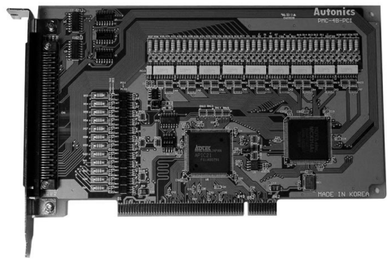
Autonics

Programmable Motion Controller
PMC-4B-PCI

INSTRUCTION MANUAL



Thank you for choosing our Autonics product.
Please read the following safety considerations before use.

▣ Safety Considerations

※Please observe all safety considerations for safe and proper product operation to avoid hazards.
※⚠ symbol represents caution due to special circumstances in which hazards may occur.

⚠ Warning Failure to follow these instructions may result in serious injury or death.
⚠ Caution Failure to follow these instructions may result in personal injury or product damage.

⚠ Warning

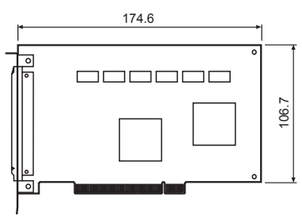
1. **Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss. (e.g. nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime/disaster prevention devices, etc.)**
   Failure to follow this instruction may result in fire, personal injury, or economic loss.
2. **Do not connect, repair, or inspect the unit while connected to a power source.**
   Failure to follow this instruction may result in fire.
3. **Check 'Connections' before wiring.**
   Failure to follow this instruction may result in fire.
4. **Do not disassemble or modify the unit.**
   Failure to follow this instruction may result in fire.
5. **Do not cut off power or disconnect connectors while operating the unit.**
   Failure to follow this instruction may result in personal injury, economic loss, or malfunction.
6. **Install the safety device at the out of the controller for stable system operation against external power error, controller malfunction, etc.**
   Failure to follow this instruction may result in fire, personal injury, or economic loss.
7. **Mount this unit on the PCI bus connector.**
   Failure to follow this instruction may result in fire, personal injury, or product damage.

⚠ Caution

1. **Use the unit within the rated specifications.**
   Failure to follow this instruction may result in fire or product damage.
2. **Use dry cloth to clean the unit, and do not use water or organic solvent.**
   Failure to follow this instruction may result in fire.
3. **Do not use the unit in the place where flammable/explosive/corrosive gas, humidity, direct sunlight, radiant heat, vibration, impact, or salinity may be present.**
   Failure to follow this instruction may result in fire or explosion.
4. **Keep metal chip, dust, and wire residue from flowing into the unit.**
   Failure to follow this instruction may result in fire or product damage.
5. **If a ribbon cable is used as the I/O line, connect the cable correctly and prevent from poor contact.**
   Failure to follow this instruction may result in malfunction.
6. **Note that this device is KCC certified for commercial use.**
   Make proper applications for the product.

▣ Dimensions

(unit: mm)



※**The above specifications are subject to change and some models may be discontinued without notice.**
※**Be sure to follow cautions written in the instruction manual, user manual and the technical descriptions (catalog, homepage).**

▣ Specifications

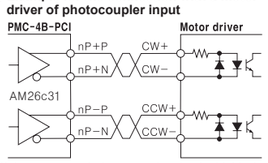
Model		PMC-4B-PCI
Control axis		4-axis
Power supply		5VDC⎓ (uses PC inner power)
External power supply		12-24VDC⎓
Allowable voltage range		90 to 110% of rated voltage
CPU data bus		8/16-bit selectable
2/3-axis linear interpolation	Range	-2,147,483,648 to 2,147,483,647 for each axis
	Speed	1pps to 4Mpps
	Position accuracy	Max. ±0.5 LBS (within all interpolation range)
Circular interpolation	Range	-2,147,483,648 to 2,147,483,647 for each axis
	Speed	1pps to 4Mpps
	Position accuracy	Max. ±1 LBS (within all interpolation range)
2/3-axis bit pattern interpolation speed		1pps to 4Mpps (depends on CPU data setup time)
Other interpolations		Selectable the axis, constant linear velocity, consecutive interpolation, interpolation step transmission (command, external signal)
Drive pulse output (X, Y-axis common specifications)		Output circuit range: 1pps to 4Mpps
		Output speed accuracy: max. ±0.1% (for setting value)
		Speed magnification: 1 to 500
		S jerk speed: 954 to 62.5×10⁶pps/sec (mag.=1) (accel/decel increase rate) 477×10³ to 31.25×10⁹pps/sec (mag.=500)
		Accel/Decel: 125 to 1×10⁶ pps/sec (mag.=1) 62.5×10³ to 500×10⁶pps/sec (mag.=500)
		Initial velocity: 1 to 8,000pps (mag.=1) / 500 to 4×10⁶pps (mag.=500)
		Drive speed: 1 to 8,000pps (mag.=1) / 500 to 4×10⁶pps (mag.=500)
		Number of output pulses: 0 to 4,294,967,295 (fixed pulse drive)
		Speed curve: Constant speed, Symmetric/Asymmetric linear accel/decel, Parabola S curve drive
		Fixed pulse drive deceleration mode auto deceleration (asymmetric linear accel/decel function) / manual deceleration
		Changeable output pulse for driving, drive speed
		Selectable individual 2-pulse/1-pulse direction method
		Selectable drive pulse logic level, changeable output terminal
Encoder input pulse		Inputable 2-phase pulse/Up-Down pulse, Selectable 2-phase pulse 1/2/4 multiply
Position counter		Logical position counter (for output pulse) count range : -2,147,483,648 to +2,147,483,647 Actual position counter (for input pulse) count range : -2,147,483,648 to +2,147,483,647
Compare register		Comp. +register position comparison range: -2,147,483,648 to +2,147,483,647
		Comp. -register position comparison range: -2,147,483,648 to +2,147,483,647
		Output/Signal output when the present value of the counter and the user position counter are same by comparing
		Enables to operate as software limit
Auto home search		High speed near home search (step1) → Low speed near home search (step2)
Interrupt function (except interpolation)		1 drive pulse output when changing position counter ≥ Comp.-, when changing position counter ≥ Comp.+, when changing position counter < Comp.-, when changing position counter < Comp.+, when starting constant speed in accel/decel drive, when ending constant speed in accel/decel drive when ending drive, when ending auto home search, when running synchronous operation
Drive adjustment by external signal		Enable to fixed/continuous pulse drive of +/- direction by EXP+/EXP- signal
		Enable to drive 2-phase encoder signal mode (encoder input)
External deceleration stop/ immediate stop signal		IN 0 to 3 each axis 4-point
		Selectable signal valid/invalid and logical level, usable as general input
Input signal for servo motor		Selectable alarm, INPOS signal valid/invalid and logic level
General output signal		OUT 4 to 7 each axis 4-point (uses same terminal with drive status output signal)
Drive status signal output		ASND (accelerating), DSND (decelerating)
Overrun limit signal input		Selectable + direction, - direction each 1-point and logic level
		At active, selectable immediate stop/decelerate stop
Emergency stop signal input		EMG 1-point, stops drive pulse of all axes by low level
Integral filter		Built-in integral filter at each input signal input terminal, selectable pass time (8 types)
Others		Selectable the axis, constant linear velocity, consecutive interpolation, interpolation step transmission (command, external signal)
Environment	Ambient temp.	0 to 45℃, storage: -10 to 55℃
	Ambient humi.	35 to 85%RH, storage: 35 to 85%RH
Approval		CE KC
Weight※1		Approx. 654.4g (approx. 100.4g)

※1: The weight includes packaging. The weight in parenthesis is for unit only.
※Environment resistance is rated at no freezing of condensation.

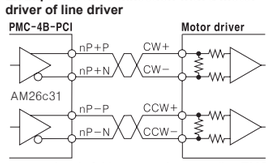
▣ Connections

◎ **Connection of pulse output signal (nP+P/N, nP-P/N)**
Drive pulse output generates drive pulse signal of +/- direction using line driver (AM26c31) of differential output. Followings are examples of connection with motor drivers with photocoupler or line driver input.

● **Example for the connection with a motor driver of photocoupler input**

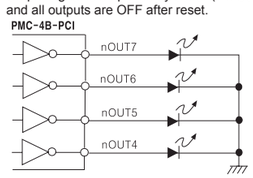


● **Example for the connection with a motor driver of line driver**

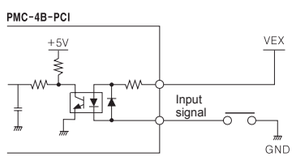


※It is recommended to use twisted pair shield wire for pulse output signal of driver operation regarding EMC.

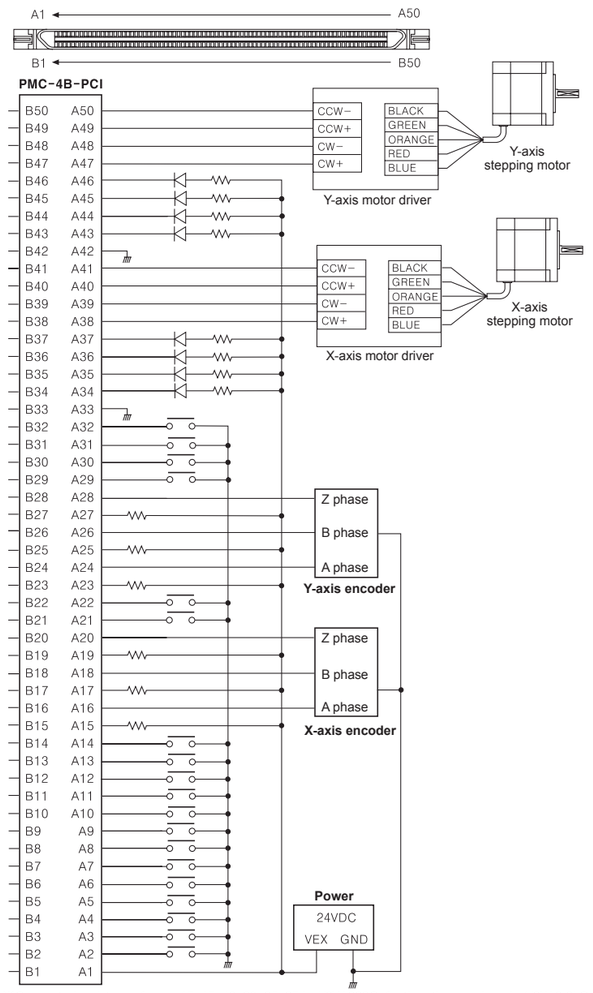
◎ **Connection of common output signal (nOUT4 to 7)**
Output signal is outputted by buffer (74LS06), and all outputs are OFF after reset.



◎ **Connection of input signal (nIN1 to 3, nINPOS, nALRAM, nEXP+/-, EMG)**



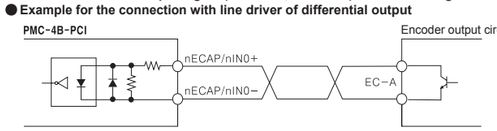
▣ I/O Connection



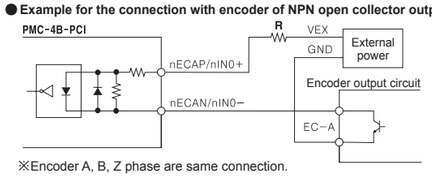
※Connected resistance for no. 15, 17, 19, 23, 25, 27 is 1/2W 220Ω, for the other numbers is 1/2W 3.3kΩ.
※Use NPN open collector output (+12VDC) for encoder.
※Only axis A 50pins are shown on the figure. Other 50 pins of axis B are having same connection. However, No. 2 of axis B is not for use.

◎ **Connection of encoder input signal (nECAP/N, nECBP/N) and nINO+/- signal**

● **Example for the connection with line driver of differential output**



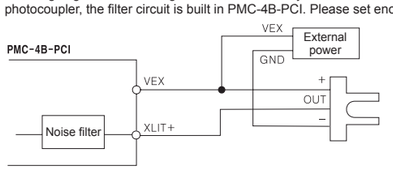
● **Example for the connection with encoder of NPN open collector output**



External voltage	Resistance (R)
5V	0
12V	820Ω 1/4W
24V	2kΩ 1W

※Encoder A, B, Z phase are same connection.

◎ **Connection of limit input signal (nLMIT+/-)**
The outgoing cable of limit signal can be affected by noise. Since it can not be removed only with photocoupler, the filter circuit is built in PMC-4B-PCI. Please set enough passing time(FL=2, 3).



▣ I/O Specifications

Pin no.	Signal	Description	Pin no.	Signal	Pin description
A1	VEX	12-24VDC	B1	VEX	12-24VDC
A2	EMG	Emergency stop (4-axis stop)	B2	—	Not used
A3	XLMIT+	X-axis + direction limit	B3	ZLMIT+	Z-axis + direction limit
A4	XLMIT-	X-axis - direction limit	B4	ZLMIT-	Z-axis – direction limit
A5	XIN1	X-axis input signal (home signal)	B5	ZIN1	Z-axis input signal (home signal)
A6	XIN0	X-axis input signal (near home signal)	B6	ZIN0	Z-axis input signal (near home signal)
A7	XIN3	X-axis input signal (Encoder Z phase signal)	B7	ZIN3	Z-axis input signal (Encoder Z phase signal)
A8	YLMIT+	Y-axis + direction limit	B8	ULMIT+	U-axis +direction limit
A9	YLMIT-	Y-axis - direction limit	B9	ULMIT-	U-axis -direction limit
A10	YIN1	Y-axis input signal (home signal)	B10	UIN1	U-axis input signal (home signal)
A11	YIN0	Y-axis input signal (near home signal)	B11	UIN0	U-axis input signal (near home signal)
A12	YIN3	Y-axis input signal (Encoder Z phase signal)	B12	UIN3	U-axis input signal (Encoder Z phase signal)
A13	XINPOS	X-axis inposition input	B13	ZINPOS	Z-axis inposition input
A14	XALRAM	X-axis alarm input	B14	ZALRAM	Z-axis alarm input
A15	XECAP	X-axis Encoder A phase+	B15	ZECAP	Z-axis Encoder A phase+
A16	XECAN	X-axis Encoder A phase-	B16	ZECAN	Z-axis Encoder A phase-
A17	XECBP	X-axis Encoder B phase+	B17	ZECBP	Z-axis Encoder B phase+
A18	XECBN	X-axis Encoder B phase-	B18	ZECBN	Z-axis Encoder B phase-
A19	XECZP	X-axis Encoder Z phase+	B19	ZECZP	Z-axis Encoder Z phase+
A20	XECZN	X-axis Encoder Z phase-	B20	ZECZN	Z-axis Encoder Z phase-
A21	YINPOS	Y-axis inposition input	B21	UINPOS	U-axis inposition input
A22	YALARM	Y-axis alarm input	B22	UALARM	U-axis alarm input
A23	YECAP	Y-axis Encoder A phase+	B23	UECAP	U-axis Encoder A phase+
A24	YECAN	Y-axis Encoder A phase-	B24	UECAN	U-axis Encoder A phase-
A25	YECBP	Y-axis Encoder B phase+	B25	UECBP	U-axis Encoder B phase+
A26	YECBN	Y-axis Encoder B phase-	B26	UECBN	U-axis Encoder B phase-
A27	YECZP	Y-axis Encoder Z phase+	B27	UECZP	U-axis Encoder Z phase+
A28	YECZN	Y-axis Encoder Z phase-	B28	UECZN	U-axis Encoder Z phase-
A29	XEXP+	X-axis manual + drive	B29	ZEXP+	Z-axis manual + drive
A30	XEXP-	X-axis manual - drive	B30	ZEXP-	Z-axis manual - drive
A31	YEXP+	Y-axis manual + drive	B31	UEXP+	U-axis manual + drive
A32	YEXP-	Y-axis manual - drive	B32	UEXP-	U-axis manual - drive
A33	GND	GND	B33	GND	GND
A34	XOUT4/ CMPP	X-axis general output	B34	ZOUT4/ CMPP	Z-axis general output
A35	XOUT5/ CMPM	X-axis general output	B35	ZOUT5/ CMPM	Z-axis general output
A36	XOUT6/ ASND	X-axis general output	B36	ZOUT6/ ASND	Z-axis general output
A37	XOUT7/ DSND	X-axis general output	B37	ZOUT7/ DSND	Z-axis general output
A38	XP+P	X-axis +direction +drive signal output	B38	ZP+P	Z-axis +direction +drive signal output
A39	XP+N	X-axis +direction -drive signal output	B39	ZP+N	Z-axis +direction -drive signal output
A40	XP-P	X-axis -direction +drive signal output	B40	ZP-P	Z-axis -direction +drive signal output
A41	XP-N	X-axis -direction -drive signal output	B41	ZP-N	Z-axis -direction -drive signal output
A42	GND	GND	B42	GND	GND
A43	YOUT4/ CMPP	Y-axis general output	B43	UOUT4/ CMPP	U-axis general output
A44	YOUT5/ CMPM	Y-axis general output	B44	UOUT5/ CMPM	U-axis general output
A45	YOUT6/ ASND	Y-axis general output	B45	UOUT6/ ASND	U-axis general output
A46	YOUT7/ DSND	Y-axis general output	B46	UOUT7/ DSND	U-axis general output
A47	YP+P	Y-axis +direction +drive signal output	B47	UP+P	U-axis +direction +drive signal output
A48	YP+N	Y-axis +direction -drive signal output	B48	UP+N	U-axis +direction -drive signal output
A49	YP-P	Y-axis -direction +drive signal output	B49	UP-P	U-axis -direction +drive signal output
A50	YP-N	Y-axis -direction -drive signal output	B50	UP-N	U-axis -direction -drive signal output

▣ Manual and Software

For the detail information and instructions, please refer to user manual and be sure to follow cautions written in the technical descriptions (catalog, homepage).
Visit our homepage (www.autonics.com) to download manuals and software.

▣ Cautions during Use

1. Follow instructions in 'Cautions during Use'.
   Otherwise, It may cause unexpected accidents.
2. 12-24VDC power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.
3. Install a power switch or circuit breaker in the easily accessible place for supplying or disconnecting the power.
4. Wire as short as possible and keep away from high voltage lines or power lines, to prevent inductive noise.
5. Run the unit after proper parameter settings depending on the load and environment.
6. This unit may be used in the following environments.
   ①Indoors (in the environment condition rated in 'Specifications')
   ②Altitude max. 2,000m
   ③Pollution degree 2
   ④Installation category II

▣ Major Products

■ Photoelectric Sensors
■ Fiber Optic Sensors
■ Door Sensors
■ Door Side Sensors
■ Area Sensors
■ Proximity Sensors
■ Pressure Sensors
■ Rotary Encoders
■ Connector/Sockets
■ Switching Mode Power Supplies
■ Control Switches/Lamps/Buzzers
■ I/O Terminal Blocks & Cables
■ Stepper Motors/Drivers/Motion Controllers
■ Graphic/Logic Panels
■ Field Network Devices
■ Laser Marking System (Fiber, CO_2, Nd: YAG)
■ Laser Welding/Cutting System
■ Temperature Controllers
■ Temperature/Humidity Transducers
■ SSRs/Power Controllers
■ Counters
■ Timers
■ Panel Meters
■ Tachometer/Pulse (Rate) Meters
■ Display Units
■ Sensor Controllers

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