MITSUBISHI

PROGRAMMABLE CONTROLLER

MELSEC-A

User's Manual

Interruption input module type A1SI61

MITSUBISHI ELECTRIC

REVISIONS

*The manual number is given on the bottom left of the back cover.

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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.

CONTENS

1. GENERAL DESCRIPTION

This User's Manual explains the specifications, the handling methods and how to use the A1SI61 type interrupt module (hereafter called the A1SI61) that is utilized with the A1SCPU.

The A1SI61 has an interrupt function to interrupt a sequence program being executed and executes the designated interrupt program when an interrupt input occurs.

REMARK

The Basic ACPU Programming Manual gives details about interrupt programs

2. SPECIFICATIONS

2.1 General Specifications

Table 2.1 General Specifications

Item	Specifications				
Operating ambient temperature	0 to 55 °C				
Storage ambient temperature	−20 to 75 °C				
Operating ambient humidity	10 to 90 % RH, non-condensing				
Storage ambient humidity	10 to 90 % RH, non-condensing				
Vibration resistance	Conforms to *JIS C 0911	Frequency	Acceleration	Amplitude	Sweep Count
		10 to 55 Hz	—	0.075 mm (0 003 in)	10 times **(1 octave /minute)
		55 to 150 Hz	9.8 m/s^2 (1 g)	—	
Shock resistance	Conforms to *JIS C 0912 (98 m/s^2 (10 g) x 3 times in 3 directions)				
Noise durability	By noise simulator of 1500 Vpp noise voltage, 1 μs noise width and 25 to 60 Hz noise frequency				
Dielectric withstand voltage	500 VAC for 1 minute across DC external terminals and ground 1500 VAC for 1 minute across AC external terminals and ground				
Insulation resistance	5 MΩ or larger by 500 VDC insulation resistance tester across AC external terminals and ground				
Grounding	Class 3 grounding: If appropriate grounding is not available, connect the grounding wire to the electric panel.				
Operating ambience	Free of corrosive gases. Dust should be minimal.				
Cooling method	Self-cooling				

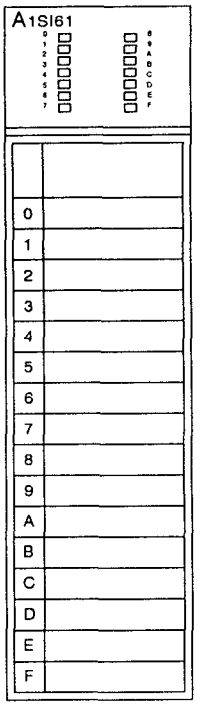
* JIS = Japanese Industrial Standard

REMARK

One octave marked ** indicates a change from the initial frequency to double or half frequency. For example, any of the changes from 10 Hz to 20 Hz, from 20 Hz to 40 Hz, from 40 Hz to 20 Hz, and 20 Hz to 10 Hz are referred to as one octave

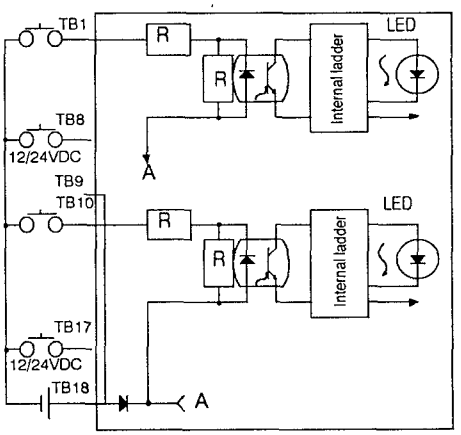
2.2 Performance Specifications

Table 2.2 Performance Specifications

Items		Specifications		Surface Shape
Number of points of interrupt input		16 points (Interrupt processing condition setting is in 4-point units)		
Number of occupied I/O points		32 points		
Insulation method		Photocoupler insulation		
Rated input voltages		12 VDC	24 VDC	
Rated input currents		Approx. 4 mA	Approx 8 mA	
Operating voltage range		10 2 to 26 4 VDC		
Number of points of maximum simultaneous input		100 % simultaneous ON		
ON voltage/ON current		9 V or more/3 mA or more		
OFF voltage/OFF current		4 V or less/1 mA or less		
Input resistance		Approx. 2 7 kΩ		
Response time	OFF → ON	0.2 msec or less		
	ON → OFF	0.2 msec or less		
Internal current consumption (5 VDC)		57 mA (TYP, all points: ON)		
Common method		16 points/common		
Operation display		ON display (LED)		
External connection method		20 points terminal block connectors (M3.5 x 7 screws)		
Applicable wire gauges		0.75 to 1.5 mm²		
Applicable solderless terminals		1 25-3, 1 25-YS3A V1.25-3, V1.25-YS3A		
Weight kg (lb)		0 2 (0.44)		

External Connections

Internal circuit



Terminal No.	Signal Name
TB1	X00
TB2	X01
TB3	X02
TB4	X03
TB5	X04
TB6	X05
TB7	X06
TB8	X07
TB9	COM
TB10	X08
TB11	X09
TB12	X0A
TB13	X0B
TB14	X0C
TB15	X0D
TB16	X0E
TB17	X0F
TB18	COM
TB19	Vacant
TB20	Vacant

POINTS

(1) The user cannot use Y00 to Y0F.

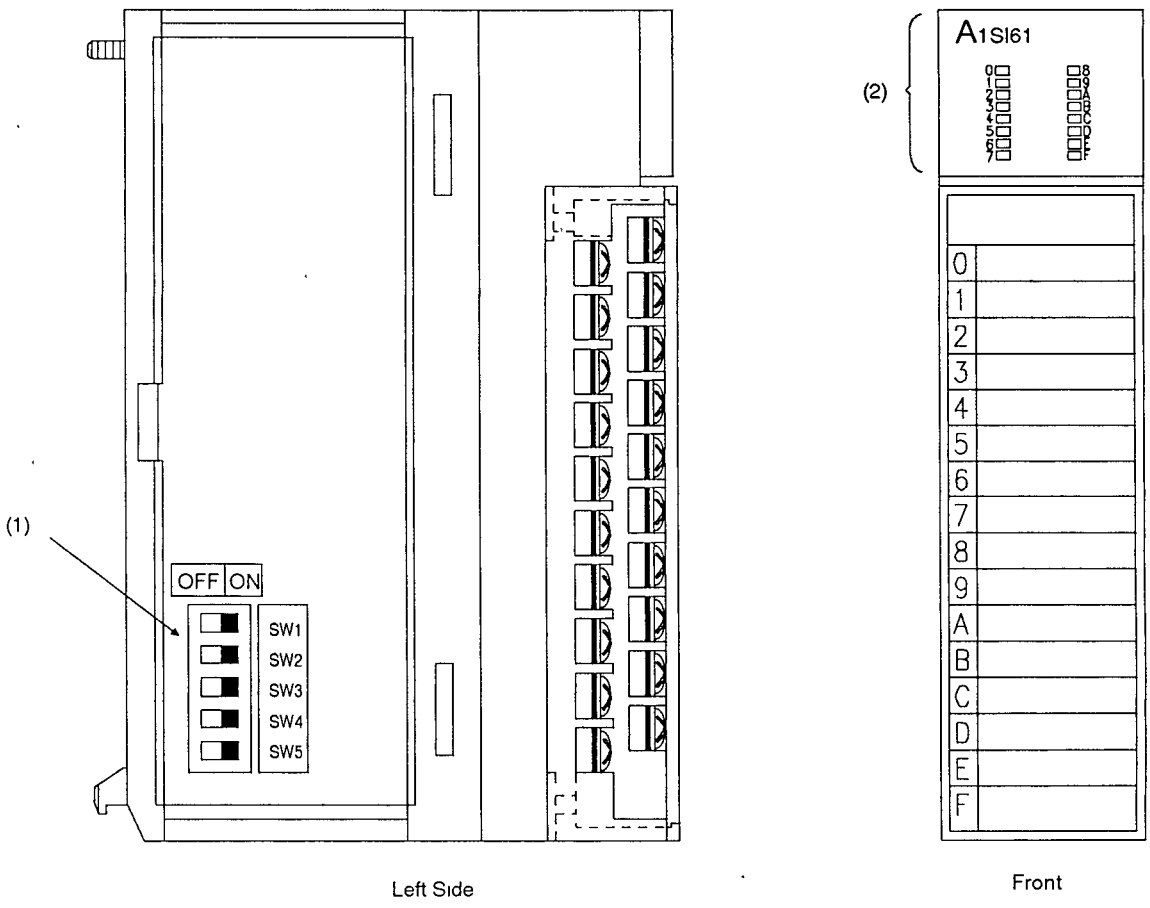
(2) Keep the interrupt input signal wire as far away as possible from the power line and main circuit cable. Use twisted-pair cables to avoid inducing noise voltage.

2.3 Applicable Systems

(1) The A1SI61 is only applicable to the A1SCPU.

(2) The A1SI61 can be installed in an A1SCPU in a one-to-one ratio.

2.4 Nomenclature



No.	Name & Contents			
(1)	Interrupt processing condition setting switch Sets whether interrupt processing is executed by the leading edge (RISE) or trailing edge (FALL) of an interrupt signal Set it in 4-points units Factory-set to ON.			
	Switch	**Terminal Number**	**OFF**	**ON**
	SW1	0 to 3	FALL	RISE
	SW2	4 to 7		
	SW3	8 to B		
	SW4	C to F		
	SW5	unused	NC	
(2)	Input display LED Displays the input ON/OFF state Lit when ON			

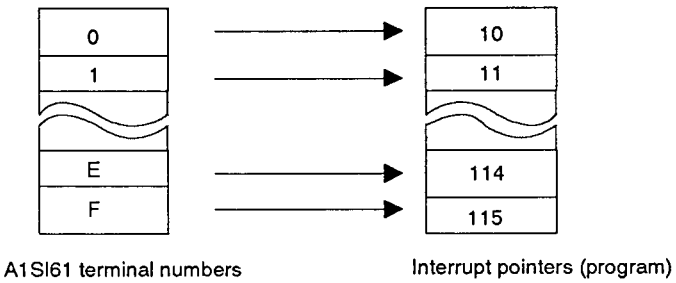
3. INTERRUPT PROCESSING

3.1 Designating an Interrupt Program (I0 to I15)

The A1SI61 can execute 16 interrupt programs (I0 to I15) which correspond to interrupt requests 0 to F.

When an interrupt signal is input to terminal number 0 and a slide switch is set to RISE, the program jumps to interrupt pointer I0, and an interrupt program is executed.

The interrupt pointer numbers (I) which correspond to A1SI61 terminal numbers is given below.



POINT

The interrupt program that corresponds to an interrupt factor includes interrupt pointers I16 to I23 (special-function module interrupt) and I29 to I31 (time interrupt).

The priority of these pointers is as follows.

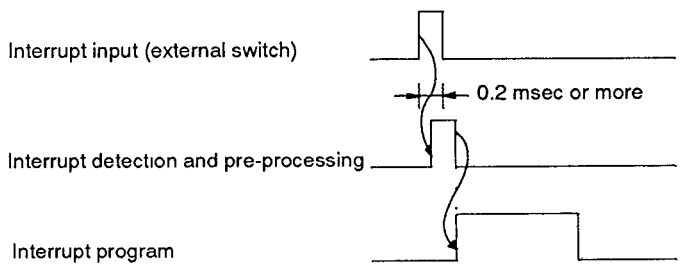
I16 to I23 → I0 to I15 → I13 to I29
← Higher priority

3.2 Interrupt Signal Pulse Width

The response time of an A1SI61 is 0.2 msec from OFF to ON.

Therefore, the pulse width of an interrupt signal is 0.2 msec or more.

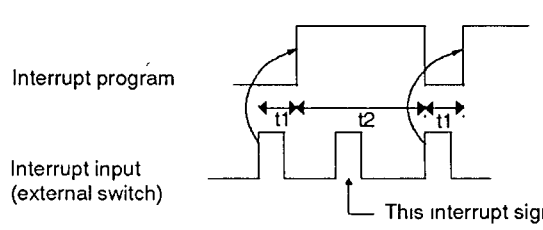
If the pulse width is less than 0.2 msec, an interrupt may not be received.



3.3 Minimum Interval When Repeating the Same Interrupt Continuously

When repeating the same interrupt continuously, set the interrupt interval input pulse to a time greater than the total time until executing an interrupt program by an interrupt signal and the execution time of an interrupt program.If it is set less than this total, the interrupt signal will be stored.

And then, the interrupt is executed after completing execution of an interrupt program. However, even if several interrupt signals are input, an interrupt is executed only once.



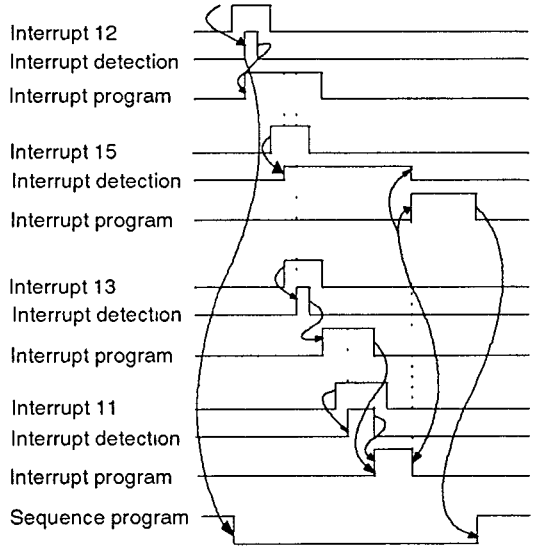
t1: Time until executing an interrupt program after inputting an interrupt

t2. Execution time of an interrupt program

3.4 Interrupt Processing Priorities

If several interrupt factors occur during interrupt processing, the lowest input number has the highest priority.

This is explained as indicated below.



In this example, the order of execution is:

I2 → I3 → I1 → I5

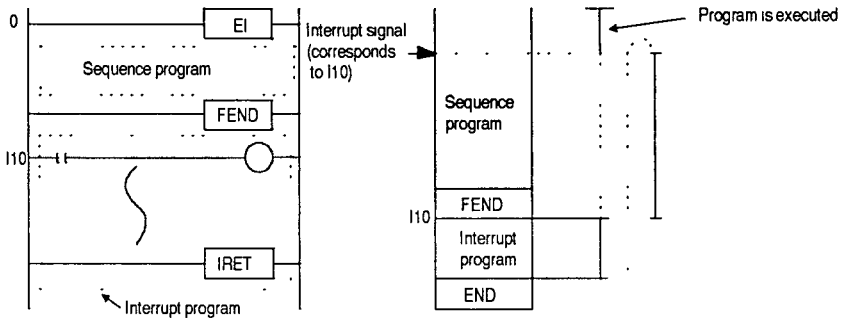
Even if an interrupt factor occurs in the order of I5 and I3 while processing interrupt I2, the interrupt program of I3 whose interrupt number (pointer) is lower has priority over I5. Therefore, after processing I2, I3 is executed.

And, while executing the I3 interrupt program, the I1 interrupt factor occurs. Therefore, after processing I3 before I5, the interrupt program of I1 will be executed, after which I5 will be executed.

3.5 Creating an Interrupt Program

Create an interrupt program after a sequence program (after the FEND instruction and before the END instruction). Enter the interrupt pointer I[ ][ ] at the head (the left side of a bus) of an interrupt program.

And then, enter an IRET instruction at the end of the interrupt program.



Sample of interrupt program ladder　　Program flow

POINTS

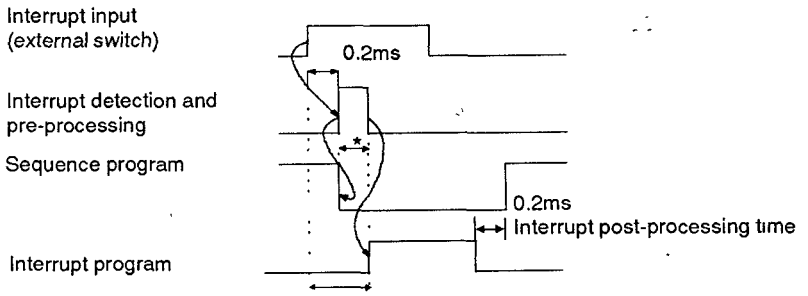
(1) When an interrupt program is executed by using an A1SI61, it is necessary to switch to the EI state (interrupt enabled state) using an EI instruction.

(2) The interrupt program that corresponds to interrupt input in the DI state is executed in the EI state.

(3) The interrupt program that corresponds to interrupt input in STOP state is executed in the EI state after switching from the STOP state to the RUN state.

3.6 Interrupt Processing Timing

The time to actually execute an interrupt program is delayed even when an interrupt signal is input. In addition, execution of a program will be delayed if an interrupt is input while executing other interrupts as explained below.



The time until executing an interrupt program after turning ON an interrupt

If a CPU is executing the following processing, execution of an interrupt program is delayed. Therefore, the * time changes.

The values are as follows. (The following shows maximum values.)

Item	A Sequence is being Executed Normally.	A Program from I29 to I31 is being Executed.	General Data Processing (Communications with an A1SJ71C24 and AD51, etc.)	Data Link Interrupt is being Processed.	Monitor Interrupt is being Processed. (Peripheral Device Interrupt)
Value of *	0.2 msec	1 msec + execution time of the interrupt program of I29 to I31	1.5 msec	0.5 msec	(0.65 msec In case of monitoring it the device of 128 bytes)

The time of * when the above processing overlaps is the total time of the individual value.

[Sample calculation]

If an interrupt is executed from an A1SI61 while processing general data

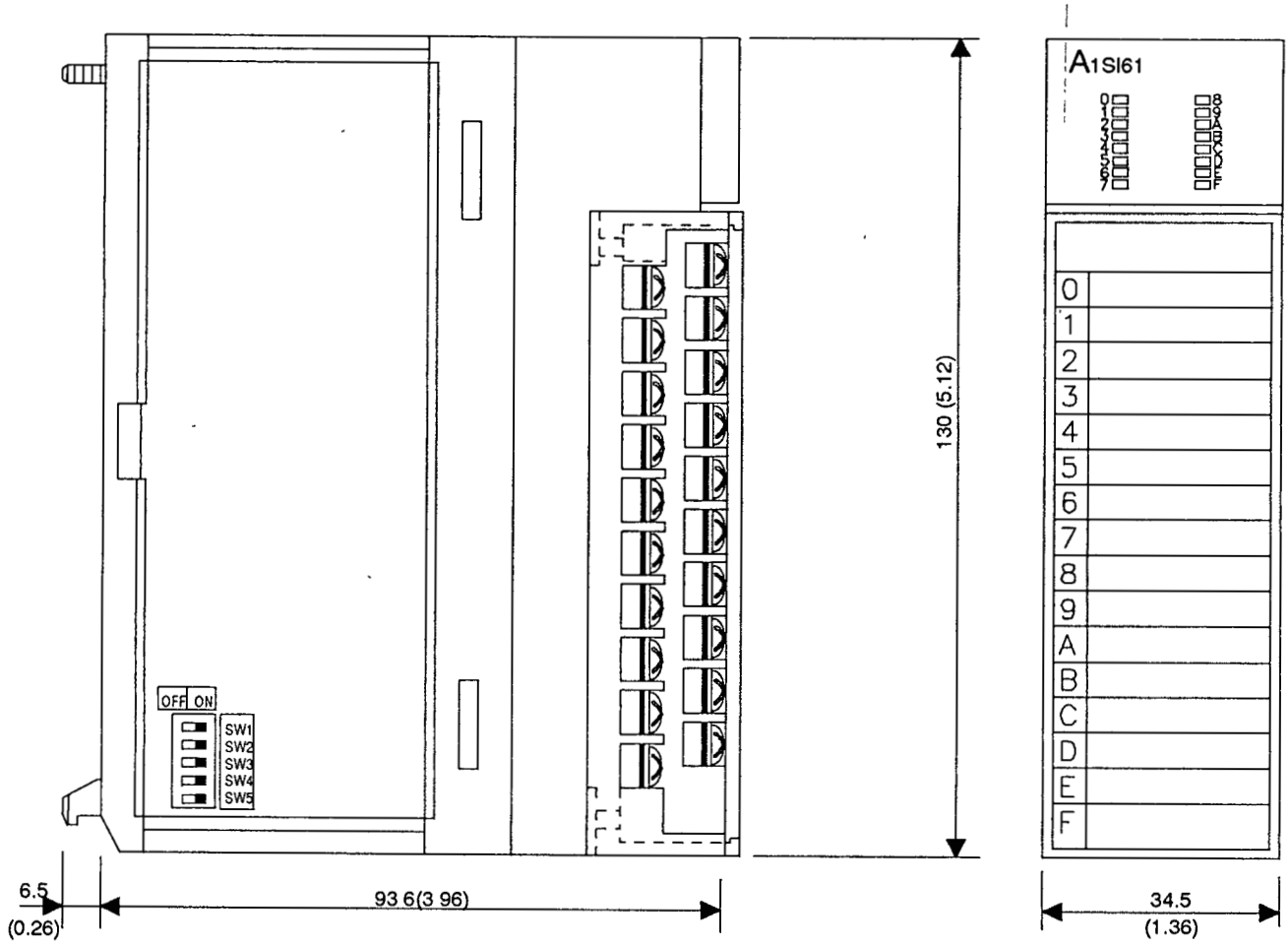
* Value = 0.2 + 1.5 msec

POINT

Even if a basic instruction and an application instruction are being executed, they are interrupted and an interrupt program is executed according to the timing indicated above.

APPENDIX

APPENDIX 1 OUTSIDE DIMENSIONS



Unit : mm(inch)

IMPORTANT

(1) Design the configuration of a system to provide an external protective or safety inter locking circuit for the PCs.

(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.

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