

MITSUBISHI

PROGRAMMABLE CONTROLLER

MELSEC-A

User's Manual

Positioning module type AD71S7 (Hardware)

INTRODUCTION

Thank you for choosing the Mitsubishi MELSEC A Series of General Purpose Programmable Controllers. Please read this manual carefully so that the equipment is used to its optimum. A copy of this manual should be forwarded to the end User.



IB (NA) 66562-A

The United States	Mitsubishi Electronics America, Inc. (Industrial Automation Division) 800 Biermann Court, Mt. Prospect, IL 60056 Phone: (708)298 9223
Canada	Mitsubishi Electric Sales Canada, Inc. (Industrial Automation Division) 4299 14th Avenue, Markham Ontario L3R 0J2 Phone: (416)475 7728
United Kingdom	Mitsubishi Electric UK Ltd. (Industrial Sales Division) Travellers Lane, Hatfield Herts., AL10 8XB Phone: (0707)276100
Germany	Mitsubishi Electric Europe GmbH, (Industrial Automation Division) Gothaer Strasse 8, Postfach 1548 D 4030 Ratingen 1 Phone: (02102)4860
Taiwan	Seteyo Enterprise Co., Ltd., (106) 11th Fl. Chung Ling Bldg 363 Sec 2 Fu Hsing S Rd., Taipei Taiwan R.O.C. Phone: (02)732 0161
Hongkong (& China)	Ryoden International Ltd. (Industrial & Electrical Controls Division) 10/F. Manulife Tower, 169 Electric Rd. North Point Hong Kong Phone: 8878870
Singapore (& Malaysia)	MELCO Sales Shingapore Pte. Ltd. (Industrial Division) 307 Alexandra Rd #05 01/02 Mitsubishi Electric Bldg Singapore 0315 Phone: 4732308
Thailand	F.A. Tech Co., Ltd., 1138/33 34 Rama 3 Rd., Yannawa, Bangkok 10120 Phone: (02)295 2861-4
Australia	Mitsubishi Electric Australia Pty Ltd (Industrial Controls Division) 348 Victoria Rd., Rydalmere, N.S.W. 2116 Phone: (02)684 7200
Republic of South Africa	M.S.A. Manufacturing (Pty) Ltd. (Factory Automation Division) P.O. Box 39733, Bramley Johannesburg 2018 Phone: (011)444 8080



MITSUBISHI ELECTRIC CORPORATION
HEAD OFFICE: 4-3-3 SHINJUKU BLDG SHINJUKU-KU TOKYO 100 TEL: 03-4321-5101 CABLE: MELCO TOKYO
NAGOYA WORKS: 1-14 YATAI-KU MARU 3, HIGASHI-KU NAGOYA, JAPAN

When a pointer from Japan, this manual does not require a special application to the Ministry of International Trade and Industry for service transaction permission.

IB (NA) 66562 A (8503) MEE Printed in Japan

Specifications subject to change without notice

1. GENERAL DESCRIPTION

1. GENERAL DESCRIPTION

This manual describes the specifications, nomenclature and I/O interface of the AD71S7 type positioning module (hereafter called the AD71S7). Confirm that all of the following components are included in the package.

Component	Quantity
AD71S7 positioning module	1
External wiring connector (Type) Connector Connector cover	1

1.1 Detailed Manual

- AD71(S1/S2/S7), A1SD71-S2(S7) Positioning Module User's Manual (IB-66563)

1.2 Related Manual

- AD71TU Teaching Unit Operation Manual (IB-66067) (Packed with AD71TU)
- SW0GP-AD71P (for Positioning Module) Operating Manual (IB-66099) (Packed with SW0GP-AD71P)

2. PERFORMANCE SPECIFICATIONS

2 PERFORMANCE SPECIFICATIONS

Item	Performance and Specifications	
Number of I/O points	32 points	
Number of control axes	2 (simultaneous or independent)	
Interpolation	Linear interpolation (for simultaneous 2 axes)	
Positioning data	Capacity	400 points per axis
	Setting method	Input from peripheral device or sequence program
RAM memory backup	15 minutes without battery (25 °C) Lithium battery guarantees power failure backup for a total of 300 days. Battery guaranteed for five years.	
Positioning	Method	Absolute and/or incremental method
	Positioning units	1 to 16,252,928 (PULSE) Max 162 (m) (command unit: 0.1 to 10 μm/PLS) Max 16200 (inch) (command unit: 1 × 10 ⁻⁵ to 0.001 inch/PLS) Max 16200 (degree) (command unit: 1 × 10 ⁻⁵ to 0.001 degree/PLS)
	Positioning speed	10 to 200000 (PLS/sec) (command unit: 10 PLS/sec) 10 to 120000 (mm/min) (command unit: 10 mm/min) 1 to 12000 (inch/min) (command unit: 1 inch/min) 1 to 12000 (degree/min) (command unit: 1 degree/min)
	Acceleration and deceleration	Automatic trapezoidal acceleration and deceleration
	Acceleration and deceleration times	64 to 4999 (msec)
	Backlash compensation	0 to 65535 × position command unit (0 to 255 pulse if unit is PULSE)
	Error compensation	Mechanical system error compensation function
Zero return	With zero address change function Zero return direction and speed can be selected	
Jog operation function	Jog operation by jog start signal input	
Inching function	Operation using manual pulse generator.	
M function	M code output	
Internal current consumption	5 VDC, 1.5 A	
External supply voltage, current	4.75 to 26.4 V Max 50 mA	
Size mm (inch)	250(H) × 37.5(W) × 121(D) (9.84 × 1.48 × 4.76)	
Weight kg (lb)	0.63 (1.39)	

For other general specifications, refer to the User's Manual for the relevant PC CPU.

3. I/O INTERFACE

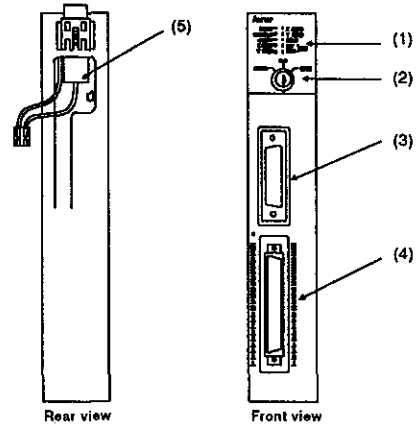
3. I/O INTERFACE

I/O	Internal Circuit	Pin Number		Signal	Description	
		X axis	Y axis			
Input		5A	7A	Common	5 to 24 VDC (external supply)	
				Drive unit ready	(1) LOW indicates the servo drive unit is serviceable and the feed pulse is acceptable (2) The AD71S7 checks the drive unit ready signal prior to start. If not ready, the AD71S7 outputs a zero return request. (3) Arrange for drive unit errors, e.g. control power error, to set this signal HIGH. (4) Switching the signal to HIGH during positioning stops the operation. Resetting the signal will not restart the operation.	
		6A	6A	STOP	(1) LOW to stop positioning. Signal duration 20 msec or more. (2) AD71S7 stops positioning by using this signal and switches the start signal OFF (HIGH). When switching from HIGH to LOW, positioning is not started.	
		6B	8B	DOG	(1) Used to detect near-point during zero return. Switched to LOW by using the near-point actuator. The grid point is resolver phase angle 0. (2) When zero return by using the zero-phase signal, the zero point is away from the dog and becomes the first grid point after detecting the near point dog.	
		1A	3A	Manual pulse generator phase A	Input signal voltage level: 5 V _{DC} ±10% HIGH level: voltage 4.5 V or higher; current 3 mA or higher LOW level: voltage 1.0 V or less; current 0 mA Pulse width: 2 msec or longer 1 msec or 1 msec or longer (Duty ratio: 50%) Phase difference: 0.5 msec or longer The positioning address (present value) increases when phase A leads phase B.	
		1B	3B	PULSER A		
		2A	4A	Manual pulse generator phase B	Input pulse rise/fall time: 500 µsec or less Timing: The positioning address set by the manual pulse generator varies as shown below: (When address increases) (When address decreases)	
		2B	4B	PULSER B		
		9A	10A	Zero-phase signal	(1) Used as the zero signal at zero return. The zero-phase grid signal of the pulse encoder is normally used. LOW at zero.	
		9B	10B	PGD	(2) Used when the zero return method uses stopper stop and zero return complete is externally input.	
Output		11A	13A	Start	(1) LOW while positioning	
		11B	13B		(2) ON (LOW) during feed pulse output and dwell. Used as a brake release signal for servos with mechanical brake. Feed pulse is output after this signal goes ON.	
		12A	14A	Error counter clear	Given before and after zero return. Resets deviations in the servo error counter.	
		12B	14B		20 msec (1st time) 20 msec (2nd time)	
		17A	20A	(+24 V power)	5 to 24 VDC (External supply) 17B and 20B for 5 to 15 VDC 17A and 20A for 24 VDC	
		17B	20B			(+) 5 to 15 V power
		15A	18A	A type	B type	Forward and reverse lead pulses. The operation direction follows the direction sign (SIGN).
		15B	18B	Forward feed pulse	Feed pulse	PULSE SIGN 25 msec + direction travel direction travel
16A	19A	Reverse feed pulse	Direction sign	PULSE F		
16B	19B	PULSE R	SIGN	PULSE R		

Select the A or B type by parameter setting

4. NOMENCLATURE

4. NOMENCLATURE



No	Name	Explanation																		
(1)	LED indicator	<table border="1"> <thead> <tr> <th>LED</th> <th>Contents</th> </tr> </thead> <tbody> <tr> <td>READY</td> <td>Lights when the AD71S7 ready signal goes ON</td> </tr> <tr> <td>SERVO X ERR</td> <td>Lights when the READY signal from the servo unit for the X or Y axis goes OFF</td> </tr> <tr> <td>X BUSY</td> <td>Lights when the X axis BUSY signal goes ON</td> </tr> <tr> <td>Y BUSY</td> <td>Lights when the Y axis BUSY signal goes ON</td> </tr> <tr> <td>X ZERO</td> <td>Lights when the X axis zero return request signal goes ON</td> </tr> <tr> <td>Y ZERO</td> <td>Lights when the Y axis zero return request signal goes ON</td> </tr> <tr> <td>HOLD</td> <td>Lights when there is an AD71S7 hardware fault</td> </tr> <tr> <td>BAT WDT</td> <td>Lights when the battery error signal or WDT error signal goes ON</td> </tr> </tbody> </table>	LED	Contents	READY	Lights when the AD71S7 ready signal goes ON	SERVO X ERR	Lights when the READY signal from the servo unit for the X or Y axis goes OFF	X BUSY	Lights when the X axis BUSY signal goes ON	Y BUSY	Lights when the Y axis BUSY signal goes ON	X ZERO	Lights when the X axis zero return request signal goes ON	Y ZERO	Lights when the Y axis zero return request signal goes ON	HOLD	Lights when there is an AD71S7 hardware fault	BAT WDT	Lights when the battery error signal or WDT error signal goes ON
		LED	Contents																	
		READY	Lights when the AD71S7 ready signal goes ON																	
		SERVO X ERR	Lights when the READY signal from the servo unit for the X or Y axis goes OFF																	
		X BUSY	Lights when the X axis BUSY signal goes ON																	
		Y BUSY	Lights when the Y axis BUSY signal goes ON																	
		X ZERO	Lights when the X axis zero return request signal goes ON																	
		Y ZERO	Lights when the Y axis zero return request signal goes ON																	
		HOLD	Lights when there is an AD71S7 hardware fault																	
		BAT WDT	Lights when the battery error signal or WDT error signal goes ON																	
(2)	Keyswitches	M PRO: Sets memory protect for the setting data and positioning data areas																		
		OFF: Cancels memory protect for the setting data and positioning data areas																		
		LOCK: Prohibits a pulse chain output from the AD71S7																		
(3)	RS 422 connector	Used for connections with a peripheral device such as an A6GPP, A6PHP, A7PHP, A7HGP, A7LMS, and AD71TU																		
(4)	40 pin connector	Used for connections with a drive unit																		
		<p>The following figure shows the pin layout of the external wiring connector supplied as an accessory. Make wire connections according to the I/O interface.</p> <p>Pin arrangement seen from the connection side. Connection pins include A1 to A20 and B1 to B20.</p>																		
(5)	Battery	For backup of positioning data. Always connect the battery leads before using the AD71S7. + side lead line (red) - side lead line (blue)																		

5. HANDLING INSTRUCTION

5. HANDLING INSTRUCTION

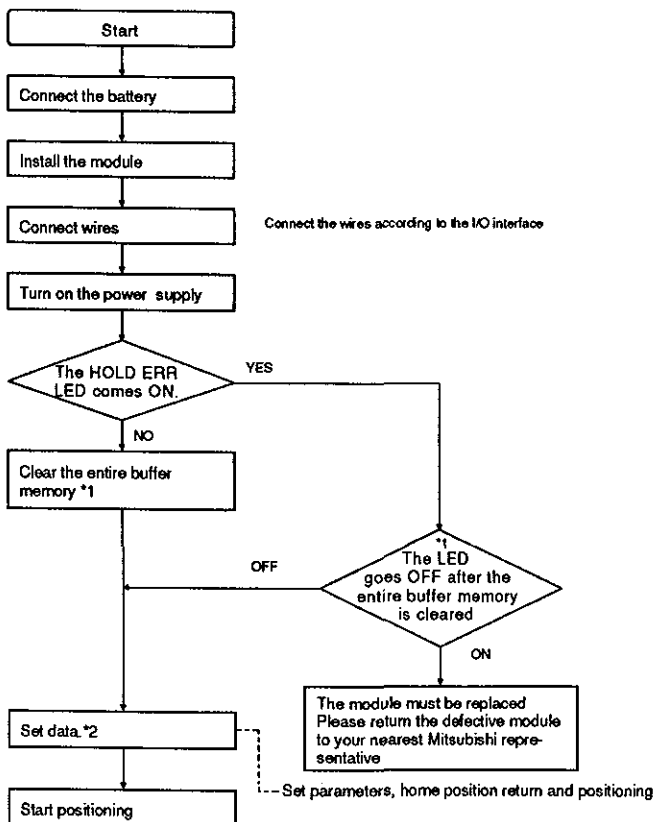
This section explains the handling (installation preparations) and nomenclature of the AD71S7

- (1) Since the body case is made of plastic, protect the AD71S7 from dropping and sudden impacts
- (2) Take care not to allow conductive debris, such as wire scraps generated during wiring or chips produced by drilling, to drop into the module. If debris does get into the module, remove it
- (3) Turn the PC PU power supply OFF before installing or removing the unit to or from the base
- (4) Turn the PC CPU and drive module power supply OFF before connecting or disconnecting the drive unit connector
After confirming the correct insertion direction, insert the connector directly from the front. Then, tighten the two fixing screws
When the drive unit is not connected, keep the connector area cover closed
- (5) When the AD71S7 is not BUSY, connect a peripheral device to the AD71S7
After confirming the correct insertion direction, insert the connector directly from the front. Then tighten the two fixing screws
When a peripheral device is not connected, keep the connector area cover closed

6. MODULE START-UP

6. MODULE START-UP

Shown below is the AD71S7 start-up procedure. For details, consult the AD71(S1/S2/S7) or AD71S7-S2(S7) Type Positioning Module User's Manual



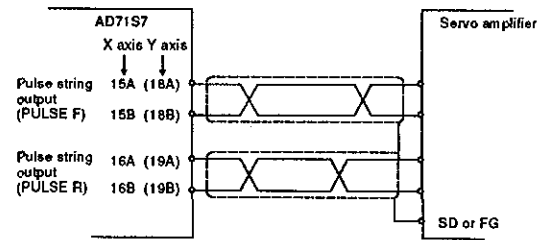
*1 Clear the entire buffer memory from a peripheral device or by using a sequence program

*2: Even if using only the X-axis or only the Y-axis, write parameters and zero return data for the axis that is not used as well as the one that is. If an attempt is made to execute a zero return without having written this data, an error will occur

7. LOADING AND INSTALLATION

7. LOADING AND INSTALLATION

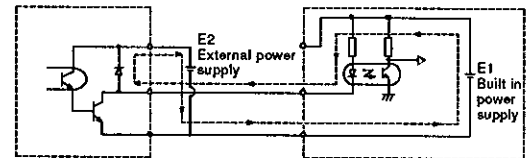
- (1) When there is a lot of noise between the AD71S7 and servo amplifier, provide wiring from the pulse string output terminal from the AD71S7 using shielded twisted-pair cable that is different from other shielded cables



- (2) 24 VDC wiring notes

When a servo drive unit has a built-in power supply of 24 VDC, a wraparound circuit is made by the state of a power supply. A malfunction will occur if a separate power supply is supplied externally. Therefore, do not use the built-in power supply and external power supply together

[Wraparound circuit]

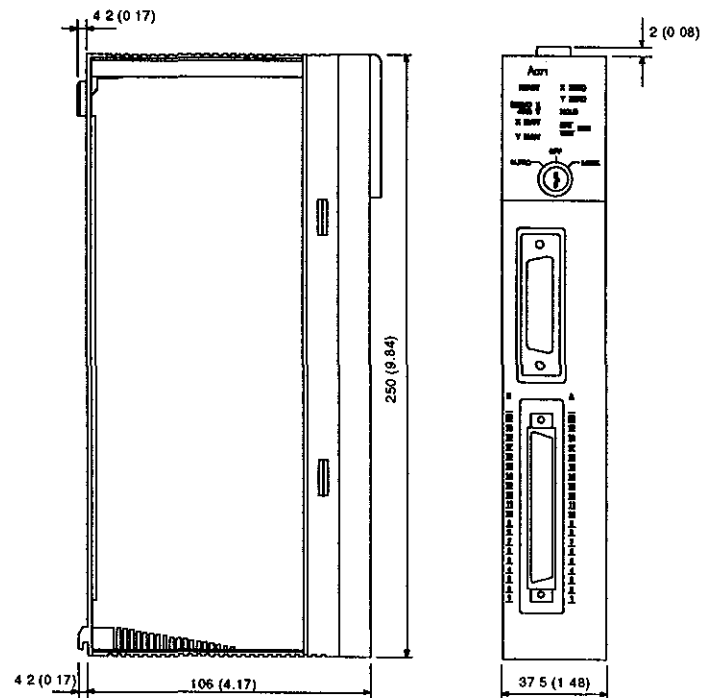


E1 > E2

Even if the pulse output of AD71S7 is OFF, the power supply flows in a servo unit pulse input line

8. OUTSIDE DIMENSIONS

8. OUTSIDE DIMENSIONS



Unit: mm (inch)