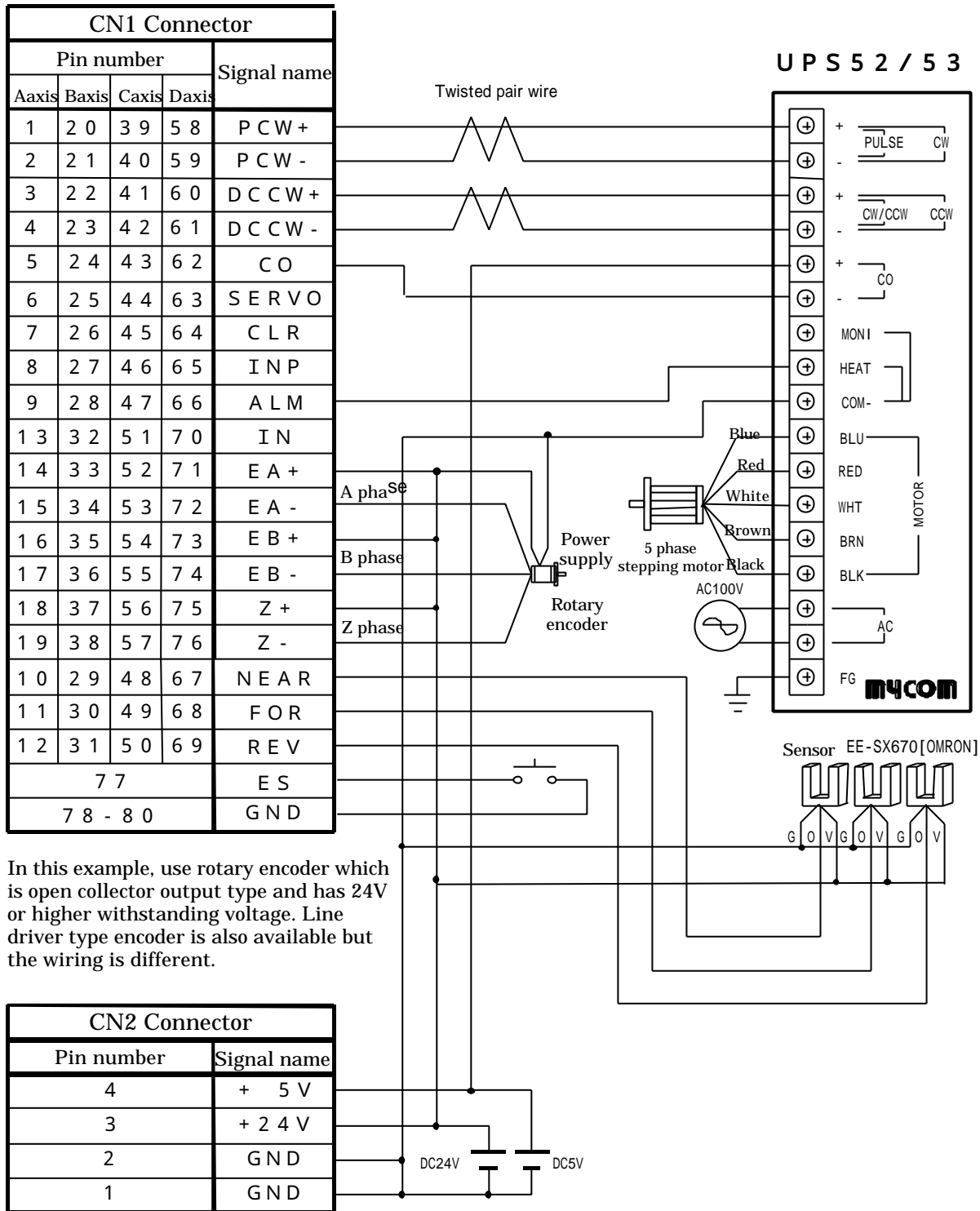
**Fig. 9-6 Circuit 4**

## 10. Wiring example

Item	Contents of setting		Setting
Set of encoder	Line receiver signal		
	Photo coupler signal		
Motor used	STP Command 5	Stepping motor	0
		Servo motor	1
Forward direction	SCW Command 5	CCW	0
		CW	1
Pulse output mode	GBM Command 5	2 pulses	0
		1 pulse	1
Pulse output logic	LOG_PLS Command 4	Positive logic	0
		Negative logic	1
Alarm input logic	LOG_ALM Command 4	A connection input	0
		B connection input	1
Overrun input logic	LOG_OV Command 4	A connection input	0
		B connection input	1
Z phase signal logic	ZLOG Output register 3 and 4	B connection input	0
		A connection input	1
Near Home logic	LOG_NEAR Command 4	A connection input	0
		B connection input	1
In-position logic	LOG_INPS Command 4	A connection input	0
		B connection input	1
Pulse output circuit	JP2 - 5	Photo coupler output	
		Line driver output	
Pulse output additional circuit	JP6 - 9	Photo coupler output	
		Line driver output	
Encoder input type	JP10 - 13	External input EA	External input EB
		External input EB	External input EA
		External output PCW	External output DCCW
		External output DCCW	External output PCW

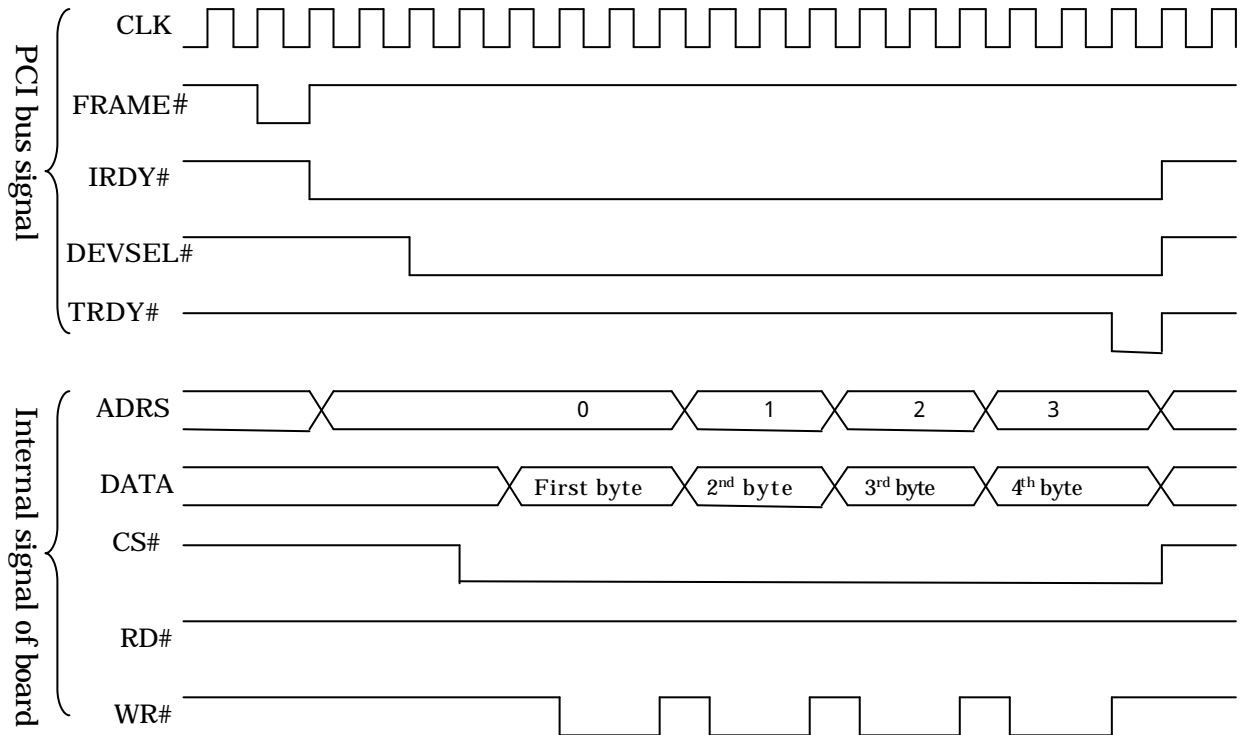
**Table 10-1 Setting of this module**

- : Set without fail
- : Set depending on system
- × : Unnecessary setting

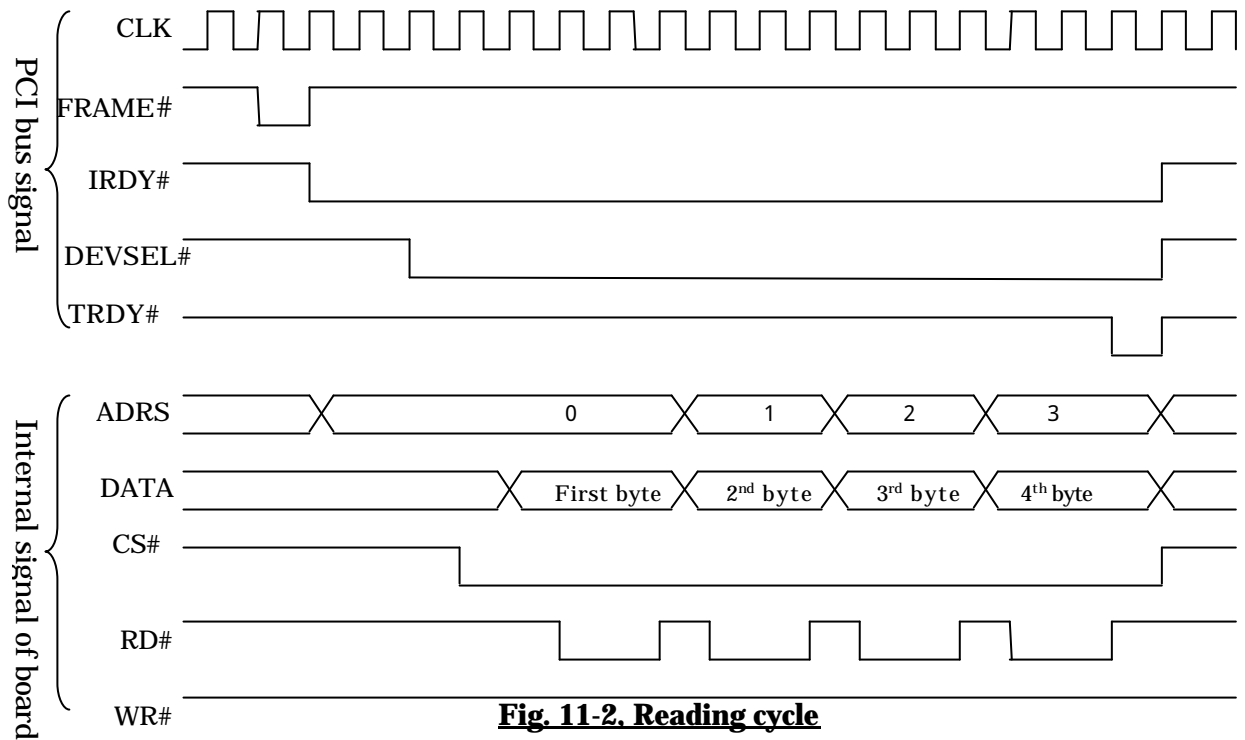


**Fig. 10-1. UPS52/53 wiring example**

# 11. Timing



**Fig. 11-1 Writing cycle**

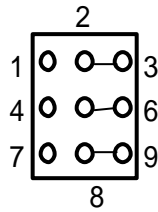


**Fig. 11-2. Reading cycle**

## 12. Factory default setting

A

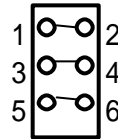
Pulse output circuit setting



Jumper name	Factory default	Description
JPA1	Short between 2-3, 5-6 and 8-9	A axis PCW is line driver output
JPA2	Short between 2-3, 5-6 and 8-9	A axis DCCW is line driver output
JPB1	Short between 2-3, 5-6 and 8-9	B axis PCW is line driver output
JPB2	Short between 2-3, 5-6 and 8-9	B axis PCW is line driver output
JPC1	Short between 2-3, 5-6 and 8-9	C axis PCW is line driver output
JPC2	Short between 2-3, 5-6 and 8-9	C axis DCCW is line driver output
JPD1	Short between 2-3, 5-6 and 8-9	D axis PCW is line driver output
JPD2	Short between 2-3, 5-6 and 8-9	D axis DCCW is line driver output

**Table 12-1, Factory default of JPA to JPD2**

Encoder input circuit setting



Jumper name	Factory default	Description
JPA3	Short between 1-2, 3-4, 5-6	A axis A, B and Z phase is line receiver input
JPB3	Short between 1-2, 3-4, 5-6	B axis A, B and Z phase is line receiver input
JPC3	Short between 1-2, 3-4, 5-6	C axis A, B and Z phase is line receiver input
JPD3	Short between 1-2, 3-4, 5-6	D axis A, B and Z phase is line receiver input

**Table 12-2, Factory default of JPA3 to JPD3**

Interrupt setting

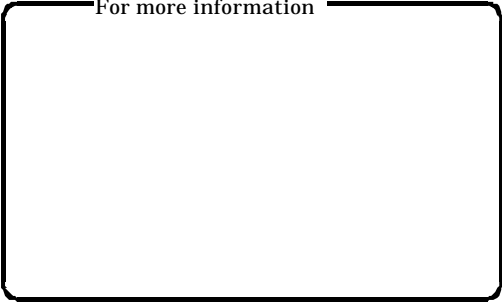


Jumper name	Factory default	Description
JP4	Open	Interrupt use

**Table 12-3, Factory default of JP4**

Please understand that we may make modifications to our products without notification in order to improve the capabilities and external appearance of our products.

For more information



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