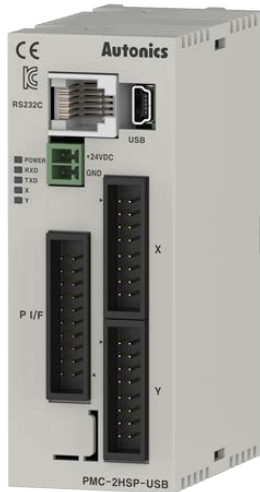# 2 axis Interpolation Type Motion Controller

PMC-2HSP 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 independent 2 axis control with processing speed up to 4 Mpps

• Supports linear and circular interpolation control

• 17 control commands and up to 200 steps of operation programming

• Supports various control interfaces (USB, RS232C, RS485, Parallel I/F)

• Multiple control of up to 32 axes (16 units) with RS485 communication (Modbus RTU)

• 4 operation modes: Jog mode, Continuous mode, Index mode, Program mode

• Symmetrical/asymmetrical trapezoid or S-shaped acceleration/deceleration control

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.

CE UK CA IC EAC

- 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

Manual

For proper use of the product, refer to the manuals and be sure to follow the safety considerations in the manuals.
Download the manuals from the Autonics website.

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
2HSP: 2-axis high speed interpolation
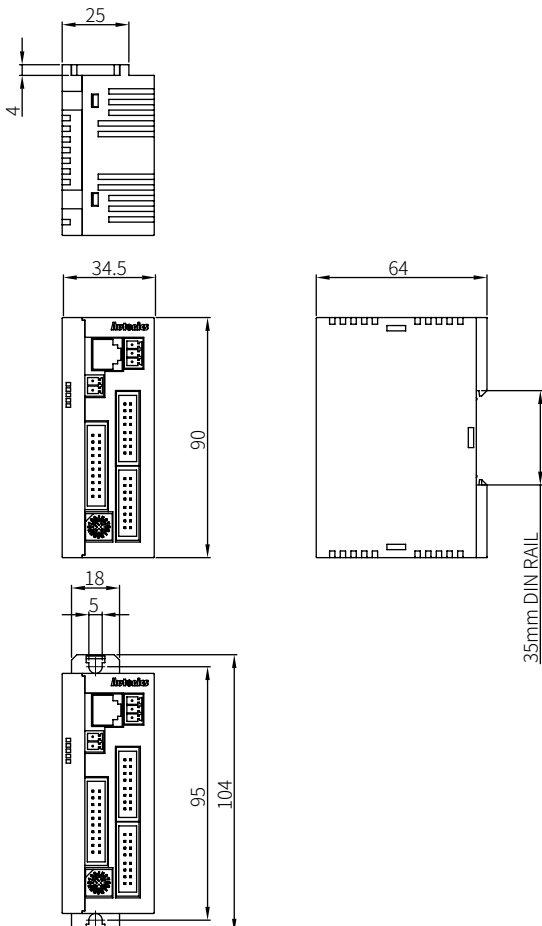
❷ Communication type
USB: USB / RS232C
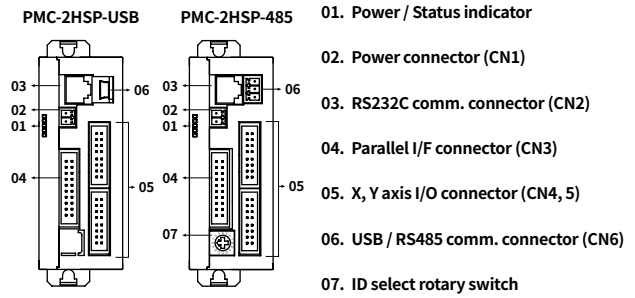485: RS485 / RS232C

Product Components

- Product
- Instruction manual
- Power connector
- I/O connector (P I/F, X axis, Y axis)
- RS232C comm. cable 1.5 m
- USB comm. cable 1 m (PMC-2HSP-USB Series)
- RS485 comm. connector (PMC-2HSP-485 Series)

Dimensions

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

Unit Descriptions

PMC-2HSP-USB　**PMC-2HSP-485**

01. **Power / Status indicator**

02. **Power connector (CN1)**

03. **RS232C comm. connector (CN2)**

04. **Parallel I/F connector (CN3)**

05. **X, Y axis I/O connector (CN4, 5)**

06. **USB / RS485 comm. connector (CN6)**

07. **ID select rotary switch**

Connectors

■ CN1: Power connector

Pin	Function
1	24 VDC⎓
2	GND

■ CN2: RS232C connector

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

■ CN3: Parallel I/F connector

Pin	Function	I/O	Description
1	RESET	Input	Reset
2	HOME	Input	Home search start
3	STROBE	Input	Start drive
4	X/JOG Y+	Input	Assign X axis / Jog 2 mode Y+
5	Y/JOG Y-	Input	Assign Y axis / Jog 2 mode Y-
6	STEPSL0/RUN+/JOG X+	Input	Assign step 0/Run+ / Jog 2 mode X+
7	STEPSL1/RUN-/JOG X-	Input	Assign step 1/Run- / Jog 2 mode X-
8	STEPSL2/SPD0	Input	Assign step 2 / Assign drive speed 0
9	STEPSL3/SPD1	Input	Assign step 3 / Assign drive speed 1
10	STEPSL4/JOG	Input	Assign step 4 / Assign jog
11	STEPSL5/STOP	Input	Assign step 5 / Stop drive
12	MODE0	Input	Assign run mode 0
13	MODE1	Input	Assign run mode 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	nOUT0	Output	General output 0
6	nOUT1	Output	General output 1
7	nIN0	Input	General input 0
8	nIN1	Input	General input 1
9	nSTOP2	Input	Encoder Z phase
10	nSTOP1	Input	Home
11	nSTOP0	Input	Near home
12	nLMT+	Input	+ direction limit
13	nLMT-	Input	- direction limit
14	EMG	Input	Emergency stop
15	GEX	-	GND
16	VEX	-	Sensor power output (24 VDC⎓, max. 100 mA)

■ CN6: RS485 connector

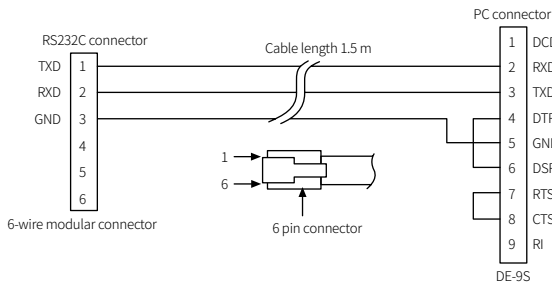| Pin	Function	Description
1	B (-)	Transmitting / Receiving data
2	A (+)	
3	G	Ground when it is required depending on comm. environment.

■ Connector specifications

- Contact the manufacture for the socket and cable.

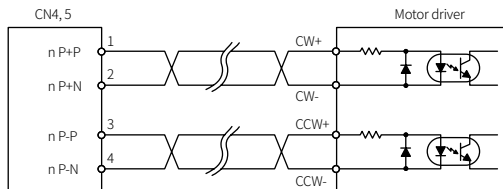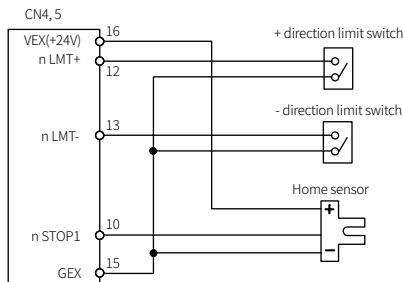| Connector		Specifications	Manufacture
CN3	Parallel I/F connector socket	HIF3BA-20D-2.54R	Hirose Electric
CN3	I/O cable (sold separately)	CO20-HP☐-L, CO20-HP☐-R	Autonics
CN4, 5	X, Y axis I/O connector socket	HIF3BA-16D-2.54R	Hirose Electric

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)
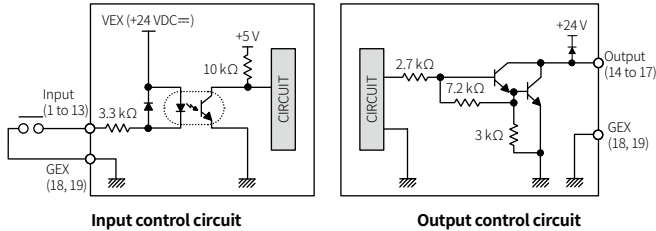
Output control circuit

■ 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
n LMT-	13
n STOP1	10
GEX	15

+ direction limit switch

- direction limit switch

Home sensor

Specifications

Model	PMC-2HSP-USB	PMC-2HSP-485
Power supply	24 VDC⎓ ± 10%	
Power consumption	≦ 6 W	
Control output	50 mA	
Control axes	2 axis	
Motor control	Pulse input stepper motor or servo motor	
In-Position range	-8,388,608 to +8,388,607 (selectable absolute / relative value, available pulse scaling function)	
Drive speed	1 pps to 4 Mpps (1 to 8,000 pps×magnification 1 to 500)	
Pulse output method	1 pulse / 2 pulse output method (line driver output)	
Operation mode	Jog mode, Continuous mode, Index mode, Program mode	
Index steps	64 step for each axis	
Steps	200 steps	
Control command	ABS, INC, HOM, LID, CID, FID, RID, FRID, TIM, JMP, REP, RPE, ICJ, IRD, OPC, OPT, NOP, END	
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)	
I/O	Parallel I/F (CN3): 13 inputs, 4 outputs X axis (CN4): 8 inputs, 6 outputs (2 general input, 2 general output) Y axis (CN5): 8 inputs, 6 outputs (2 general input, 2 general output)	
Ambient temp.	0 to 45℃, storage: -15 to 70℃ (no freezing or condensation)	
Ambient humi.	20 to 90%RH, storage: 20 to 90%RH (no freezing or condensation)	
Approval	CE UK EAC	CE UK EAC
Unit weight (packaged)	≈ 101.5 g (≈ 344 g)	≈ 101.6 g (≈ 308.7 g)

Connections

- direction limit sensor   Home sensor   + direction limit sensor

5-phase stepper motor

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

5-phase stepper motor driver

XLMT-   XSTOP1   XLMT+

Motion controller

RS232C RS485 USB

PC
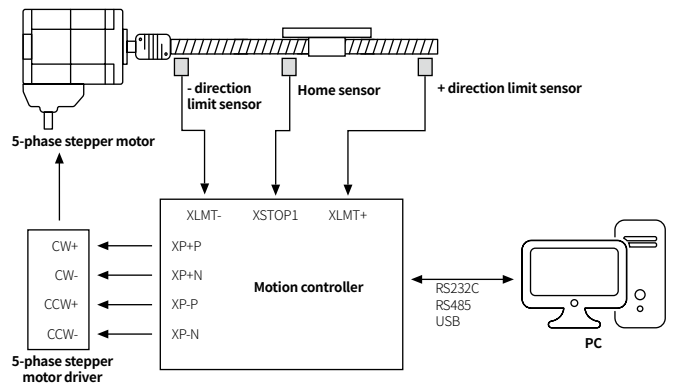
Basic Operation Method

■ 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.

Control Commands

Command type	Code	Description
Drive command	ABS	Absolute position move
	INC	Relative position move
	HOM	Home search
	LID	2-axis linear interpolation
	CID	2-axis CW circular interpolation
	FID	2-axis CW arc interpolation
	RID	2-axis CCW arc interpolation
	FRID	Continuous interpolation
I/O command	ICJ	Jump input condition
	IRD	Stand-by external input
	OPC	ON/OFF output port
	OPT	ON pulse from output port
Program control command	JMP	Jump
	REP	Start repetition
	RPE	End repetition
	END	End program
Others	TIM	Timer
	NOP	No operation