MITSUBISHI

PROGRAMMABLE CONTROLLER

MELSEC-A

User's Manual

Positioning module type AD71S2 (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

MITSUBISHI ELECTRIC

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Specifications subject to change without notice

1. GENERAL DESCRIPTION

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This manual describes the specifications, nomenclature and I/O interface of the AD71S2 type positioning module (hereafter called the AD71S2) Confirm that all of the following components are included in the package

Component	Quantity
AD71S2 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

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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	Modes		Positioning control mode Speed/positioning control switching mode Speed control mode Select using parameters (Same mode is applied to the X and Y axes)
	Method		Absolute and/or incremental method Speed/positioning control switching mode: Incremental method (current address is switched to 0 when starting)
	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 50000 (msec)
	Backlash compensation		0 to 65535 × position command unit (0 to 255 pulse if unit is PULSE)
	Error compensation		In the positioning control mode and speed/positioning control switching mode Mechanical system error compensation function
Zero return			With zero address change function Zero return direction and speed can be seleceted
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)

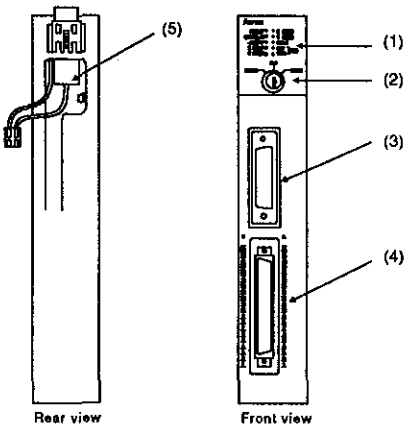
For other general specifications, refer to the User's Manual for the relevant PC CPU

3. I/O INTERFACE

I/O	Internal Circuit	Pin Number X axis	Pin Number Y axis	Signal	Description
Input		5A	7A	Common	5 to 24 VDC (external supply)
		5B	7B	Drive unit ready $\overline{\text{READY}}$	(1) LOW indicates the servo drive unit is serviceable and the feed pulse is acceptable (2) The AD71S2 checks the drive unit ready signal prior to start if not ready, the AD71S2 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	8A	Stop signal $\overline{\text{STOP}}$	(1) LOW to stop positioning Signal duration 20 msec or more (2) AD71S2 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	Near point signal $\overline{\text{DOG}}$	(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	Enable signal	(1) Used to select control switching signal enable/disable (2) LOW enables the control switching signal
		1B	3B		
		2A	4A	Control switching signal	(1) Used as the control switching command in the speed/positioning control switching mode (2) LOW selects positioning control
		2B	4B		
		9A	10A	Zero phase signal $\overline{\text{PGO}}$	(1) Used as the zero signal at zero return The zero-phase grid signal of the pulse encoder is normally used LOW at zero (2) Used when the zero return method uses stopper stop and zero return complete is externally input
		9B	10B		
Output		11A	13A	Start $\overline{\text{START}}$	(1) LOW while positioning (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
		11B	13B		
		12A	14A	Error counter clear $\overline{\text{CLEAR}}$	Given before and after zero return Resets deviations in the servo error counter 20 msec (1st time) 20 msec (2nd time) $\overline{\text{CLEAR}}$ Before feed pulse output After feed pulse output
		12B	14B		
		17A	20A	(+) 24 V power (+) 5 to 15 V power	5 to 24 VDC (External supply) 17B and 20B for 5 to 15 VDC 17A and 20A for 24 VDC
		17B	20B		
	Internal circuit	15A	18A	A type: Forward feed pulse $\overline{\text{PULSE F}}$	B type: Feed pulse $\overline{\text{PULSE}}$ (B type)
		15B	18B		Forward and reverse feed pulses The operation direction follows the direction sign ($\overline{\text{SIGN}}$) $\overline{\text{PULSE}}$ $\overline{\text{SIGN}}$ 25 msec + direction travel direction travel
	Internal circuit	16A	19A	Reverse feed pulse $\overline{\text{PULSE R}}$	Direction sign $\overline{\text{SIGN}}$ (A type) $\overline{\text{PULSE F}}$
		16B	19B		$\overline{\text{PULSE R}}$

Select the A or B type by parameter setting

4. NOMENCLATURE



No	Name	Explanation	
(1)	LED indicator READY ☐ ☐ X ZERO SERVO [X ☐ ☐ Y ZERO ERR [Y ☐ ☐ HOLD X BUSY ☐ ☐ BAT] ERR Y BUSY ☐ ☐ WDT]	LED	Contents
		READY	Lights when the AD71S2 ready signal goes ON
		SER VO ERR [X Y	Lights when the $\overline{\text{READY}}$ 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 AD71S2 hardware fault
		BAT WDT] ERR	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 AD71S2	
(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. 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 Soldering UB Wire FCN-AG B V Pin arrangement seen from the connection side Connection pins include A1 to A20 and B1 to B20	
(5)	Battery	For backup of positioning data Always connect the battery leads before using the AD71S2 + side lead line (red) A6BAT side lead line (blue)	

5. HANDLING INSTRUCTION

5. HANDLING INSTRUCTION

This section explains the handling (installation preparations) and nomenclature of the AD71S2

(1) Since the body case is made of plastic, protect the AD71S2 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

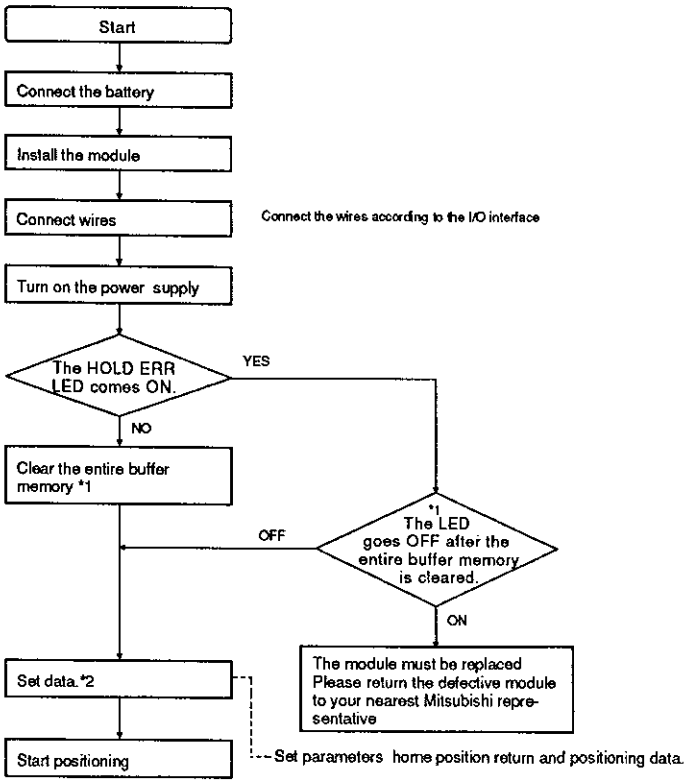
(4) Turn the PC CPU and drive module power supply OFF before connecting or disconnecting the drive unit connector
After confirming the correct insertion direction, insert the connector directly from the front Then, tighten the two fixing screws
When the drive unit is not connected, keep the connector area cover closed

(5) When the AD71S2 is not BUSY, connect a peripheral device to the AD71S2
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 AD71S2 start-up procedure For details, consult the AD71(S1/S2/S7) or AD71S7-S2(S7) Type Positioning Module User's Manual



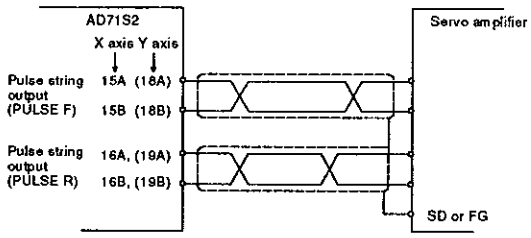
*1 Clear the entire buffer memory from a peripheral device or by using a sequence program
However, the following data will not be cleared by executing an all clear operation from a peripheral device "0" must be witten using the sequence program to clear it
- Deceleration time for emergency stop
- Positioning mode

*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

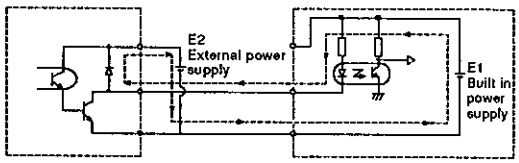
(1) When there is a lot of noise between the AD71S2 and servo amplifier, provide wiring from the pulse string output terminal from the AD71S2 using shielded twisted-pair cable that is different from other shielded cables



(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 Therfore, do not use the built-in power supply and external power supply together

[Wraparound circuit]

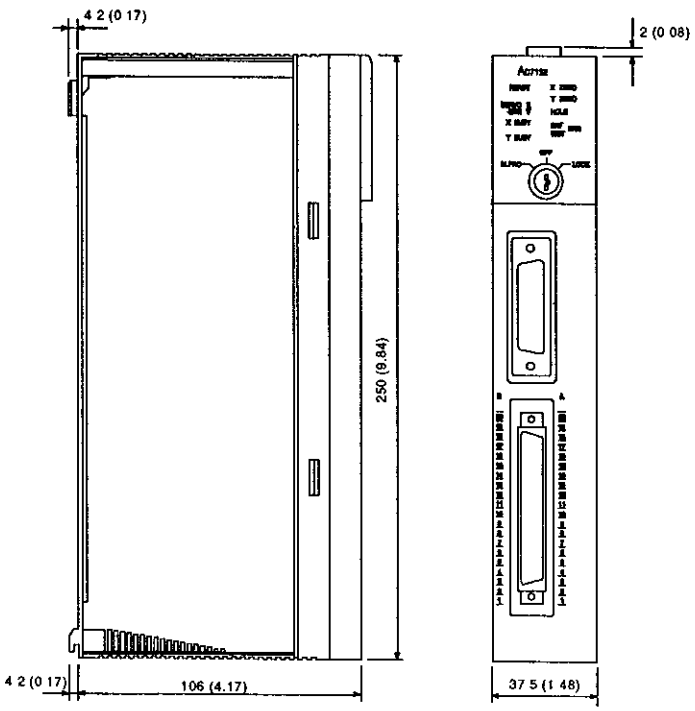


E1 > E2

Even if the pulse output of AD71S2 is OFF, the power supply flows in a servo unit pulse input line

8. OUTSIDE DIMENSIONS

8 OUTSIDE DIMENSIONS



Unit: mm (inch)

REVISIONS

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Mar., 1995	

IMPORTANT

(1) Design the configuration of a system to provide an external protective or safety interlocking circuit for the CPs

(2) The components on the printed circuit boards will be damaged by static electricity, so avoid handling them directly If it is necessary to handle them take the following precautions

(a) Ground human body and work bench

(b) Do not touch the conductive areas of the printed circuit board and its electrical parts with and non-grounded tools etc

Under no circumstances will Mitsubishi Electric be liable or responsible for any consequential damage that may arise as a result of the installation or use of this equipment

All examples and diagrams shown in this manual are intended only as an aid to understanding the text, not to guarantee operation Mitsubishi Electric will accept no responsibility for actual use of the product based on these illustrative examples

Owing to the very great variety in possible applications of this equipment, you must satisfy yourself as to its suitability for your specific application