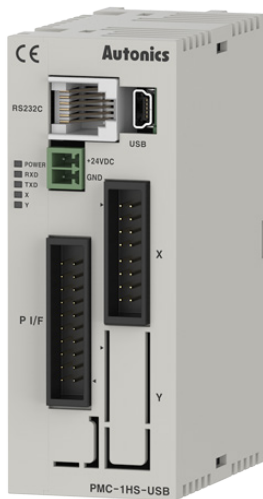# 1 axis / 2 axis
Motion Controller

PMC-1HS / PMC-2HS Series
PRODUCT MANUAL

For your safety, read and follow the considerations written in the instruction manual, other manuals and Autonics website.
The specifications, dimensions, etc. are subject to change without notice for product improvement. Some models may be discontinued without notice.

Features

- High-speed processing up to 4 Mpps
- 4 operation modes : Scan mode, Continuous mode, Index mode, Program mode
- 12 control commands and up to 64 steps of programming per axis
- Parallel interface input/output terminal to communicate with various PLCs
- Operation programming, parameter configuration and editing with dedicated software
- Joystick signal support for convenient XY stage control
- Remote controlling possible with serial port (RS232C) on all models
- Teaching and monitoring with Teaching Unit (PMC-2TU-232)

Safety Considerations

- Observe all 'Safety Considerations' for safe and proper operation to avoid hazards.
- ⚠ symbol indicates caution due to special circumstances in which hazards may occur.

⚠ **Warning** Failure to follow instructions may result in serious injury or death.

01. **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 personal injury, economic loss or fire.
02. **Do not use the unit in the place where flammable / explosive / corrosive gas, high humidity, direct sunlight, radiant heat, vibration, impact or salinity may be present.**
Failure to follow this instruction may result in explosion or fire.
03. **Install on a device panel or DIN rail to use.**
Failure to follow this instruction may result in fire.
04. **Do not connect, repair, or inspect the unit while connected to a power source.**
Failure to follow this instruction may result in fire.
05. **Check 'Connections' before wiring.**
Failure to follow this instruction may result in fire.
06. **Do not disassemble or modify the unit.**
Failure to follow this instruction may result in fire.
07. **Do not cut off power or disconnect connectors while operating the unit.**
Failure to follow this instruction may result in personal injury or economic loss.
08. **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 personal injury or economic loss.

⚠ **Caution** Failure to follow instructions may result in injury or product damage.

01. **When connecting the power input, use AWG 28 - 16 (0.081 to 1.31mm^2) cable or over.**
02. **Must use the insulated trans at the power input.**
Failure to follow this instruction may result in personal injury or fire.
03. **Use the unit within the rated specifications.**
Failure to follow this instruction may result in fire or product damage.
04. **Use a dry cloth to clean the unit, and do not use water or organic solvent.**
Failure to follow this instruction may result in fire.
05. **Keep the product away from metal chip, dust, and wire residue which flow into the unit.**
Failure to follow this instruction may result in fire or product damage.
06. **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.
07. **Note that this device is KCC certified for commercial use. Make proper applications for the product.**

Cautions during Use

- Follow instructions in 'Cautions during Use'.
Otherwise, it may cause unexpected accidents.
- Power supply should be insulated and limited voltage/current or Class2, SELV power supply device.
- Install a power switch or circuit breaker in the easily accessible place for supplying or disconnecting the power.
- Wire as short as possible and keep away from high voltage lines or power lines, to prevent inductive noise.
- Run the unit after setting parameter with proper value depending on the load and environment.
- Make sure that Power On function is set to ON in atMotion program before supplying the power to the unit.

- Keep the distance between power cable and signal cable over 10 cm.
- It is recommended to use twisted pair shield wire when connecting cables to CN3, 4, 5 connectors.
  Ground the shield wires depending on the installation environment.
- It is recommended to use the communication cables provided with the product.
  (RS232C, USB)
- When wiring the RS485 cable, twist pair wire is recommended, and use AWG 24 (0.2mm^2) cable or over.
- This unit may be used in the following environments.
  - Indoors (in the environment condition rated in 'Specifications')
  - Altitude max. 2,000 m
  - Pollution degree 2
  - Installation category II

Software

Download the installation file and the manuals from the Autonics website.

■ atMotion

The program allows to manage the motor driver's parameter setting and monitoring data.

Ordering Information

This is only for reference, the actual product does not support all combinations..
For selecting the specified model, follow the Autonics website.

| PMC | - | ❶ | - | ❷ |

❶ Axis / Type
1HS: 1 axis high speed stand alone
2HS: 2 axis high speed stand alone

❷ Communication type
232: RS232C
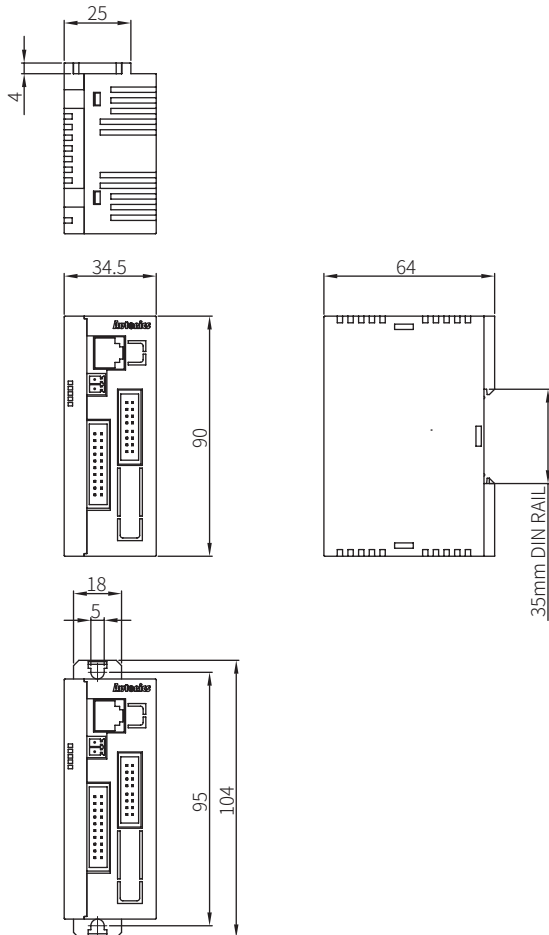USB: USB / RS232C

Product Components

- Product
- User manual
- CD
- D-Sub cable
- Power connector
- I/O connector (P I/F, X axis, Y axis)
- RS232C comm. cable 1.5 m
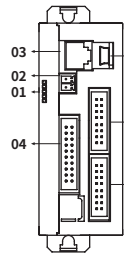- USB comm. cable 1 m (PMC-☐-USB Series)

Sold Separately

- Teaching unit (PCM-2TU-232)

Dimensions

- Unit: mm, For the detailed drawings, follow the Autonics website.

Unit Descriptions

01.	**Power / Status indicator**
02.	**Power connector (CN1)**
03.	**RS232C comm. connector (CN2)**
04.	**Parallel I/F connector (CN3)**
05.	**X axis I/O connector (CN4)**
06.	**Y axis I/O connector (CN5)** [01]
07.	**USB comm. connector (CN6)** [02]

01) The corresponding connector is only available on PMC-2HS-☐.
02) The corresponding connector is only available on PMC-☐-USB.

Connectors

■ CN1: Power connector

Pin	Function
1	24 VDC
2	GND

■ CN2: RS232C connector

Pin	Function
1	TXD
2	RXD
3	GND
4	N·C
5	
6	

■ CN3: Parallel I/F connector

Pin	Function	I/O	Description
1	RESET	Input	Reset
2	HOME	Input	Home search start
3	STROBE	Input	Drive start
4	X/JOG Y+	Input	X axis designate / Jog Y+
5	Y/JOG Y-	Input	Y axis designate / Jog Y-
6	REGSL0/RUN+/JOG X+	Input	Register setting 0 / Run+ / Jog X+
7	REGSL1/RUN-/JOG X-	Input	Register setting 1 /Run- / JogX-
8	REGSL2/SPD0	Input	Register setting 2 / Drive speed designate 0
9	REGSL3/SPD1	Input	Register setting 3 / Drive speed designate 1
10	REGSL4/JOG	Input	Register setting 4 / Jog designate
11	REGSL5/STOP	Input	Register setting 5 / Drive stop
12	MODE0	Input	Operation mode designate 0
13	MODE1	Input	Operation mode designate 1
14	X DRIVE/END	Output	X axis drive / Drive end pulse
15	Y DRIVE/END	Output	Y axis drive / Drive end pulse
16	X ERROR	Output	X axis error
17	Y ERROR	Output	Y axis error
18	GEX	-	GND
19	GEX	-	GND
20	VEX	-	Sensor power output (24 VDC, max. 100 mA)

■ CN4, 5: X, Y axis I/O connector

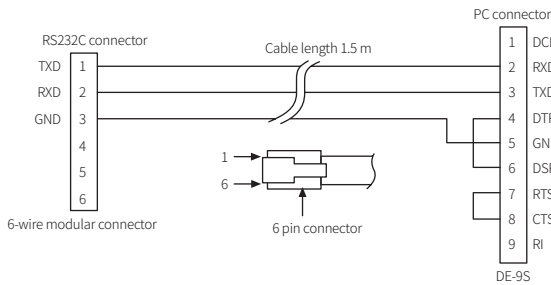| Pin	Function	I/O	Description
1	nP+P	Output	CW+ drive pulse
2	nP+N	Output	CW- drive pulse
3	nP-P	Output	CCW+ drive pulse
4	nP-N	Output	CCW- drive pulse
5	n OUT0	Output	General output 0 / DCC
6	n INPOS	Input	Servo In-Position complete
7	n ALARM	Input	Servo alarm
8	GEX	-	GND
9	n STOP2	Input	Encoder Z phase
10	n STOP1	Input	Home
11	n STOP0	Input	Near Home
12	n LMT+	Input	+ direction limit
13	n LMT-	Input	- direction limit
14	EMG	Input	Emergency stop
15	GEX	-	GND
16	VEX	-	Sensor power output (24 VDC, max. 100 mA)

■ Connector specifications

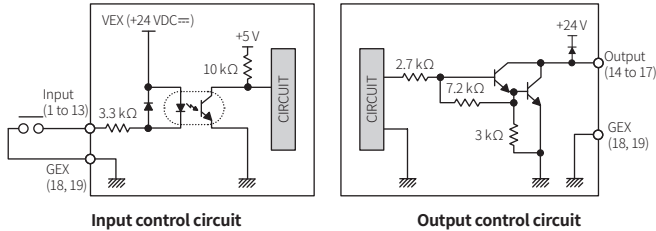- Contact the manufacture for the socket and cable.

Connector		Specifications	Manufacture
CN3	Parallel I/F connector socket	HIF3BA-20D-2.54R	Hirose Electric
CN3	I/O cable (sold separately)	CO20-HP☐-L, CO20-HP☐-R	Autonics
CN4, 5	X, Y axis I/O connector socket	HIF3BA-16D-2.54R	Hirose Electric

Connection Diagram

■ RS232C communication cable

RS232C connector

TXD	1
RXD	2
GND	3
	4
	5
	6

6-wire modular connector

Cable length 1.5 m

1 →
6 →

6 pin connector

PC connector

1	DCD
2	RXD
3	TXD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

DE-9S

■ Parallel I/F

VEX (+24 VDC⎓)   +5 V

Input (1 to 13)   3.3 kΩ   10 kΩ   CIRCUIT

GEX (18, 19)

Input control circuit

+24 V

CIRCUIT   2.7 kΩ   7.2 kΩ   Output (14 to 17)

3 kΩ   GEX (18, 19)

Output control circuit

■ Motor driver

CN4, 5   Motor driver

n P+P	1	CW+
n P+N	2	CW-
n P-P	3	CCW+
n P-N	4	CCW-
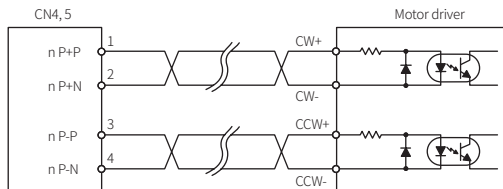
■ Limit switch and home sensor

CN4, 5

VEX(+24V) 16

n LMT+ 12 — + direction limit switch

n LMT- 13 — - direction limit switch

Home sensor

n STOP1 10

GEX 15

Specifications

Model	PMC-1HS-232	PMC-1HS-USB	PMC-2HS-232	PMC-2HS-USB
Power supply	24 VDC⎓ ± 10%			
Power consumption	≤ 6 W			
Control axes	1 axis		2 axis (each axis can be programmed independently)	
Motor control	Pulse input stepper motor or servo motor			
In-Position setting	ABSOLUTE method / INCREMENTAL method			
In-Position range	-8,388,608 to +8,388,607 (available pulse scaling function)			
Drive speed	1 pps to 4 Mpps (1 to 8000×magnification 1 to 500)			
Pulse output method	2 pulse output method (line driver output)			
Operation mode	Jog mode, Continuous mode, Index mode, Program mode			
No. of drive speed	4			
Program save	EEPROM			
Index steps	64 step per each axis			
Steps	64 Step			
Control command	ABS, INC, HOM, IJP, OUT, OTP, JMP, REP, RPE, END, TIM, NOP			
Program function	Power On Program Start, Power On Home Search			
Home search mode	High speed near home search (STEP1) → Low speed near home search (STEP2) → Encoder Z phase search (STEP3) → Offset movement (STEP4) Configuring the detection direction and Enable/Disable in each step			
General output	1 point		2 point	
Control interface	Parallel I/F			
Ambient temp.	0 to 45℃ (no freezing or condensation)			
Ambient humi.	35 to 85%RH (no freezing or condensation)			
Approval	CE UK EAC			
Unit weight (packaged)	≈ 96.8 g (≈ 386 g)	≈ 96.9 g (≈ 421.6 g)	≈ 100.2 g (≈ 393.6 g)	≈ 100.4 g (≈ 432.2 g)

Connections

- direction limit sensor   Home sensor   + direction limit sensor

5-phase stepper motor

XLMT-   XSTOP1   XLMT+

CW+	←	XP+P
CW-	←	XP+N
CCW+	←	XP-P
CCW-	←	XP-N

5-phase stepper motor driver

Motion controller

RS232C RS485 USB

PC

Basic Operation Method

■ PC
Connect PC and motion controller with comm. cable and run atMotion program.

■ Parallel I/F
Connect a sequence controller, switch or etc. to parallel I/F.

■ Serial communication (dedicated communication protocol)
Using serial communication command to operate depending on program written by user.

■ Teaching unit (PCM-2TU-232, sold separately)
Connect communication cable included in teaching unit.

Control Commands

| Command type	Code	Description
Drive command	ABS	Absolute position move
	INC	Relative position move
	HOM	Home search
I/O command	IJP	Jump input condition
	OUT	ON/OFF output port
	OTP	ON Pulse from output port (certain time)
Program control command	JMP	Jump
	REP	Start repetition
	RPE	End repetition
	END	End program
Others	TIM	Timer
	NOP	No Operation

Sold Separately: Teaching Unit PMC-2TU-232

The teaching unit (PMC-2TU-232) is a device that builds the operation mode parameter and operation program for the main body without a PC.
In addition, it can carry out the start of the operation program, the home search and Jog operation.
The teaching unit is used by connection the private cable (1.5 m) to the RS-232C connector (CN2) of the main body.

■ Dimensions

• Unit: mm, For the detailed drawings, follow the Autonics website.
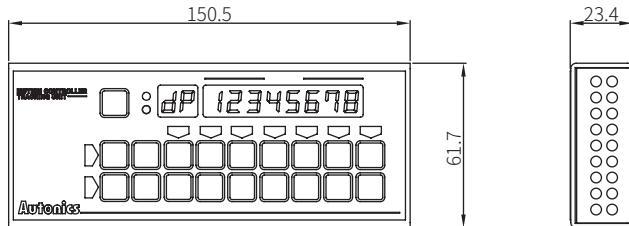
■ Operation mode

• When power ON, it starts as the drive control mode (dP).
• The [DP] button is used to convert the status of the data edit mode and the drive operation mode.

Mode	Operation	REG display
Data edit	• Adding operation mode parameter and operation program • Index drive operation	Register number
Drive control	• Displaying the current position • Jog operation • Home search • Program execution	dP (drive operation)

■ Unit descriptions
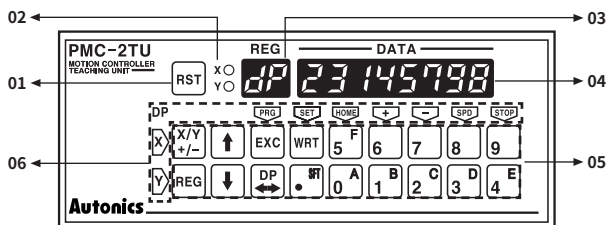
01. Reset

Reset the controller and teaching unit.

02. X/Y display

Display the currently selected axis.

03. Register number display/dp

Displays the currently selected register number when data is editing and dp when operating drive.

04. Data display

Displays the data of each register when data is editing and the current position of the selected axis when operating drive.

05. Input button

X/Y: Converts the selecting axis. It is used to convert the sign of an input value when the value is entered and a mode data that the mode data is entered.

REG: It is used to input the register number to display.
If this button is pressed on the data input, the data input is canceled and returns to the state before the data input.

↑ ↓ : Increases / decreases the displayed register number.

EXC: Runs the displayed command. However, this command is only valid for ABS, INC, OUT, OTP and HOM 1 to 4 commands.

DP: Converts the drive handling status and the data edit status.

WRT: Adds a value when data is editing.

06. Button display for drive operation

Displays button function as yellow letters to the left or the top of the input button in drive handling status. The top end and the bottom end of the button handle X axis and Y axis respectively.