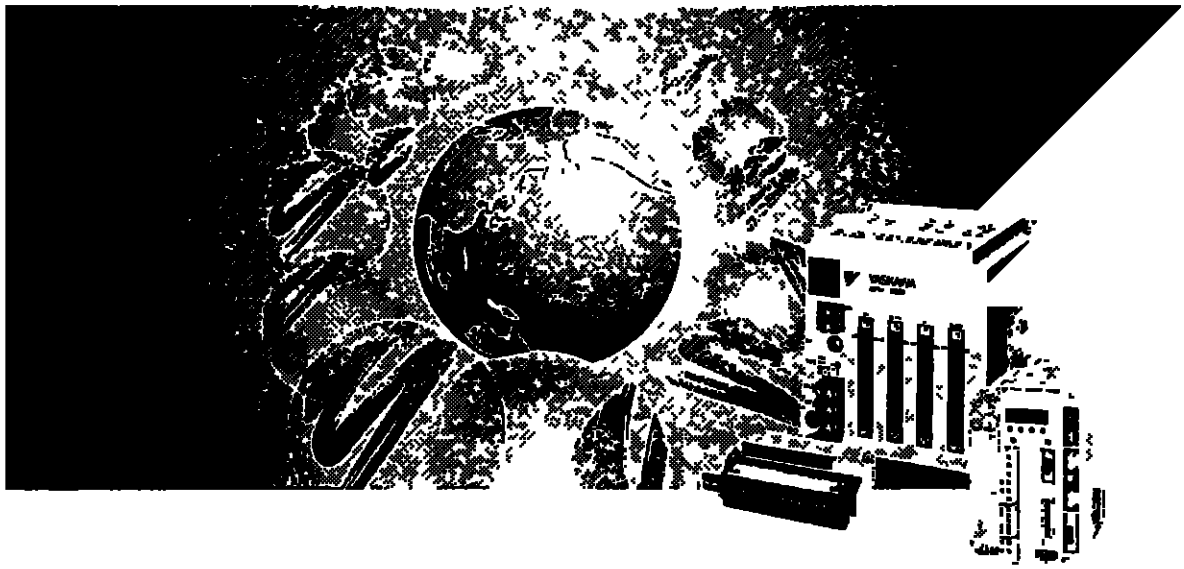
Machine Controller MP900 Series

MECHATROLINK System

USER'S MANUAL



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MANUAL NO SIEZ-C887-5 1

Safety Information

The following conventions are used to indicate precautions in this manual. Failure to heed precautions provided in this manual can result in serious or possibly even fatal injury or damage to the products or to related equipment and systems.

⚠ WARNING Indicates precautions that, if not heeded, could possibly result in loss of life or serious injury.

⚠ Caution Indicates precautions that, if not heeded, could result in relatively serious or minor injury, damage to the product, or faulty operation.

In some situations, the precautions indicated could have serious consequences if not heeded.

⃠ Prohibited Indicates prohibited actions that must not be performed. For example, this symbol would be used to indicate that fire is prohibited as follows ⃠.

Mandatory Indicates compulsory actions that must be performed. For example, this symbol would be used as follows to indicate that grounding is compulsory .

Visual Aids

The following aids are used to indicate certain types of information for easier reference

Indicates important information that should be memorized

Also, indicates low-level precautions that, if not heeded, may cause an alarm to sound but will not result in the device being damaged

Indicates additional information or information that is useful to have memorized

Describes technical terms that are difficult to understand, or appear in the text without an explanation being given

CONTENTS

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About this Manual

- This manual describes MECHATROLINK, a high-speed field network used with the MP9□□ Machine Controllers
- The following MECHATROLINK Driver Modules can be used with the MP9□□ Machine Controllers
  - MP910
  - MP920 (SVB)
  - MP930
  - MP940
- Read this manual before creating a MECHATROLINK system including MP9□□ Machine Controllers and store it in a safe place for future reference

Related Manuals

- The following table shows the manuals relating to the MP9□□ Machine Controllers Refer to these manuals as required
- Understand the product specifications, limitations, and other conditions before attempting to use this product

Manual Name	Manual No	Contents
MP9□□ Machine Controller User's Manual Ladder Programming	SIEZ-C887-1.2	Describes the processing instructions used in MP9□□ ladder programs
MP9□□ Machine Controller User's Manual Motion Programming	SIEZ-C887-1.3	Describes the motion programming language used for the MP9□□
MP9□□ Machine Controller User's Manual Programming Panel Software (for simple operation/standard operation)	SIEZ-C887-2.3 (for simple operation) (To be prepared), SIEZ-C887-2.4 (for standard operation) (To be prepared)	Describes the CP-717 Programming Panel software used for designing and maintaining the MP9□□
MP920 Machine Controller User's Manual Motion Module	SIEZ-C887-2.5	Describes the functions, specifications, and usage of the MP920 Motion Modules (SVA-01/02, SVB-01, PO-01, etc.)
MP920 Machine Controller User's Manual Communications Module	SIEZ-C887-2.6	Describes the functions, specifications, and operating methods of the MP920 Communications Modules (217IF, 215IF, and 218IF) in details

Manual Name	Manual No	Contents
MP910 Machine Controller User s Manual Design and Maintenance	SIEZ-C887-3 1	Describes the functions specifications, setup procedures, and operating methods of the MP910 Machine Controller
MP920 Machine Controller User's Manual Design and Maintenance	SIEZ-C887-2 1	Describes the functions specifications, setup procedures, and operating methods of the MP920 Machine Controller
MP930 Machine Controller User s Manual Design and Maintenance	SIEZ-C887-1 1	Describes the functions, specifications, setup procedures, and operating methods of the MP930 Machine Controller
MP940 Machine Controller User's Manual Design and Maintenance	SIEZ-C887-4 1 (To be prepared)	Describes the functions specifications, setup procedures, and operating methods of the MP940 Machine Controller
FDS System Installation Manual	SIE-C873-16 4	Describes transmission line wiring methods

Using This Manual

Intended Audience

This manual is intended for the following users

- Those responsible for estimating the MP9□□ system
- Those responsible for deciding whether to apply the MP9□□ system
- Those responsible for designing the MP9□□ system so that it can be mounted in the control and operating panels
- Those responsible for making, inspecting, testing, adjusting, and maintaining the control and operating panels in which the MP9□□ is mounted

Description of Technical Terms

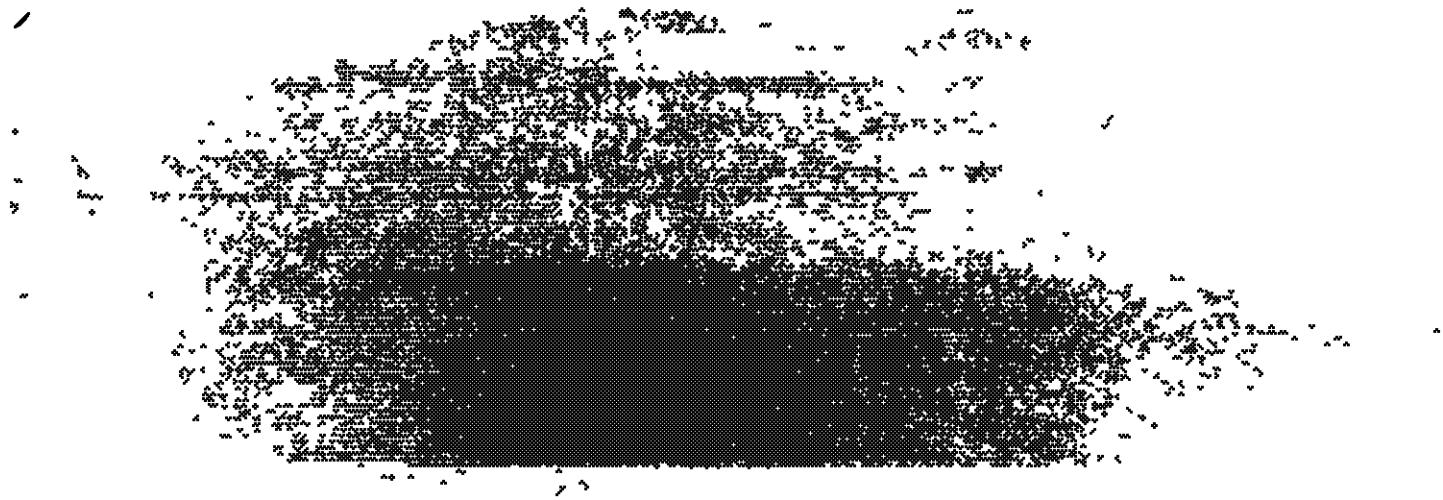
In this manual, the following terms are defined as follows

- PC = Programmable Logic Controller
- MP□□ = MP9□□ Series Machine Controllers (MP910/920/930/940)
- "--" in "MOV [axis1]-- " represents numeric data for axis 1

Inverted Signals

In this manual a slash (/) is placed in front of the name of any signal that is valid when low (L).

- $\overline{\text{S-ON}}$ = /S-ON
- $\overline{\text{P-CON}}$ = /P-CON



Safety Precautions

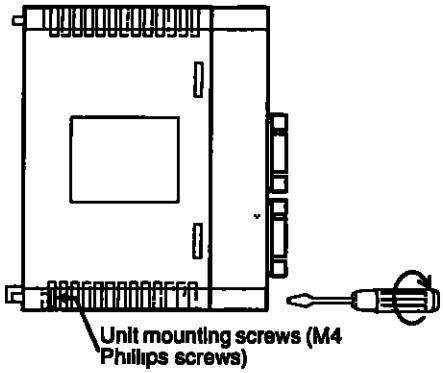
This section describes precautions that apply to correct use of devices Before installing, operating, maintaining or inspecting devices, always read this manual and all other documents provided to ensure correct programming Before using the equipment, familiarize yourself with equipment details, safety information, and all other precautions

■ Installation

⚠ Caution

- Firmly tighten the Module mounting screws and terminal block mounting screws to prevent them from loosening during operation

  Loose screws may result in a malfunction of the MP9□□



- Always turn OFF the power supply to the Module before installing it
- Insert the connectors of the cables that are to be connected to the MP9□□ Modules and secure them well

  Incorrect insertion of the connectors may result in a malfunction of the MP9□□

■ Wiring

⚠ Caution

- Always connect a power supply that meets the given specifications

  Connecting an inappropriate power supply may cause fires
- Wiring must be performed by qualified personnel

  Incorrect wiring may cause fires, product failure, or malfunctions
- Do not accidentally leave foreign matter such as wire chips in the Module when wiring

  This may cause fires, failures, and malfunctions

Manditory

- Always ground the FG terminal to a ground resistance 100 Ω or less

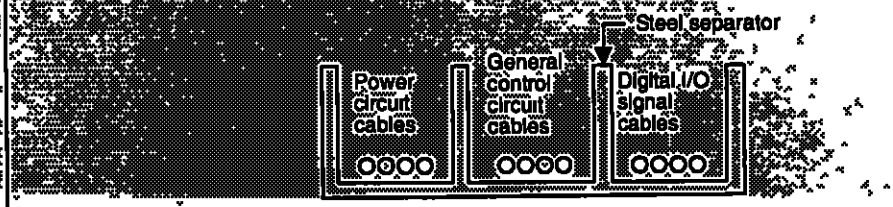
  Failure to ground the MP9□□ may result in electrical shocks or malfunctioning

Select, separate, and lay external cables correctly.

- Consider the following items when selecting the I/O signal lines (external cables) to connect the MP9□□ Module to external devices
  - Mechanical strength
  - Noise interference
  - Wiring distance
  - Signal voltage etc.
- Separate the I/O signal lines from the power lines both inside and outside the control panel to reduce the influence of noise from the power lines.

  If the I/O signal lines and power lines are not separated properly, malfunctioning may result

Example of Separated External Cables



■ Application

⚠ WARNING

- Do not touch any Module terminals when the system power is ON

  There is a risk of electrical shock

⚠ Caution

- Do not attempt to modify the MP9□□ programs, force outputs, switch between RUN and STOP, or performed other similar operations while the MP9□□ is operating without knowing the direct and indirect consequences of the operation

  Incorrect programming or operation may damage the equipment or cause an accident

■ Maintenance

⚠ WARNING

- Make sure that the polarity of the Module's built-in battery is correct The battery must be installed correctly and must not be charged, disassembled, heated, thrown into fire, or short-circuited

  Improper handling may cause the battery to explode or ignite

⊘ Prohibited

- Do not attempt to disassemble or modify the MP9□□ Modules in any way

  Doing so can cause fires, product failure, or malfunctions
- The customer must not replace any built-in fuses

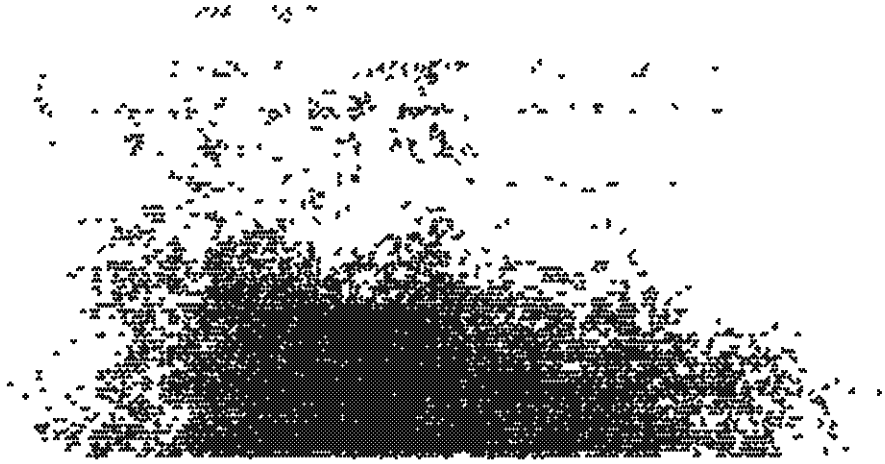
  If the customer replaces a built-in fuse, the MP9□□ Modules may malfunction or break down The built-in fuse must always be replaced by Yaskawa service staff

■ General Precautions

Always note the following to ensure safe use
• The MP9□□ was not designed or manufactured for use in devices or systems directly related to human life Users who intend to use the product described in this manual for special purposes such as devices or systems relating to transportation, medical, space aviation, atomic power control, or underwater use must contact Yaskawa Electric Corporation beforehand
• The MP9□□ has been manufactured under strict quality control guidelines However, if this product is to be installed in any location in which a failure of the MP9□□ involves a life and death situation or in a facility where failure may cause a serious accident, safety devices MUST be installed to minimize the likelihood of any accident
• Drawings in this manual show typical product examples that may differ somewhat from the product delivered
• This manual may change without prior notice due to product improvements and specification changes or for easier use We will update the manual number of the manual and issue revisions when changes are made The revision number of the revised manual appears on the back of the manual
• Contact your nearest Yaskawa sales representative or the dealer from whom you purchased the product and quote the manual number on the front page of the manual if you need to replace a manual that was lost or destroyed
• Contact your nearest Yaskawa sales representative or the dealer from whom you purchased the product to order new nameplates whenever a nameplate becomes worn or damaged
• Products modified by the customer are not covered by the Yaskawa warranty, nor does Yaskawa assume any liability for injury or damage that may result from such modifications

1 System Overview

This section provides an overview of the MECHATROLINK system



1.1 MECHATROLINK System Overview

This section provides an overview of the MECHATROLINK system and its features

1 1 1 The MECHATROLINK System

A basic MECHATROLINK system is composed of one MECHATROLINK Driver Module and one or more MECHATROLINK Modules, which are MECHATROLINK-compatible devices

The main characteristics of the MECHATROLINK system configuration are listed below

- A MECHATROLINK system is a high-speed field network that provides distributed control over I/O Modules
- A MECHATROLINK system's network uses the Master/Slave format
- A MECHATROLINK system is composed of a Master device and Slave devices

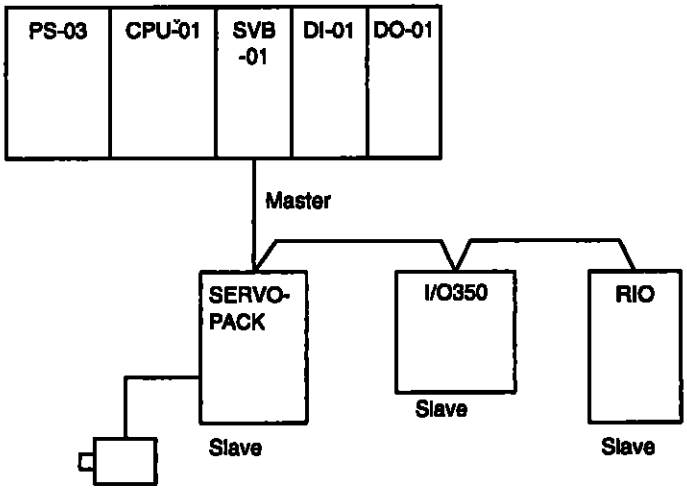
■Master Devices

The following MECHATROLINK Driver Modules can be used as Master devices The MECHATROLINK Driver Module is standard in all of the Modules except the MP920

Machine Controller	Driver Module	Model Number
MP910	JAPMC-MC101 Board (ISA)	JAPMC-MC101
	JAPMC-MC151 Board (C-PCI)	JAPMC-MC151
MP920	SVB-01 Module	JEPMC-MC210
MP930	CPU Module	JEPMC-MC350
MP940	CPU Module	JEPMC-MC400

■Slave Devices

Some MECHATROLINK Slave Devices cannot be connected to the MP930 and MP940 The following table shows the classes of Slave Modules that can be controlled from each MECHATROLINK Driver Module (A 'Y" indicates that the Module can be connected and an "N" indicates that it cannot)



Module Model	Name	Model Number	MP910	MP920	MP930	MP940
MECHATROLINK-compatible Servos	Σ Series SGD-□□□N Servodrive	SGD-□□□N	Y	Y	Y	N
	Σ Series SGDB-□□□N Servodrive	SGDB-□□□N	Y	Y	Y	N
	Σ Series SGDH-□□□E Servodrive	SGDH-□□□E + JUSP-NS100	Y	Y	Y	N
Digital I/O Modules	64-point I/O Module	JEPMC-IO350	Y	Y	Y	Y
	16-point I/O Module	87816-1100X	Y	Y	N	Y
	Wide-voltage 8-point Output Module	JAMSC-120DRA83030	Y	Y	Y	Y
	100-VAC 8-point Input Module	JAMSC-120DAI53330	Y	Y	Y	Y
	200-VAC 8-point Input Module	JAMSC-120DAI73330	Y	Y	Y	Y
	12/24-VDC 16-point Input Module	JAMSC-120DDI34330	Y	Y	Y	Y
	12/24-VDC 16-point Output Module	JAMSC-120DDO34340	Y	Y	Y	Y
	100/200-VAC 8-point Output Module	JAMSC-120DAO83330	Y	Y	Y	Y
	Wildcard I/O Module		Y	Y	Y	Y
Analog I/O Modules	Analog Input Module (±10 V)	JAMSC-120AVI02030	Y	Y	Y	Y
	Analog Output Module (±10 V)	JAMSC-120AVO01030	Y	Y	Y	Y
Special Purpose Modules	Reversible Counter Module with Preset Function	JAMSC-120EHC21140	Y	Y	Y	N
	Pulse MC Module	JAMSC-120MMB20230	Y	Y	Y	N
PLC Module	MP940 Module	JEPMC-MC400 JEPMC-MC410	Y	Y	Y	Y

1.1.2 MECHATROLINK System Features

The MECHATROLINK system features are listed below

- The MECHATROLINK system now provides high-speed refreshing rates comparable to local I/O With some Modules in the MP9□□ Series, the refreshing rate is selectable, which determines the maximum number of Modules that can be connected
- Up to 14 MECHATROLINK Modules can be connected to the MECHATROLINK Driver Module that is the Master Device in the system
- Up to 16 Modules can be connected to an MP920 MECHATROLINK Driver Module (the SVB-01 Module) when CPU Racks are added
- The MP940 does not support Servo Modules or Special I/O Modules (Intelligent Modules)
- MECHATROLINK Modules can be connected with a single twisted-pair cable This configuration provides remote I/O with less wiring so a simple and low-cost system can be configured
- For better fault tolerance, the Master can detect when an error has occurred in a Slave Also, Slaves other than Servo Modules are equipped with an automatic disconnection[1]/ automatic restart[2] function

[1] Automatic disconnection If an error is detected in communications between the Master and a Slave, the affected Slave will be removed from the network and communications will continue with the unaffected Slaves

[2] Automatic restart The Master will resume communications automatically when it determines that the affected Slave is responding regularly and has resumed normal operation

1.2 MECHATROLINK System Configuration

In the following example of the system, several Slave devices such as a MECHATROLINK-compatible Servo and I/O Module are connected to an MP920 MECHATROLINK Driver Module (SVB-01 Module) which acts as the Master device

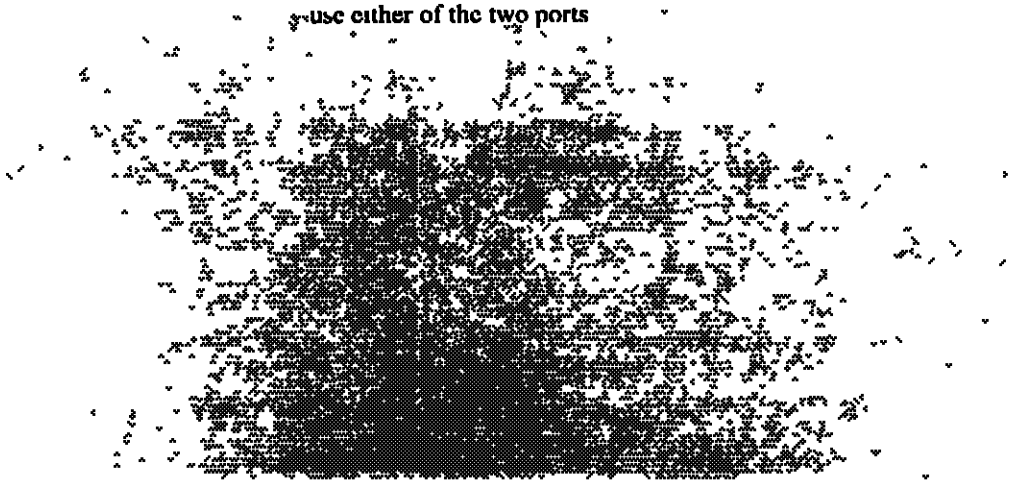
1 2.1 System Configuration Precautions

Note the following precautions when configuring a MECHATROLINK network system

- The MP910, MP930, and MP940 have a MECHATROLINK Driver Module built into the Unit as a standard feature
- The MP920 MECHATROLINK Driver Module (SVB-01 Module) can be mounted in any slot on the Mounting Base of any Rack The Module occupies one slot
- Be sure that terminators (terminating resistance) are connected at both ends of the system Refer to the following table

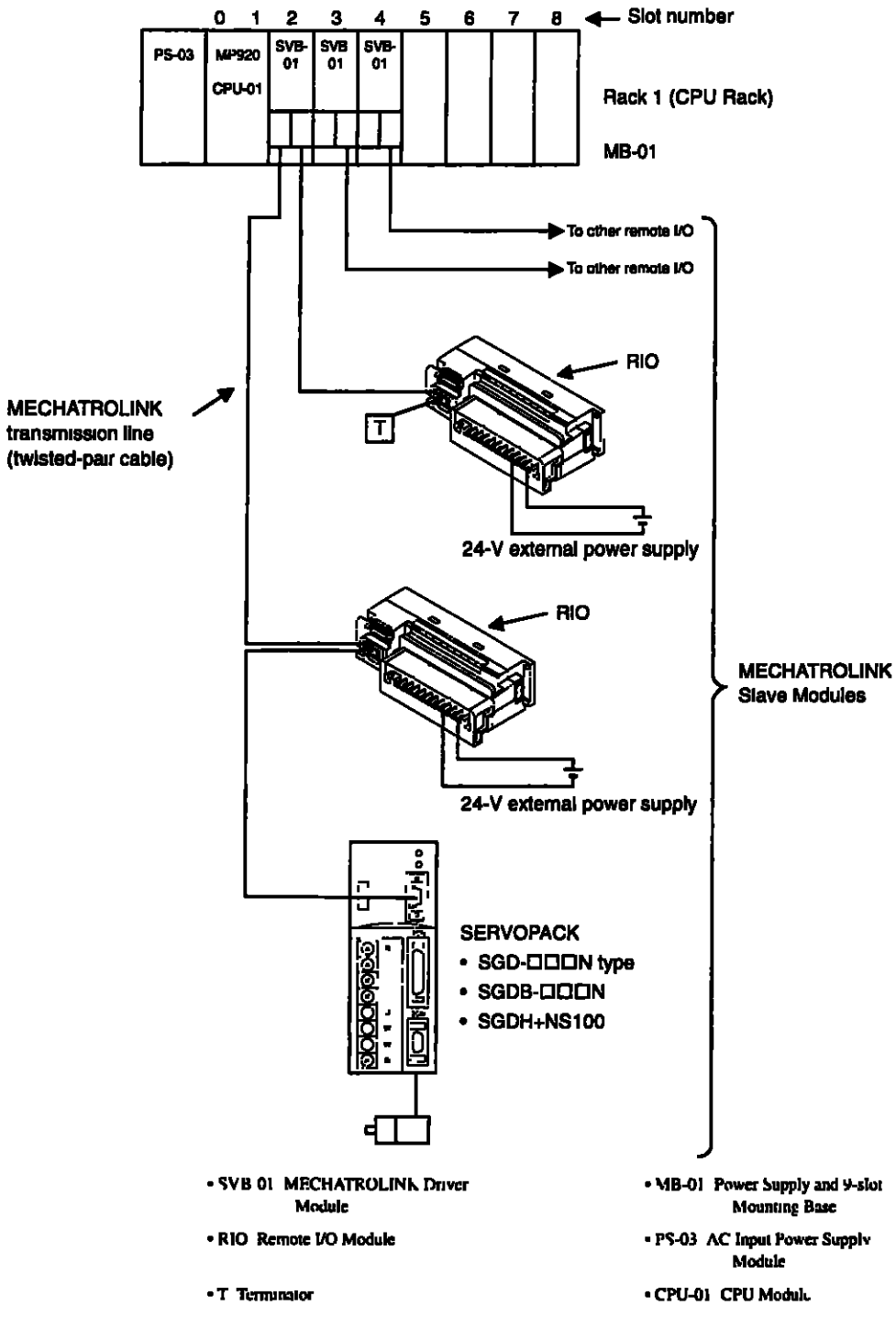
Machine Controller (MECHATROLINK Driver Module)	Termination
MP910	A terminator is required when the Module is at the end of the system
MP920 (SVB-01)	A terminator is required when the Module is at the end of the system
MP930	A terminator is not required because one is built into the Module
MP940	A terminator is required when the Module is at the end of the system

- The MP920 (SVB-01) and MP940 MECHATROLINK Driver Modules are equipped with two MECHATROLINK ports per Module The port's functions are the same, so use either of the two ports



1 2 2 System Configuration Example

The system configuration example is shown in the following diagram Up to 30 I/O Modules can be connected to a single SVB-01 Module



- SVB 01 MECHATROLINK Driver Module
- RIO Remote I/O Module
- T Terminator
- MB-01 Power Supply and 9-slot Mounting Base
- PS-03 AC Input Power Supply Module
- CPU-01 CPU Module

Fig 1 1 MECHATROLINK Network System Configuration Example

1.3 MECHATROLINK Driver Module

This section describes the components and specifications of the MP9□□ MECHATROLINK Driver Modules

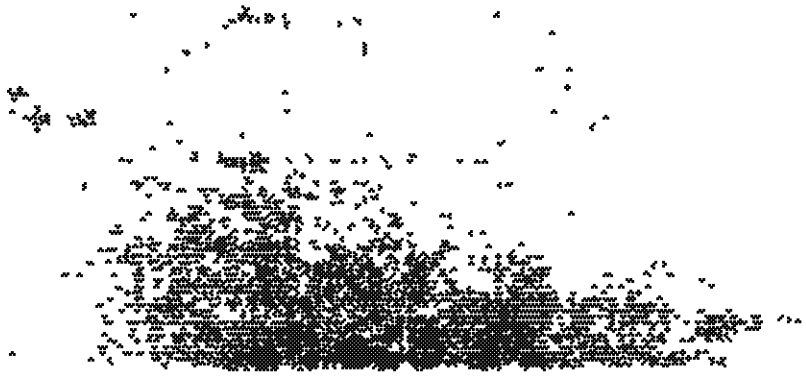
The MECHATROLINK Driver Module is also installed as a standard feature in the CPU Modules of some MP9□□ Series Machine Controllers In this case, refer to *MP9□□ Machine Controller User's Manual Design and Maintenance* for details

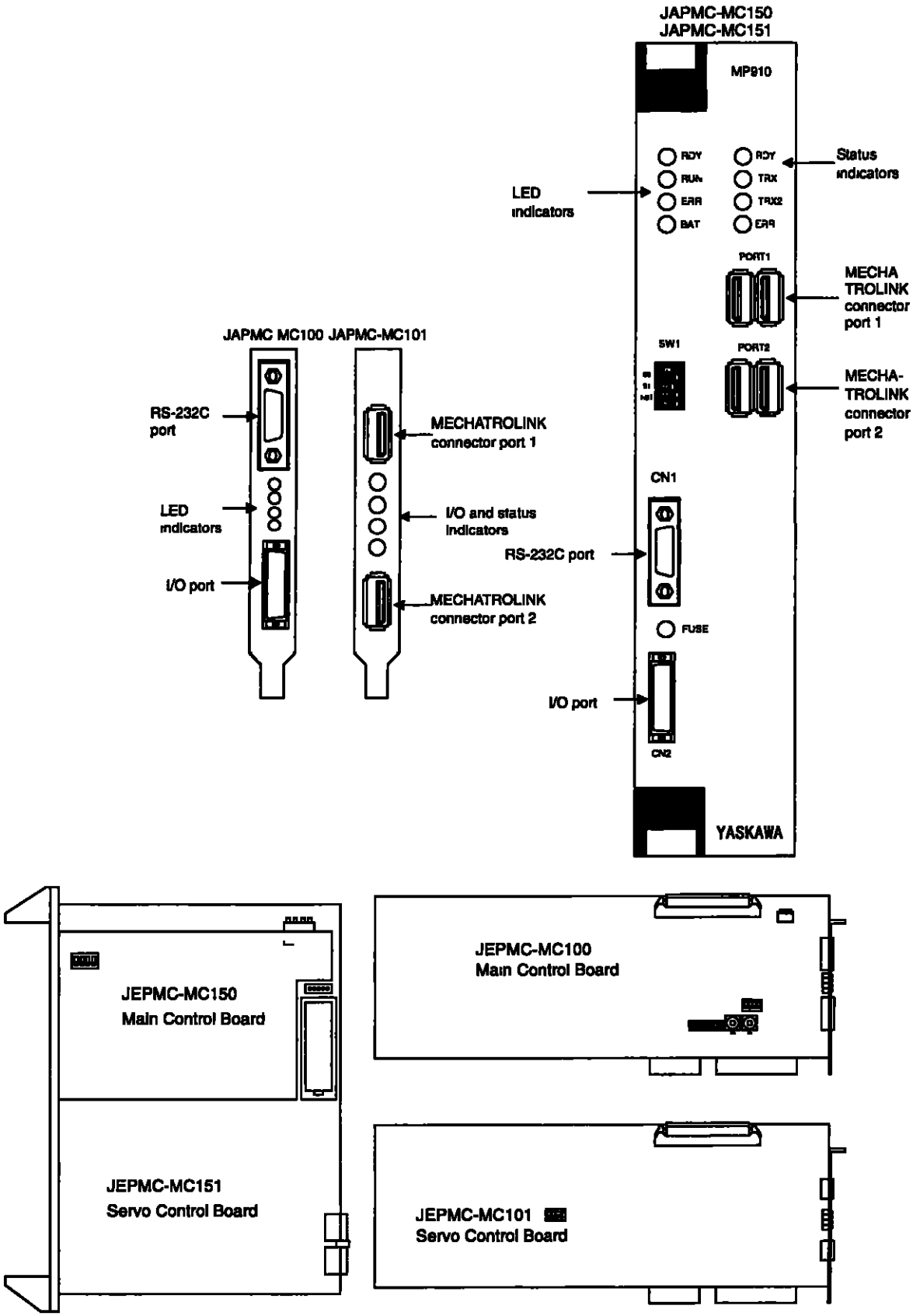
1.3.1 MP910 Driver Module

The MP910's MECHATROLINK Driver Module is built-in as a standard feature in the Unit Both ISA bus and C-PCI bus are available to meet the requirements of your personal computer

■ External Appearance and Configuration

The following diagram shows the MP910 Module's external parts

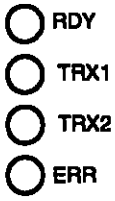



JAPMC-MC150
JAPMC-MC151
MP910
RDY
RUN
ERR
BAT
RDY
TRX
TRX2
ERR
Status indicators
LED indicators
PORT1
MECHA TROLINK connector port 1
SW1
PORT2
MECHA-TROLINK connector port 2
JAPMC MC100 JAPMC-MC101
RS-232C port
LED indicators
I/O port
MECHATROLINK connector port 1
I/O and status indicators
MECHATROLINK connector port 2
CN1
RS-232C port
FUSE
I/O port
CN2
YASKAWA
JEPMC-MC150
Main Control Board
JEPMC-MC151
Servo Control Board
JEPMC-MC100
Main Control Board
JEPMC-MC101
Servo Control Board

■LED Indicators

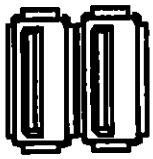
Indicator Name	Color	Meaning When Lit
RDY	Green	System operating normally
RUN	Green	Program running
ERR	Red	System fault or failure occurred
BAT	Red	Battery needs replacing
FUSE	Red	Blown fuse

■I/O and Status Indicators



Indicator Name	Color	Meaning When Lit
RDY	Green	System operating normally
TRX1	Green	Transmitting through MECHATROLINK Port 1
TRX2	Green	Transmitting through MECHATROLINK Port 2
ERR	Red	An error occurred

■MECHATROLINK Connector



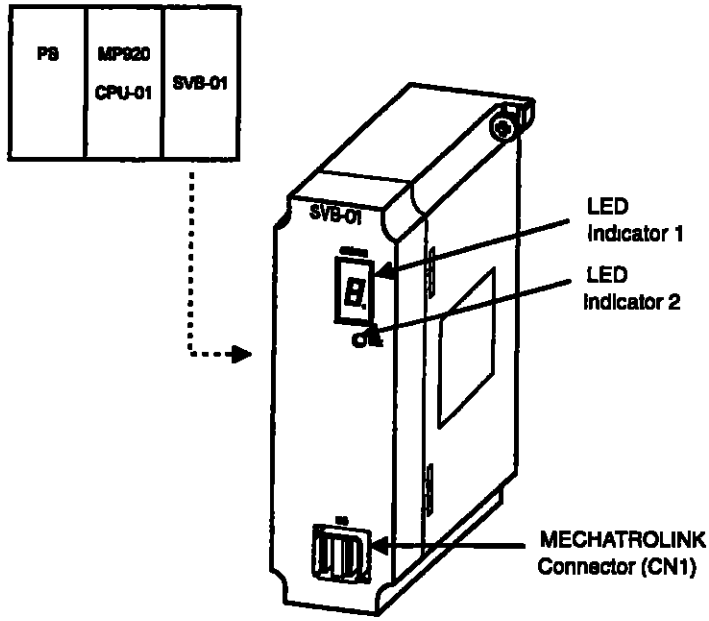
Connects the I/O Unit for MECHATROLINK communications (JEPMC-IO350) or a SERVOPACK (SGD-□□□N or SGDB-□□AN) with the MECHATROLINK cable (JEPMC-W6000-A3)

1.3 2 MP920 Driver Module

An SVB-01 Option Module is required as the MP920's MECHATROLINK Driver Module

■ External Appearance and Configuration

The following diagram shows the SVB-01 MECHATROLINK Driver Module's external parts

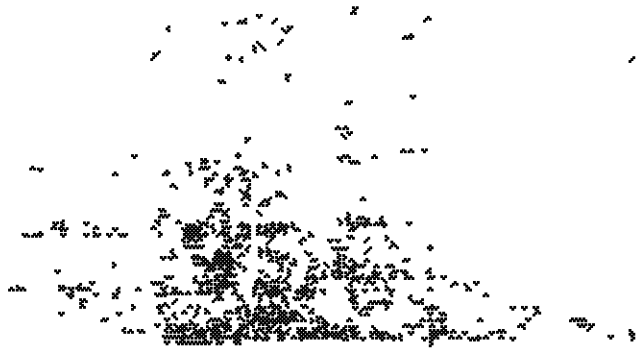


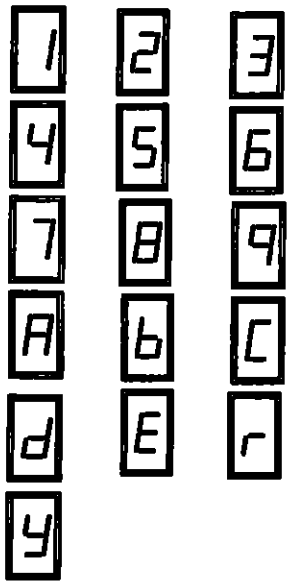
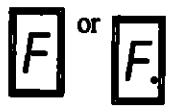
■LED Indicator 1

The STATUS indicator is a 7-segment LED indicator that displays the RUN/error status of the SVB-01 Module

The following table shows the indicator display patterns

Display	Category	Meaning
	Hardware reset	The SVB-01 Module is in hardware reset status
	Initializing	This display appears for 1 to 6 seconds after the power of the SVB-01 Module is turned ON or reset



Display	Category	Meaning
	Normal operation	One of servo numbers 1 to 16 will be displayed The servo Module is operating normally
 or followed by error code	Serious fault	A 2-digit error code appears following "F" Example F→□→1 F→0→1 Watchdog timer over F→4→1 ROM diagnosis error F→4→2 RAM diagnosis error F→4→3 Shared memory diagnosis error F→4→8 General illegal instruction interruption occurrence F→4→9 Slot illegal instruction interruption occurrence F→5→0 CPU address error interruption occurrence F→5→2 User brake interruption occurrence F→5→3 TRAP instruction interruption occurrence F→5→5 CERF initialization error F→5→8 TLB error exception interruption occurrence F→ 5→9 TLB error exception interruption occurrence F→6→0 TLB disable exception interruption occurrence F→6→1 TLB disable exception interruption occurrence F→6→2 Initial page write in exception interruption occurrence F→6→3 TLB protective exception interruption occurrence F→6→4 TLB protective exception interruption occurrence

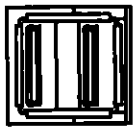
Display	Category	Meaning
	Alarm	This will be displayed when the following errors occur at one of the four axes (axis 1 to 14) • Motion setting parameter setting error (Refer to IB□□001) • Alarm occurrs (Refer to IL□□22) • Motion command abnormal-end status (when IB□□155 is ON)
	Abnormal	This will be displayed when the following error occurs at one of the four axes (axis 1 to 14) Fixed motion parameter setting error (Refer to IB□□002)

■LED Indicator 2

The TRX indicator is an LED indicator that displays the communications status of the SVB-01 Module

Name	Color	Meaning When Lit
TRX	Green	Transmission enabled

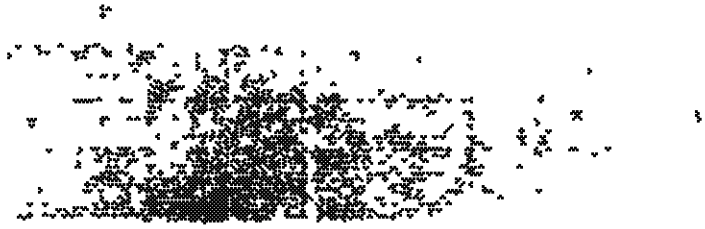
■MECHATROLINK Connector (CN1)



Connects SERVOPACK or I/O Unit with MECHATROLINK Cable (JEPMC-W6000-A3 or JEPMC-W6000-01)

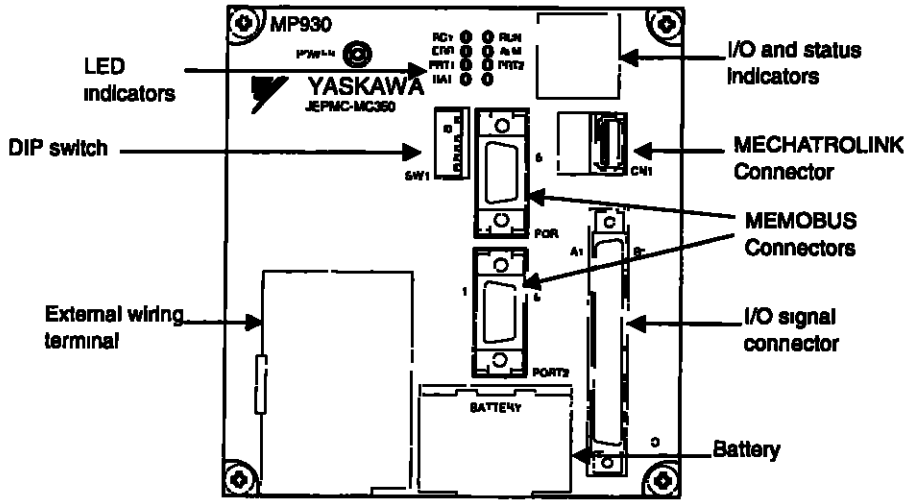
1.3.3 MP930 Driver Module

The MP930 s MECHATROLINK Driver Module is built-in as a standard feature in the Unit



■ External Appearance and Configuration

The following diagram shows the MP930 Module's external parts



■LED Indicators

RDY RUN
ERR ALM
PRT1 PRT2
BAT

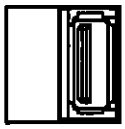
Name	Color	Meaning When Lit
RDY	Green	System operating normally
RUN	Green	User program running
ERR	Red	System fault or failure occurred
ALM	Red	Minor system failure occurred
PRT1	Green/Red	Port 1 sending/receiving data
PRT2	Green/Red	Port 2 sending/receiving data
BAT	Red	Battery needs replacing

■I/O and Status Indicators

R	ACTIVE		F
1	9	17	25
2	10	18	26
3	11	19	27
4	12	20	28
5	13	21	29
6	14	22	30
7	15	23	31
8	16	24	32

Name	Color	Meaning When Lit
R	Yellow	Not used (Does not light)
ACTIVE	Yellow	Lights during MECHATROLINK transmission
F	Red	Blown fuse (The indicator lights even when 24-V power is not being supplied to the I/O signal connector)
1 to 16	Yellow	Input signal monitor
17 to 32	Yellow	Output signal monitor

■MECHATROLINK Connector



Connects the I/O Unit for MECHATROLINK communications (JEPMC-IO350) or a SERVOPACK (SGD-□□□N or SGDB-□□AN) with the MECHATROLINK cable (JEPMC-W6000-A3)

■DIP Switch

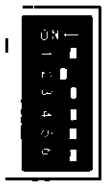
The DIP switch consists of six pins The pins are numbered 1 to 6, as shown in the following table

Each pin is ON when it is moved to the left

New pin settings are enabled the next time that the power is turned ON

The following table shows the function of each pin

Table 1 1 DIP Switch Pin Functions



Pin	Name	Setting	Function	Default Setting
1	FLASH	ON	Used by the system	OFF
		OFF	---	
2	RUN	ON	User program running	ON
		OFF	User program stopped	
3	INIT	ON	Function depends on the status of pin 4 ON Memory clear OFF Programming Panel port defaults	OFF
		OFF	Online	
4	TEST	ON	Terminal (communications) mode	OFF
		OFF	Online	
5	Not used	ON	---	OFF
		OFF	---	
6	S TST	ON	Used by the system	OFF
		OFF	Online	

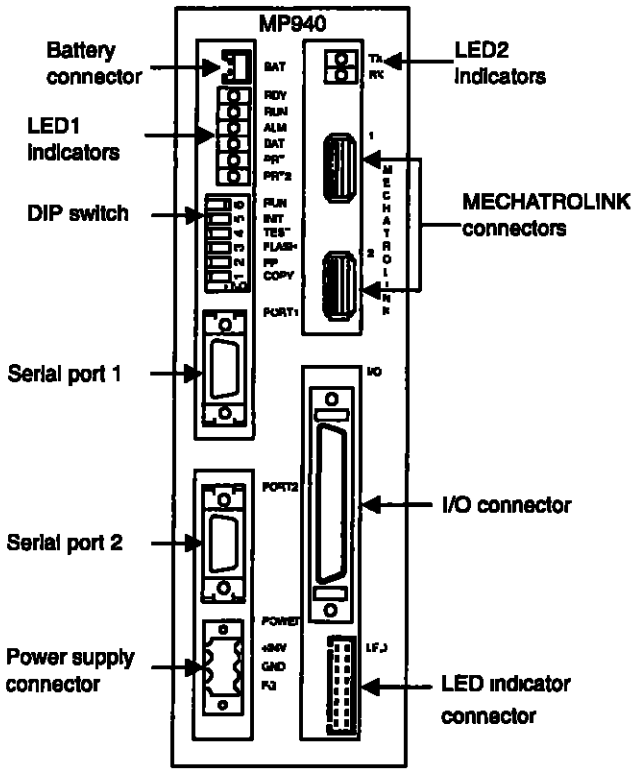
Note Pins 1, 4, 5, and 6 are always OFF during normal use

1.3 4 MP940 Driver Module

The MP940's MECHATROLINK Driver Module is built-in as a standard feature in the Unit

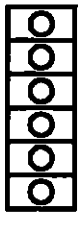
■ External Appearance and Configuration

The following diagram shows the external parts of the MP940 Module (MC400)



■LED1 Indicators

LED1 indicators show the Module's status



Name	Color	Meaning When Lit
RDY	Green	System operating normally
RUN	Green	Program running
ALM	Red	Lit Minor system failure occurred Flashing System fault or failure occurred
BAT	Red	Battery needs replacing
PRT1	Green	Serial port 1 sending data.
PRT2	Green	Serial port 2 sending data.

■LED2 Indicators

LED2 indicators show the MECHATROLINK's status

Name	Color	Meaning When Lit
TX	Green	Sending data
RX	Green	Receiving data.

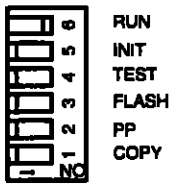
■DIP Switch

The DIP switch consists of 6 pins The pins are numbered from 1 to 6, as shown in the diagram

Each pin turns ON when it is moved to the right

New pin settings are enabled the next time that the power is turned ON

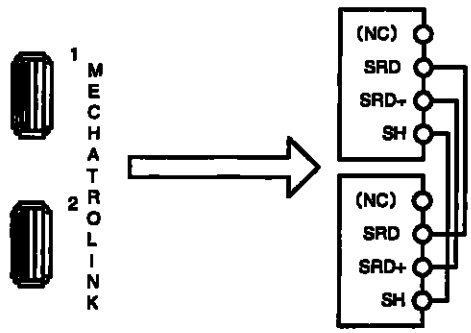
The following table shows the function of each pin



Pin	Name	Setting	Function	Default Setting
6	RUN	ON	Program running	ON
		OFF	Program stopped	
5	INIT	ON	Depends on the status of pin 4 OFF ON Memory cleared	OFF
		OFF	Depends on the status of pin 4 OFF ON Setting prohibited	
4	TEST	ON	Terminal mode/initialization mode	OFF
		OFF	Online	
3	FLASH	ON	Program copied from FLASH to RAM	ON
		OFF	Program not copied from FLASH to RAM	
2	PP	ON	Serial port 1 Operates according to the settings set in the definitions window (Programming Panel operation is used if those settings have not been set)	OFF
		OFF	Serial port 1 Programming Panel operation	
1	COPY (Valid when pin 3 is ON)	ON	M-register copy from FLASH provided	ON
		OFF	M-register copy from FLASH not provided	

■MECHATROLINK Connector

MECHATROLINK connectors 1 and 2 are the same Connect to either connector Insert a USB Terminator (JEPMC-W6020) to the unused port



IMPORTANT

The MP940 Module has only one MECHATROLINK channel There are two connectors, but these connectors are the same Use either of the two connectors

1.4 MECHATROLINK Communications Specifications

The following table shows the MECHATROLINK communications ports specifications

Item	Specifications		
Topology (Communications Network Format)	Bus		
Media Access Control Method	Multidrop (1 N communications)		
Media (Transmission Path)	Shielded, twisted-pair cable (120 Ω)		
Communications Method	MECHATROLINK		
Synchronization Method	Frame synchronization		
Communications Format	HDLC standard		
Baud Rate	4 Mbps		
Transmission Distance	200 m max		
Maximum Number of I/O Modules	28 max		
Maximum Number Of Transmission Points/Stations (Number of Inputs + Outputs)	128 inputs and 128 outputs One register is equivalent to 16 points		
Maximum Number of Allocated Points (per MECHATROLINK Driver Module)	• 480 inputs and 512 outputs One register is equivalent to 16 points • Two input registers are used to monitor the status of the MECHATROLINK		
Refresh Time	The refresh time depends upon the number of Slaves connected, as shown below Some selections shown below may not be available due to the Driver Module being used or operating conditions		
	Max Number of Stations	Baud Rate	Refresh Time
	2	4 Mbps	500 µs
	2	10 Mbps	250 µs
	3	2 Mbps	1 ms
	6	4 Mbps	1 ms
	6	10 Mbps	500 µs
	7	2 Mbps	2 ms
	14	4 Mbps	2 ms
	14	10 Mbps	1 ms
	15	2 Mbps	4 ms
	29	4 Mbps	4 ms
	29	10 Mbps	2 ms
	30	10 Mbps	4 ms
Watchdog Timer	45 ms Communications are stopped when a timeout occurs		

2 MECHATROLINK Functions

This section explains the MECHATROLINK system's communications procedures, data flow, and processing time.

2.1 Overview of MECHATROLINK Functions

This section summarizes the functions of the MECHATROLINK Driver Module and MECHATROLINK Slave Modules

2.1.1 Usable Registers

The following table shows the I/O register addresses that can be allocated to reference I/O data

The usable I/O register addresses depend upon the Machine Controller being used

Registers	Machine Controller			
	MP910	MP920	MP930	MP940
Input Registers	IW0000 to IW13FF	IW0000 to IW13FF	IW0000 to IW07FF	IW0000 to IW07FF
Output Registers	OW0000 to OW13FF	OW0000 to OW13FF	OW0000 to OW07FF	OW0000 to OW07FF

2.1 2 Maximum Number of Slaves Setting

The following table shows the maximum number of Slaves that can be connected to a Master The maximum number of Slaves depends upon the combination of the baud rate and refresh time

Max Number of Slaves	Baud Rate	Refresh Time	MP910	MP920 (SVB-01)	MP930	MP940
2	4 Mbps	500 µs	(Y)	(Y)	N	N
2	10 Mbps	250 µs	(Y)	(Y)	N	N
3	2 Mbps	1 ms	(Y)	(Y)	N	N
6	4 Mbps	1 ms	(Y)	(Y)	N	Y
6	10 Mbps	500 µs	(Y)	(Y)	N	N
7	2 Mbps	2 ms	(Y)	(Y)	N	N
14	4 Mbps	2 ms	Y	Y	Y	Y
14	10 Mbps	1 ms	(Y)	(Y)	N	N
15	2 Mbps	4 ms	(Y)	(Y)	N	N
29	4 Mbps	4 ms	(Y)	(Y)	N	Y
29	10 Mbps	2 ms	(Y)	(Y)	N	N
30	10 Mbps	4 ms	(Y)	(Y)	N	N

Note Y Setting allowed
(Y) Setting allowed when a Servo is not used
N Setting not allowed

IMPORTANT

- In the MP9□□ Series, the default MECHATROLINK settings are 14 Slaves max , 4 Mbps (baud rate) and 2 ms (refresh time)
- When a Servo Module is connected to a Slave, always use the 14 Slaves max , 4 Mbps baud rate, and 2 ms refresh time settings If any other settings are used an error, such as a synchronous communications error with the SERVOPACK, may occur and operation will not be reliable
- More than one SVB-01 Module can be mounted in an MP920 System The setting restriction does not apply to an SVB-01 Module if a Servo Module is not connected
- With an MP930, only the 14 Slaves max , 4 Mbps baud rate, and 2 ms refresh time settings are possible
- Reset the CPU after changing the transmission parameters
- Be sure to set the same baud rate in the Master and the Slaves connected to it
- The number of Slaves that can be connected is not always the same as the maximum number of Slaves setting The number of Slaves that can actually be connected may be lower depending upon the types of Slaves connected in the system and the scan set time

2 1 3 Number of Allocated Points

■ Maximum Number of Allocated Points per Slave

The maximum number of points that can be allocated to a single MECHATROLINK Module is shown below For details, see the description of the I/O Module being used

Inputs

Number of digital input points + register input points ≤ 128 points

(Calculated with 1 register containing 16 points)

Outputs

Number of digital output points + register output points ≤ 128 points

(Calculated with 1 register containing 16 points)

■ Maximum Number of Allocated Points per Master

The maximum number of points that can be allocated to a single MECHATROLINK Driver Module is as follows

Both Inputs and Outputs

No of Slaves (14) × Max No of points per Slave (128) = 1792 points

2.1 4 Automatic Disconnection and Automatic Restart

■ Automatic Disconnection

With the automatic disconnection, if an error is detected in communications between the Master and a Slave, the affected Slave will be removed from the network and communications will continue with the unaffected Slaves

■ Automatic Restart

With the automatic restart, the Master will resume communications automatically when it determines that the affected Slave is responding regularly and has resumed normal operation This is the automatic restart function

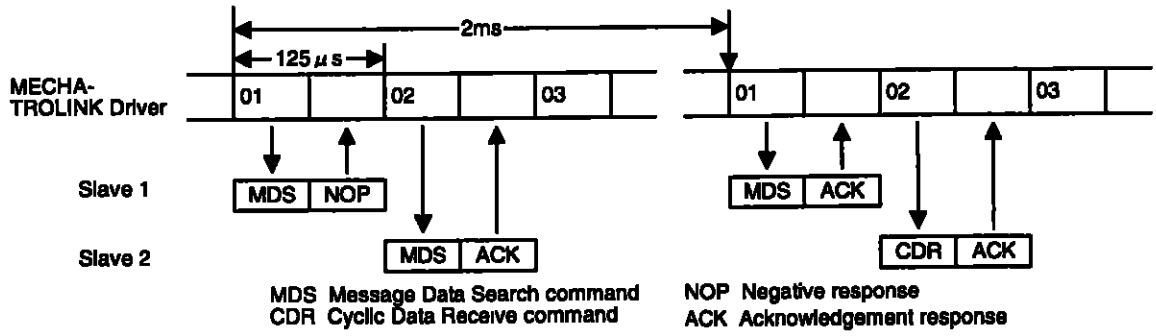
2.2 Communications Procedures

This section explains the MECHATROLINK system's communications procedures

2.2 1 Connection Preparation Sequence

The MECHATROLINK Driver Module checks the Slave Module's ID number to connect with the Slave This operation is known as the connection preparation sequence

The following diagram shows the data transfer procedure of the connection preparation sequence



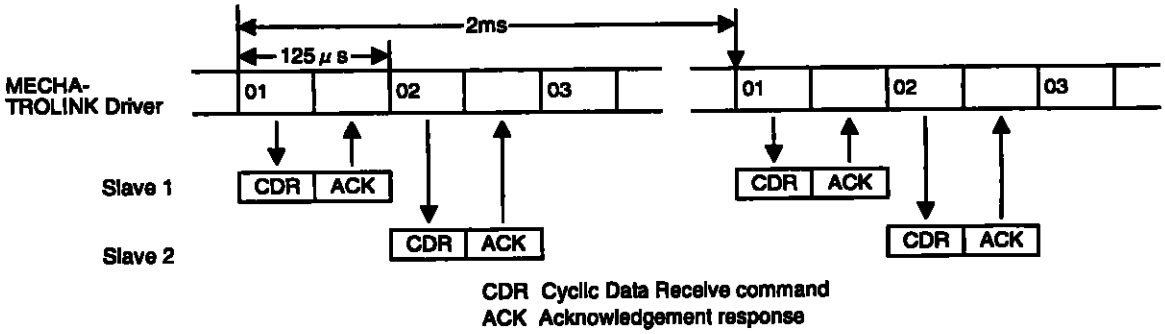
Note Conditions Fewer than 15 Slaves and a baud rate of 4 Mbps

When the MECHATROLINK Driver Module receives no response or an NOP (negative response) from the Slave, it will repeat the connection preparation sequence to that Slave

2.2.2 Normal Sequence

The MECHATROLINK Driver Module transfers I/O data according the bit allocation This operation is known as a normal sequence

The following diagram shows the data transfer procedure of a normal sequence



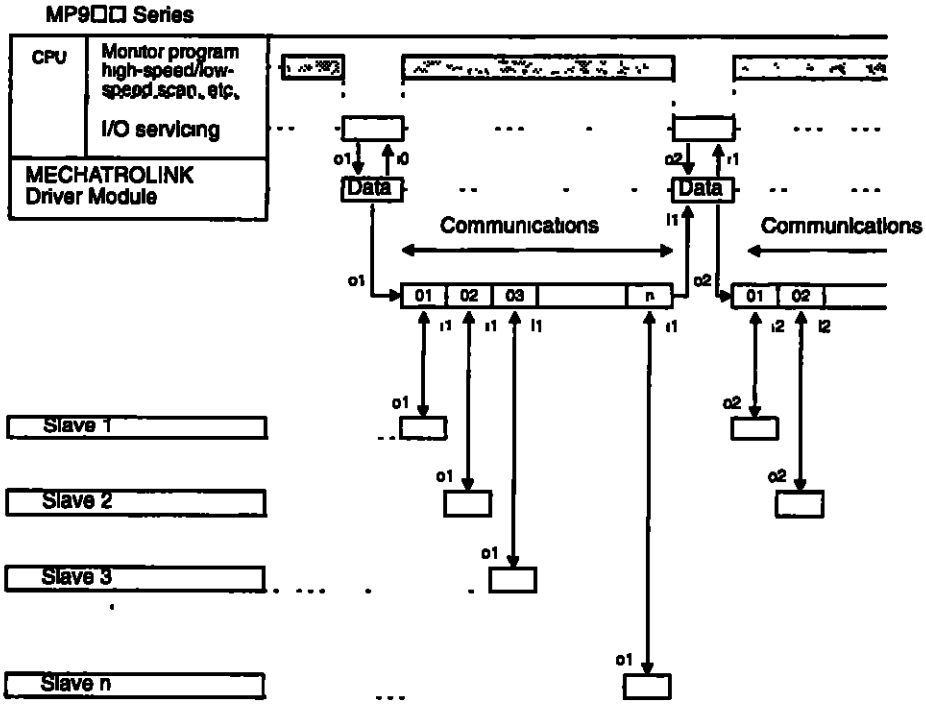
Note Fewer than 15 Slaves and a baud rate of 4 Mbps

When the MECHATROLINK Driver Module receives no response or an NOP (negative response) from the Slave, it will retry the normal sequence to that Slave up to two times

2.2 3 Data Flow and Communications Processing Time[1]

■ Data Flow

The following diagram shows the flow of data between the CPU Module and Master as well as the flow of data between the Master and Slaves



■ Communications Processing Time

Baud Rate	Number of Slaves	Communications Time
4 Mbps	15 or less	2 ms
	16 or more	4 ms

TERMS

1 Communications Processing Time In this case, the communications processing time indicates the time in one cycle required to transfer data with all of the Slave to which I/O is allocated

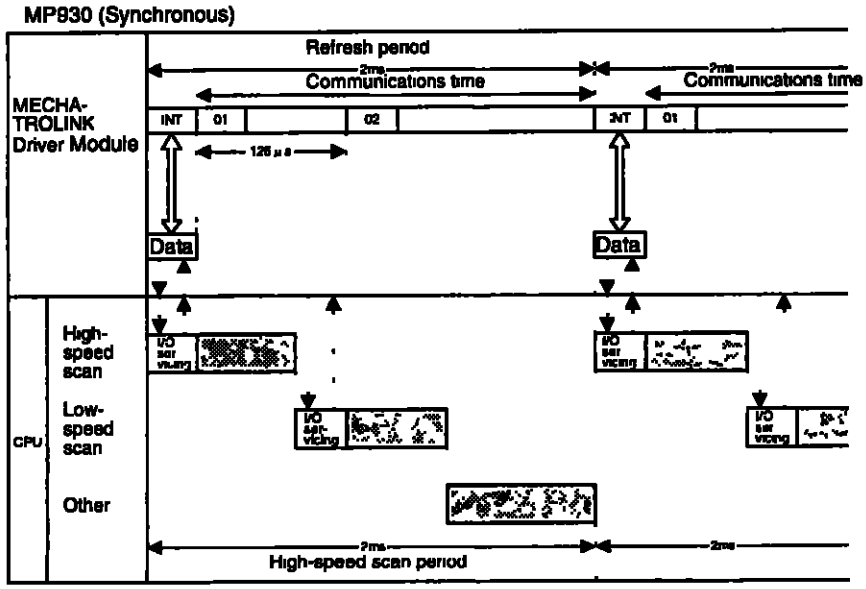
2.3 Communications Timing

This section explains the timing of data transfers between the CPU and MECHATROLINK devices

2.3.1 MP930 Timing

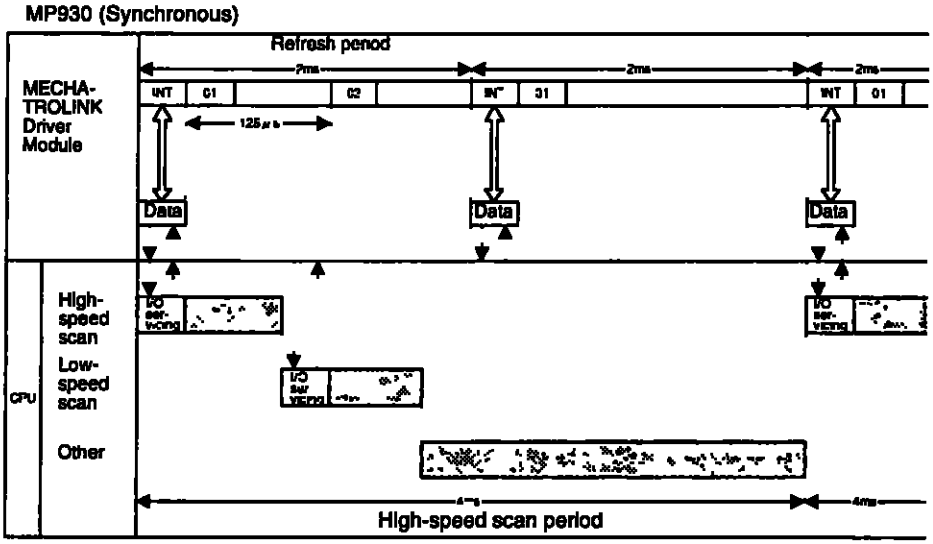
The CPU's high-speed scan period is not based on the MECHATROLINK refresh period The CPU's high-speed scan period and the MECHATROLINK refresh period always operate with the same timing Data reception is also performed with the same timing
The following diagrams show timing charts of these data transfers

■ High-speed Scan = 2 ms



Note The high-speed scan time, low-speed scan time, and the scan timing depend on the system configuration

■ High-speed Scan = 4 ms



2 3 2 MP910, MP920, and MP940 Timing

With the MECHATROLINK transmission parameters, the number of Slaves, baud rate, and refresh period can be selected to allow for system expansion

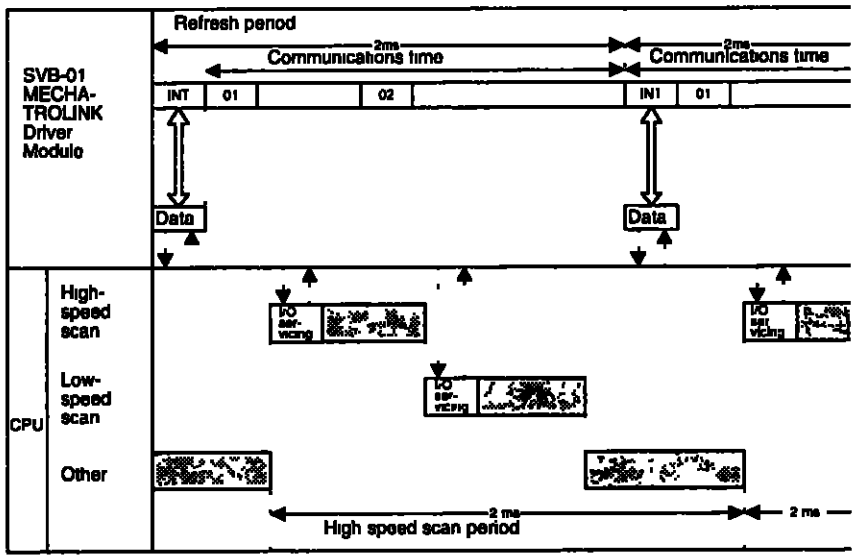
The CPU s high-speed scan can also be set freely to match system requirements To achieve this capability, the CPU s high-speed scan and the MECHATROLINK's refresh period are handled independently

Consequently, it is not necessary for the CPU's high-speed scan and the MECHA-TROLINK's refresh period to have the same length or start at the same time

The following timing chart shows this relationship graphically

■ High-speed Scan = 2 ms; Refresh Period = 2 ms

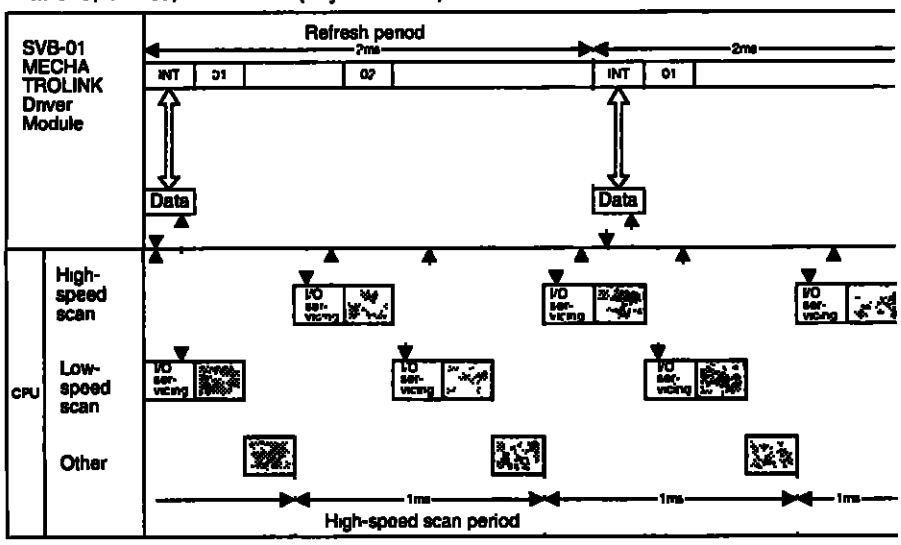
MP910, MP920, and MP940 (Asynchronous)



Note The high-speed scan time, low-speed scan time, and the scan timing depend on the system configuration

■ High-speed Scan = 1 ms, Refresh Period = 2 ms

MP910, MP920, and MP940 (Asynchronous)



3 I/O Allocations

This section explains how to allocate the I/O registers used to control MECHATROLINK Modules and exchange data

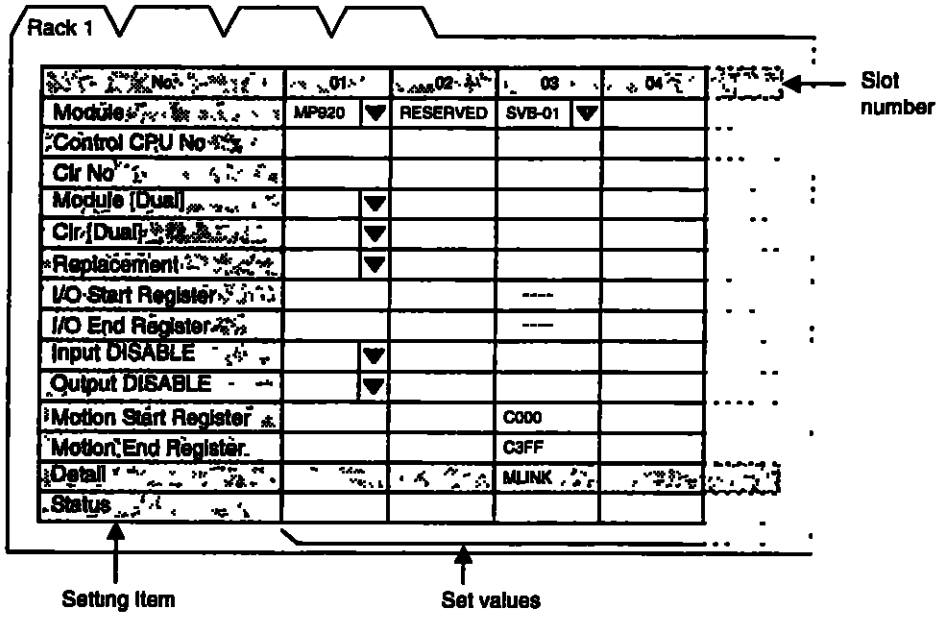
3.1 MECHATROLINK Driver Module Definitions

This section explains the MECHATROLINK Driver Module definitions

Before allocating I/O registers in the MECHATROLINK Module, the MECHATROLINK Driver Module must be set with the CP-717's Module configuration definitions For details on the Module configuration definitions, refer to the *MP9□□ Machine Controller User's Manual Programming Panel Software (for simple operation/standard operation) (SIEZ-C887-2 3 (To be prepared), SIEZ-C887-2 4 (To be prepared))* This manual provides a summary of that information

3.1.1 Module Configuration Definitions

Open the Module configuration definitions window for the MP9□□ Machine Controllers Set the Module, leading I/O register number, and end I/O register number Default values are set for the other items In the following example an SVB-01 Module is allocated in slot number 3 of an MP920



■ Driver Module Settings

Define the Machine Controller Module (MP910, MP920 MP930, or MP940) in the column for slot number 01

Define MECHATROLINK Driver Modules in open slots numbered 02 or higher Select Driver Modules that are compatible with the Machine Controller being used, as shown in the following table

Machine Controller	MECHATROLINK Driver Module	Remarks
MP910	SVB-01	Select "SVB-01" from the pull-down menu in the Module row for slot number 03

Machine Controller	MECHATROLINK Driver Module	Remarks
MP920	SVB-01	Select "SVB-01" from the pull-down menu in the Module row for an open slot
MP930	MC350-NET	Set automatically
MP940	MLINK (C)	Select "MLINK(C)" from the pull-down menu in the Module row for slot number 06

■ Setting the Leading and End I/O Register Numbers

Set the continuous range of I/O register numbers allocated to the MECHATROLINK Module that will be connected. The number of registers required depends upon the MECHATROLINK Module being connected.

The range of I/O registers is the sum total of the registers allocated to each MECHATROLINK Module.

Module	Name	Model Number	Required Size of I/O Registers (Words)	
			Inputs	Outputs
MECHATROLINK-compatible Servos	SGD-□□□N	SGD-□□□N	-	-
	SGDB-□□□N	SGDB-□□□N	-	-
	SGDH-□□□E	SGDH-□□□E	-	-
Digital I/O Modules	64-point I/O Module	JEPMC-IO350	4	4
	Wide-voltage 8-point Output Module	JAMSC-120DRA83030	-	1
	100-VAC 8-point Input Module	JAMSC-120DAI53330	1	-
	200-VAC 8-point Input Module	JAMSC-120DAI73330	1	-
	12/24-VDC 16-point Input Module	JAMSC-120DDI34330	1	-
	12/24-VDC 16-point Output Module	JAMSC-120DDO34340	-	1
	100/200-VAC 8-point Output Module	JAMSC-120DAO83330	-	1
	Wildcard I/O Module	□□□□□I/O	Any	Any
Analog I/O Modules	Analog Input Module (±10 V)	JAMSC-120AVI02030	7	2
	Analog Output Module (±10 V)	JAMSC-120AVO01030	2	4
Special Purpose Modules	Reversible Counter Module with Preset Function	JAMSC-120EHC21140	7	8
	Pulse MC Module	JAMSC-120MMB20230	8	8
PLC Module	MP940 Module	JEPMC-MC400 JEPMC-MC410	8	8

■ Saving Module Configuration Definitions

After completing the MECHATROLINK Driver Module's settings, save the settings in a Module configuration definitions file.

1. Select ***File (F)*** and then ***Save (S)*** from the menus.
2. A confirmation dialog box will be displayed. Click the **Yes (Y)** Button.

3.2 Allocating I/O to MECHATROLINK Modules

After completing the MECHATROLINK Driver Module's settings, allocate I/O registers to each MECHATROLINK Module that will be connected to the MECHATROLINK network

3 2 1 Overview of I/O Allocation

Open the MECHATROLINK definitions window and set the transmission parameters, I/O allocations, and other settings in the order listed below After making the settings, save the definitions data

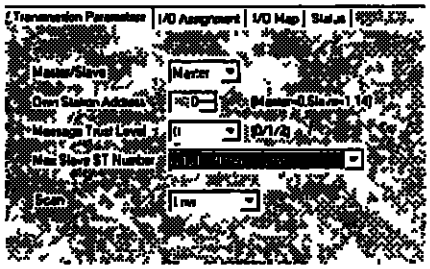
1 Open the MECHATROLINK definitions window
2 Set the transmission parameters
3 Assign I/O registers
4 Check the I/O map
5 Monitor status
6 Save the MECHATROLINK definitions data

3.2.2 Opening the MECHATROLINK Definitions Window

Open the MECHATROLINK definitions window The procedure depends upon the MECHATROLINK Driver Module being used

■ Procedure for the SVB-01 Driver Module

Double-click ***MLINK*** in the *Details* row for the slot in which the SVB-01 Module is defined The MECHATROLINK definitions window will be displayed as shown below



■ Procedure for the MC350-NET and MLINK(C) Driver Modules

Double-click the slot number in the top row of the column in which the MECHATROLINK Driver Module is defined The same MECHATROLINK definitions window will be displayed

■ Configuration Information

The MECHATROLINK definition window's configuration information is displayed below the window title This information mirrors the information set in the Module configuration definitions window

Configuration Information	Contents
PT#	Displays the logical port number being used when online
CPU#	Displays the CPU number logged in when online
Rack number	Displays the rack number where the Driver Module is defined
Slot number	Displays the slot number where the Driver Module is defined
Circuit number	Displays the circuit number of the MECHATROLINK
Register range	Displays the range of I/O registers

■ Tab Pages

Four tab pages are used when allocating resources to each MECHATROLINK Module

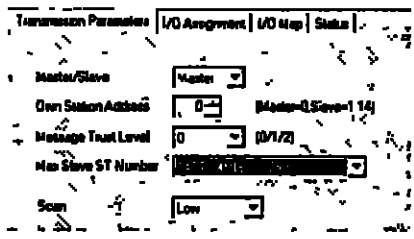
Tab Page	Function
Transmission Parameters	Sets the basic MECHATROLINK transmission parameters
I/O Assignment	Allocates I/O registers to MECHATROLINK Modules
I/O Map	Displays a detailed I/O map
Status	Displays the transmission status when online

INFO

A confirmation dialog box will be displayed when the MECHATROLINK definitions window is opened if settings are being made for the first time Click the **OK** Button to proceed to the next operation

3.2.3 Setting Transmission Parameters

Click the MECHATROLINK definitions window's **Transmission Parameters** Tab The Transmission Parameters Tab Page will be displayed when the MECHATROLINK definitions window is opened



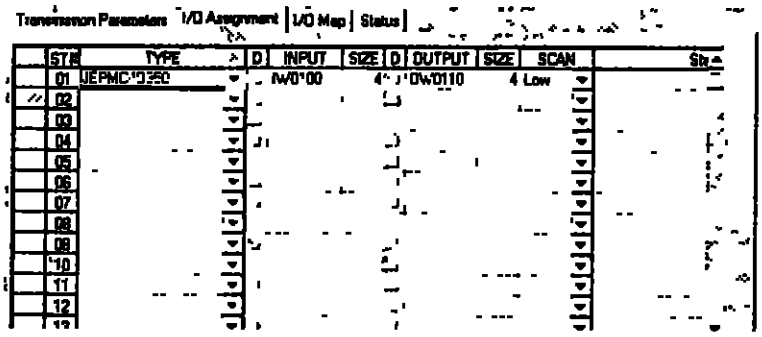
Parameter	Function	Default Setting
Master/Slave	Set whether the Machine Controller is used as a master or slave	Master
Own Station Address	When the Machine Controller is the master the station address is fixed at 0 When it is a slave, set the station address between 1 and 14.	0
Message Trust Level	Set the error recovery method used when sending MEMOBUS commands Set the required message reliability level (See table below)	0
Max Slave ST Number	Open the pull-down menu to display the various combinations of the number of slaves, communications speed, and communications period settings Select the desired combination	14
Scan	Specify High or Low	Low

The list for the trust levels of messages is shown in the following table

Level	Function
0	Sends the command once and waits indefinitely for a response from the destination
1	Sends the command once and resends the command if a response is not received within 8 seconds
2	Transmits each word of the command twice in succession and waits indefinitely for a response from the destination This method provides high quality transmissions but cuts the transmission efficiency in half

3 2 4 I/O Allocation

Click the MECHATROLINK definitions window's **I/O Assignment** Tab



Parameter	Function	
ST#	Displays the station number Up to 14 stations can be set	
TYPE	Sets the model of MECHATROLINK Module connected at the station Select the module from the drop-down list	
D	A check mark disables the input registers	
		Enabled
		Disabled
INPUT, SIZE	Sets the leading input register number and the number of registers (size) The number of registers is set automatically The register ranges specified for different stations must not overlap The register numbers can be set within the range specified by the leading and end I/O register numbers set in the Module configuration definitions	
D	A check mark disables the output registers	
OUTPUT, SIZE	Sets the leading output register number and the number of registers (size) The number of registers is set automatically The register ranges specified for different stations must not overlap The register numbers can be set within the range specified by the leading and end I/O register numbers set in the Module configuration definitions	
SCAN	Sets the scan used for I/O servicing Corresponds to the scan setting in the Transmission Parameters Tab Page	
Station name	A comment up to 32-characters long can be input for each station	

The following settings can be made for the TYPE, SIZE, and SCAN parameters The settings marked with a "-" are set automatically by the system and cannot be set by the user

Type	Size		Scan
	Inputs	Outputs	
SGD-□□□N	-	-	High
SGDB-□□□N	-	-	High
SGDH-□□□E	-	-	High
JEPMC-IO350	4	4	High/Low
120DRA83030	-	1	High/Low
120DAI53330	1	-	High/Low
120DAI73330	1	-	High/Low
120DDI34330	1	-	High/Low
120DDO34340	-	1	High/Low
120DAO83330	-	1	High/Low
□□□□□I/O	Any	Any	High/Low
120AVI02030	7	2	High/Low
120AVO01030	2	4	High/Low
120EHC21140	7	8	High/Low
120MMB20230	8	8	High/Low
MP940	8	8	High/Low

IMPORTANT

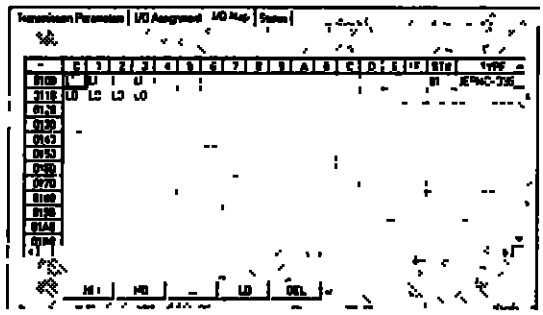
Observe the following precautions when setting the I/O register number ranges

- Input register numbers and output register numbers must not overlap
- I/O register numbers allocated to different stations must not overlap

3.2.5 I/O Map

Click the MECHATROLINK definitions window's **I/O Map** Tab

The I/O Map Tab Page shows the scan setting (High or Low) of the I/O registers allocated to each station and allows the user to change these settings The settings are abbreviated HI, HO, LI and LO



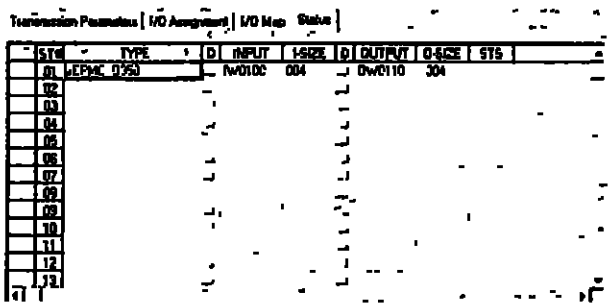
Button	Function
HI	Allocates a high-speed scan input
HO	Allocates a high-speed scan output
LI	Allocates a low-speed scan input
LO	Allocates a low-speed scan output
DEL	Deletes the allocation

INFO

- With the MP940, scan allocations are not allowed from the I/O Map
  All allocations correspond to the scan settings in the Transmission Parameters Tab Page
- With the MP930, the I/O Map cannot be changed
- The scan setting can be changed in the I/O Map (e g , LI to HI), but the I/O setting (e g , LO to LI) cannot be changed

3 2.6 Status

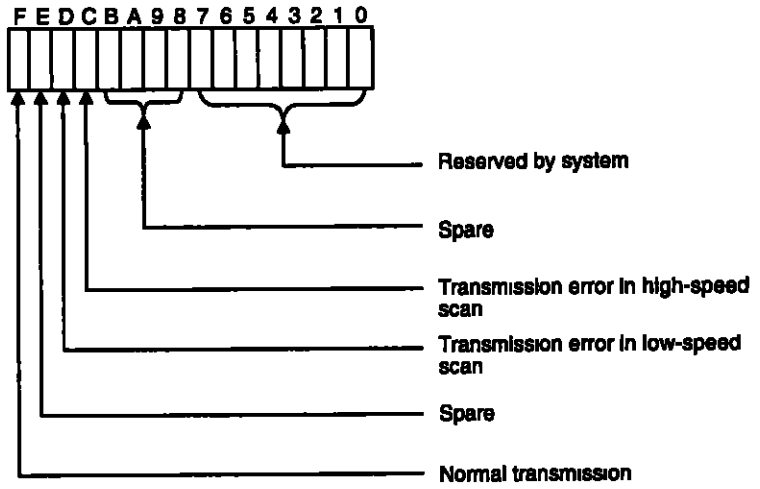
Click the MECHATROLINK definitions window's **Status** Tab The data currently being transmitted by MECHATROLINK will be displayed



This tab page just displays the status, the set values cannot be changed in this window The functions of the parameters in the Status Tab are identical to those of the I/O Assignment Tab The only difference is the addition of the 'STS" column

STS

In online mode, the MECHATROLINK transmission status is displayed in hexadecimal The following diagram shows the meaning of each bit Nothing will be displayed in the STS column when offline



3.2.7 Saving MECHATROLINK Definitions Data

Use the following procedure to save MECHATROLINK definitions data.

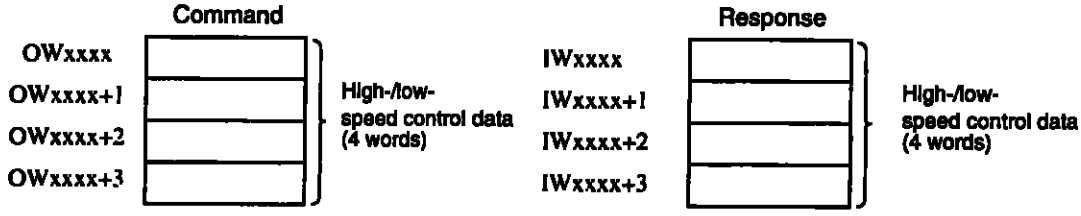
1 Select ***File (F)*** and then ***Save (S)*** from the menus

2 Click the Yes (Y) Button in the confirmation dialog box to save the definitions data

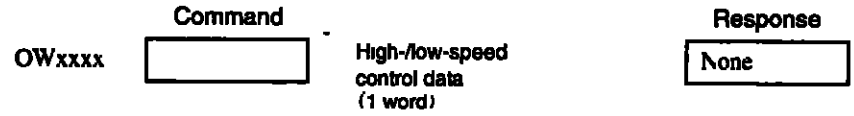
3.2 8 I/O Register Configuration

A continuous range of I/O registers was allocated to each MECHATROLINK Module This heading shows the configuration of those I/O registers

■ JEPMC-IO350 (64-point I/O Module)



■ 120DRA83030 (8-point Output Module)

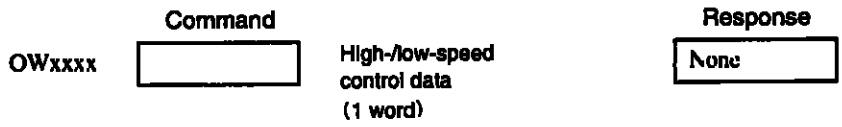


■ 120DAI53330 (8-point Input Module)

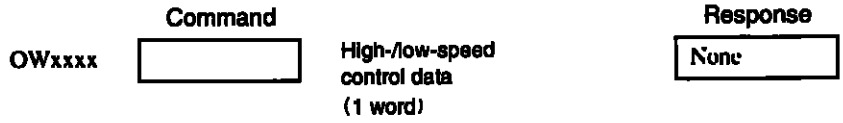
■ 120DAI73330 (8-point Input Module)

■ 120DDI34330 (16-point Input Module)

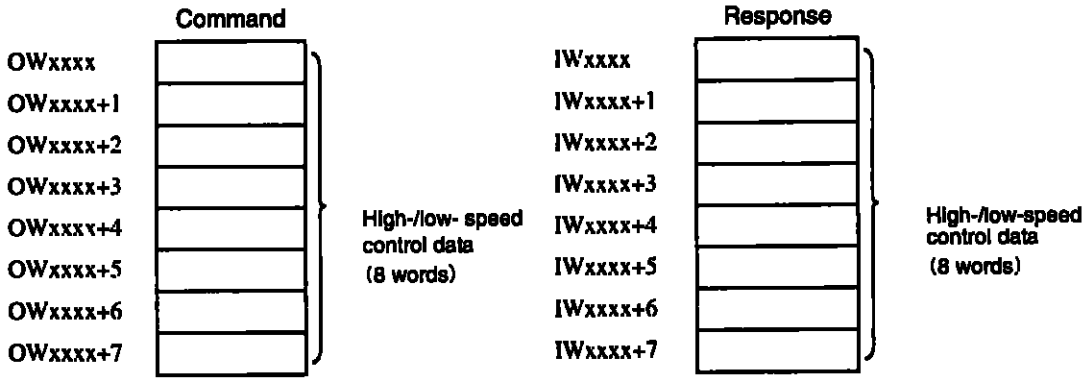
■ 120DDO34340 (16-point Output Module)



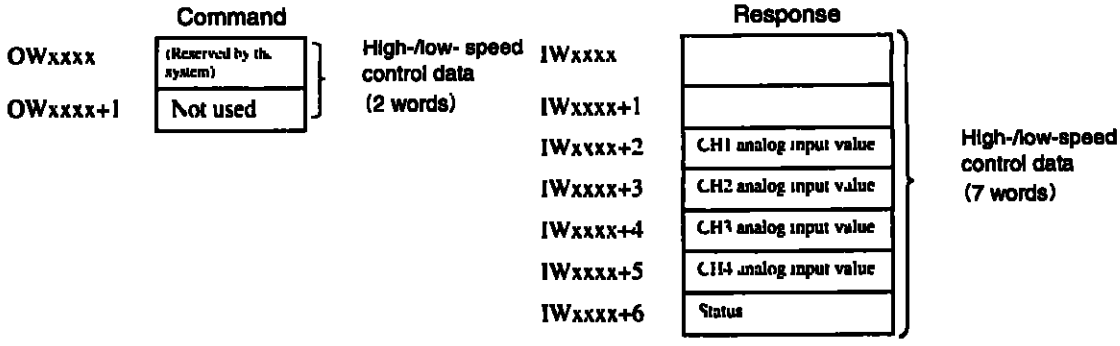
■ 120DAO83330 (8-point Output Module)



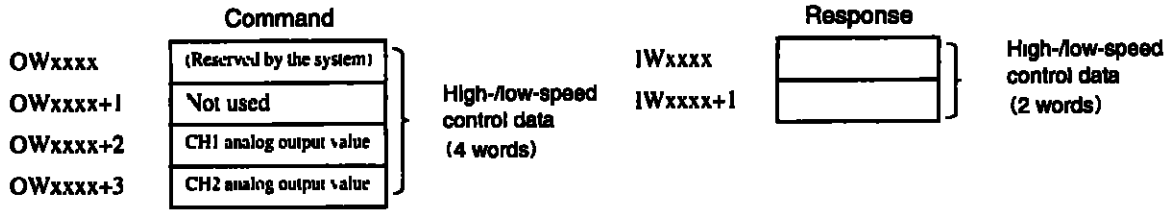
■ □□□□□I/O (Wildcard I/O Module)



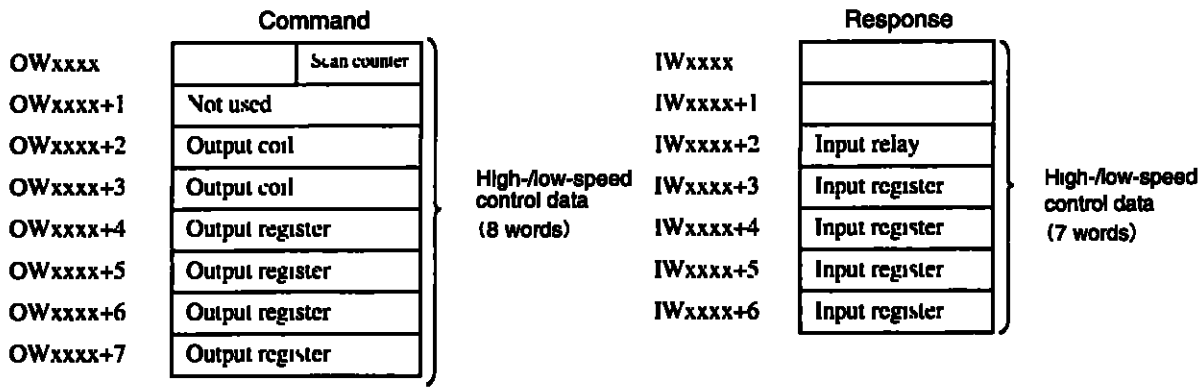
■ 120AVI02030 (Analog Input Module)



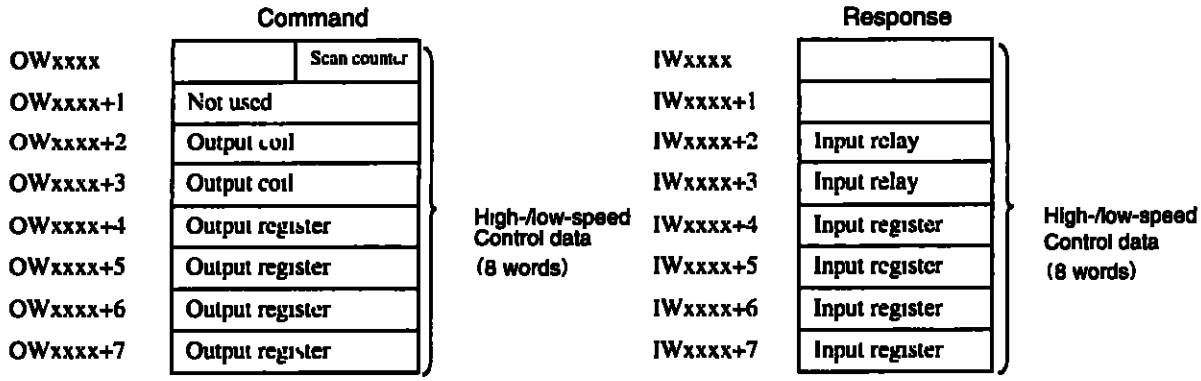
■ 120AVO01030 (Analog Output Module)



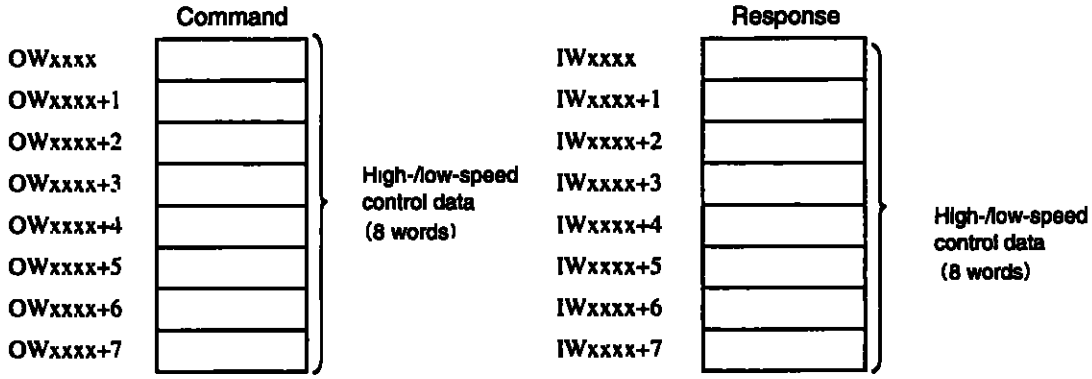
■ 120EHC21140 (Counter Module with Preset)



■ 120MMB2030 (Pulse MC Module)



■ MP940 (Machine Controller)

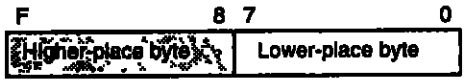


INFO

I/O registers are allocated in 1-word units, but there are Modules that require only 1 byte Output Modules use the higher-place byte and Input Modules use the lower-place byte, as shown below

- Output Modules

  The higher-place byte is used and the contents of the lower-place byte are undefined



  Bits OBxxxx8 to OBxxxxF are valid

- Input Modules

  The lower-place byte is used and the contents of the higher-place byte are undefined

  Bits IBxxxx0 to IBxxxx7 are valid

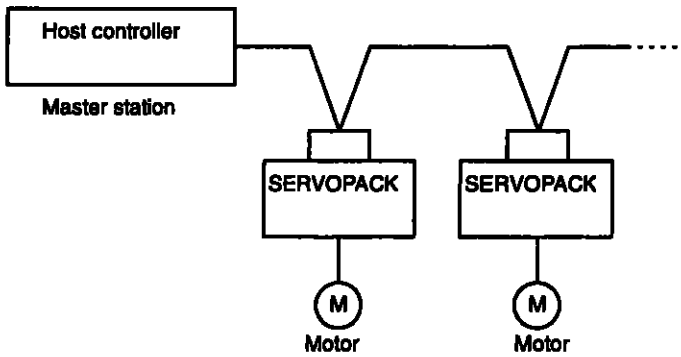
4 SERVOPACKs

This section provides an overview of MECHATROLINK-compatible SERVOPACKs

4.1 Overview of MECHATROLINK Control Configuration

The following diagram shows an overview of the control configuration for MECHATROLINK-compatible SERVOPACKs

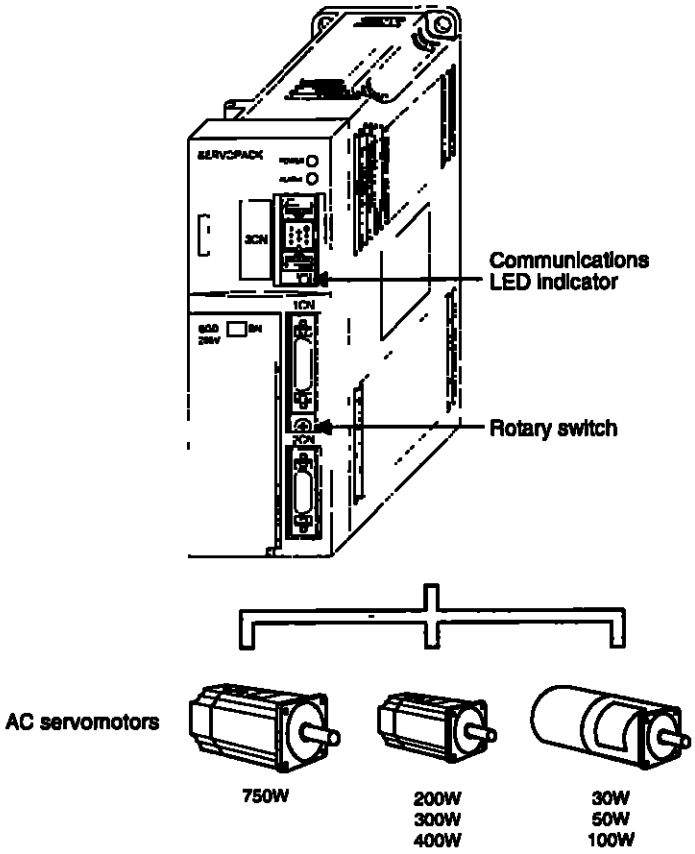
Up to 14 axes can be connected to one MECHATROLINK Driver Module



4.2 SGD-□□□N SERVOPACKs

4.2 1 External Appearance and Configuration

The following diagram shows the SGD-□□□N SERVOPACK s external parts



■ Connectors

Connector	Specifications
1CN	I/O signal connector
2CN	Encoder connector
3CN	MECHATROLINK communications connector

■ LED Indicator and Switch

Component	Specifications
Communications LED indicator	Lit during MECHATROLINK communications
Rotary switch (SW1)	This switch is used to set the MECHATROLINK station address

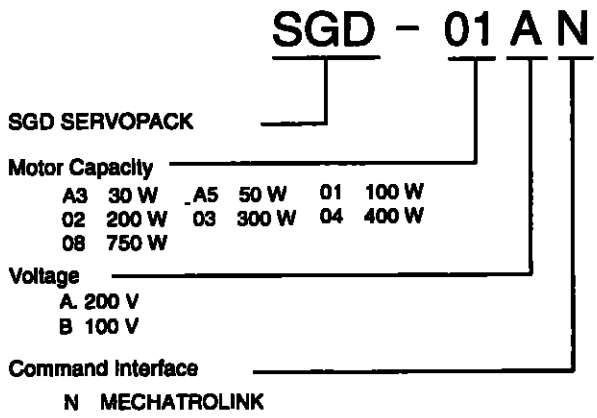
The setting on the rotary switch (SW1) selects the slave station address of the SGD-□□□N, as shown in the following table

1SW Setting	Station Address
0	Invalid (Do not set)
1	41 Hex (factory setting)
2	42 Hex
3	43 Hex
4	44 Hex
5	45 Hex
6	46 Hex
7	47 Hex
8	48 Hex
9	49 Hex
A	4A Hex
B	4B Hex
C	4C Hex
D	4D Hex
E	4E Hex
F	4F Hex

Note Settings are effective only when the power is turned ON

4.2.2 Model Numbers

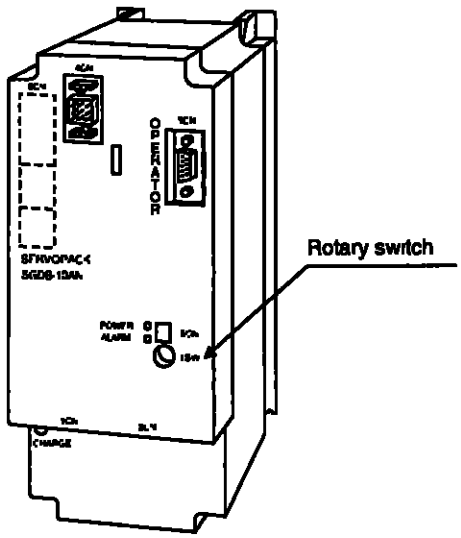
The following diagram shows the meaning of the codes in SGD-□□□N SERVOPACK model numbers

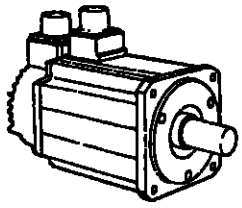


4.3 SGDB-□□□N SERVOPACKs

4.3.1 External Appearance and Configuration

The following diagram shows the SGDB-□□□N SERVOPACK's external parts





■ Connectors

Connector	Specifications
1CN	I/O signal connector
2CN	Encoder connector
3CN	Digital Operator connector
4CN	MECHATROLINK communications connector

■ Rotary Switch (1SW)

The rotary switch is used to set the MECHATROI INK station address

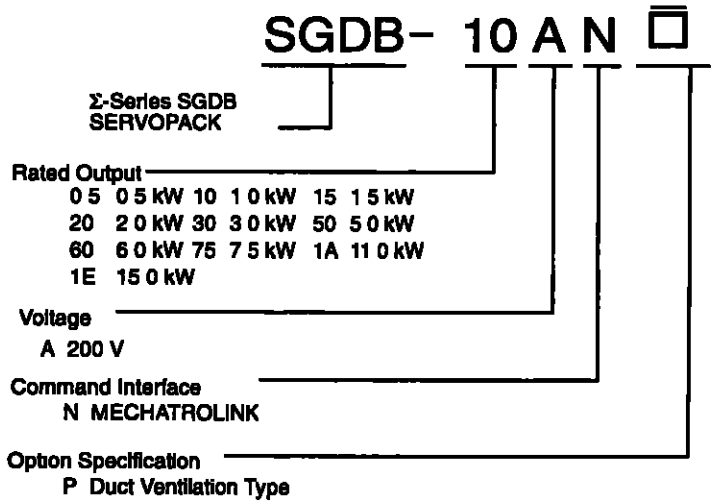
The setting on the rotary switch (1SW) selects the slave station address of the SGD-□□□N, as shown in the following table

1SW setting	Station address
0	Invalid (Do not set)
1	41 Hex (factory setting)
2	42 Hex
3	43 Hex
4	44 Hex
5	45 Hex
6	46 Hex
7	47 Hex
8	48 Hex
9	49 Hex
A	4A Hex
B	4B Hex
C	4C Hex
D	4D Hex
E	4E Hex
F	4F Hex

Note Settings are effective only when the power is turned ON

4.3.2 Model Numbers

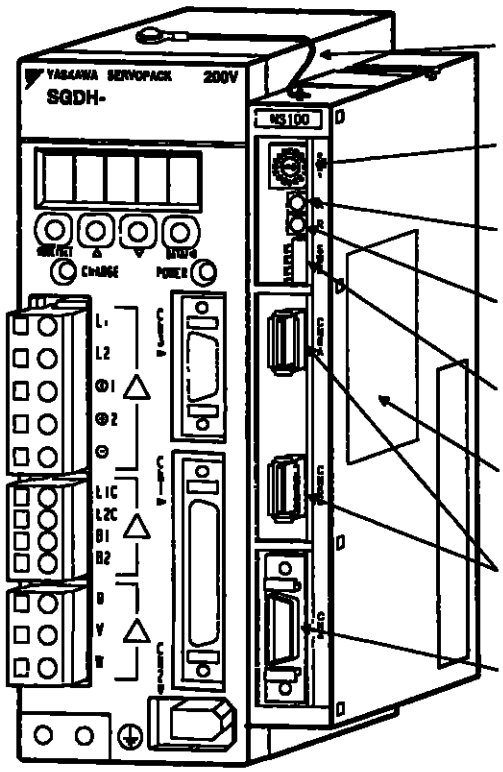
The following diagram shows the meaning of the codes in SGDB-□□□N SERVOPACK model numbers



4.4 SGDH-□□□E SERVOPACKs

An optional NS100 Unit must be connected to the bus of an SGDH- □□□ E SERVOPACK to equip it with a MECHATROLINK interface

4 4.1 External Appearance and Configuration



Ground wire
To ground the Unit, tighten the machine screw at the point marked with a "G" on the SGDH SERVOPACK

Rotary switch (SW1)
This switch sets the MECHATROLINK station address

LED indicator (A)
This LED is lit when an alarm has occurred

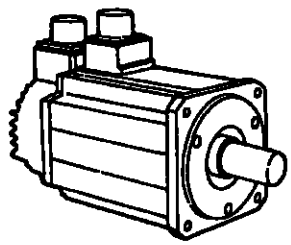
LED indicator (R)
This LED is lit during MECHATROLINK communications

Communications switch (SW2)
This piano switch sets MECHATROLINK communications settings

Nameplate
The nameplate shows the Option Unit model number and serial number

MECHATROLINK connectors (CN6A and CN6B)
These connectors connect to the other devices in the MECHATROLINK system

Fully enclosed encoder signal connector (CN4)
This connector is for fully enclosed encoder signals



Σ-II Series servomotor

■ Rotary Switch (SW1) Settings

Rotary switch SW1 sets the MECHATROLINK station address A new setting becomes effective the next time that power is turned ON

The setting on SW1 determines the station address of the Option Unit (JUSP-NS100) as shown in the following table

SW1 setting	Station address	SW1 setting	Station address
0	Invalid (Do not set)	8	48 Hex
1	41 Hex	9	49 Hex
2	42 Hex	A	4A Hex
3	43 Hex	B	4B Hex
4	44 Hex	C	4C Hex
5	45 Hex	D	4D Hex
6	46 Hex	E	4E Hex
7	47 Hex	F	4F Hex

■ Communications Switch (SW2) Settings

Piano switch SW2 sets the MECHATROLINK communications specifications

New settings become effective the next time that power is turned ON

Bit No	Function	Settings	Setting method *
Bit 1	Communications specifications	Ver 1 0 (Baud rate 4 Mbps communications time 2 ms)	0 Ver 1 0
Bit 2	Reserved	Do not change these settings (Leave OFF)	---
Bit 3			---
Bit 4	Cn number usage mode	---	---

* 0 OFF (Bit switch OFF)
1 ON (Bit switch ON)

Setting Method for Bit 1

Set this switch to match the actual MECHATROLINK physical specifications The Option Unit is compatible with MECHATROLINK Ver 1 0

Set bit 1 to OFF

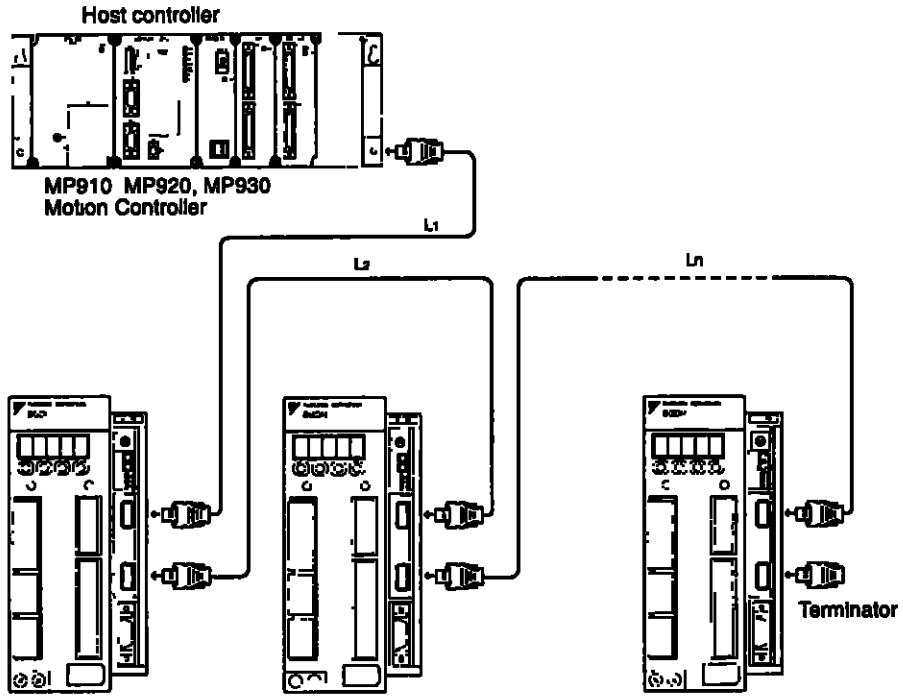
Since the Option Unit is compatible with Ver 1 0, set bit switch 1 to OFF (Baud rate of 4 Mbps communications time of 2 ms)

Setting Method for Bit 4

Sets the mode that enables using Cn numbers for the Σ-Series (SGDB-N, SGD-N) as parameter numbers in MECHATROLINK communications

IMPORTANT

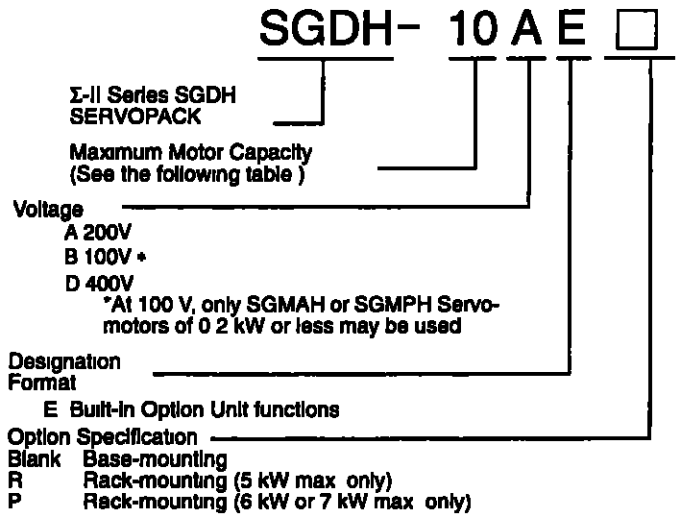
Do not set the Cn Number Usage Mode
When using an SGDH-□□□E with an NS100, the system reads and writes the parameters with Pn numbers Normal processing will be impossible if the Cn Number Usage Mode has been set



Note The overall cable length must not exceed 50 m
(L1 + L2 + Ln ≤ 50m)
Up to 15 stations can be connected

4 4 2 Model Numbers

The following diagram shows the meaning of the codes in SGDB-□□□E SERVOPACK model numbers



Maximum Applicable Servomotor Capacity Code	Capacity (kW)	Maximum Applicable Servomotor Capacity Code	Capacity (kW)
A3	0 03	15	1 5
A5	0 05	20	2 0
01	0 10	30	3 0
02	0 20	50	5 0
04	0 40	60	6 0
05	0 45	75	7 5
08	0 75	1A	11
10	1 0	1E	15

5 GL-Series Remote I/O Modules

This section provides an overview of the GL-Series Remote I/O Modules

5.1 General Specifications

This section describes the general specifications and installation methods for Remote I/O Modules

5.1 1 General Specifications

The specifications of Remote I/O Modules are shown below

Item		Specifications
Main External Power Supply	Rated Voltage	24 VDC (insulating DC/DC converter)
	Allowable Voltage Range	20 4 to 26 4 VDC
	Allowable Ripple	Not to exceed +10% or -15%
	Current Consumption	Listed in each Remote I/O Module's performance specifications
Dielectric Strength		500 VAC for 1 minute between the I/O terminals and power supply terminals Insulated with a DC/DC converter
Insulation Resistance		50 MΩ min (at room temperature and humidity) for 500 VDC insulation resistance between the I/O terminals and power supply terminals Insulated with a DC/DC converter
Environmental Conditions	Ambient Operating Temperature	0 to 60°C The max temperature depends on the Module's mounting direction Refer to *5 1 2 Mounting Orientation* for details
	Storage Temperature	-25 to 85°C
	Operating Humidity	30% to 95% (with no condensation)
	Storage Humidity	5% to 95% (with no condensation)
	Pollution Level	Pollution level 1 according to JIS B 3501
	Corrosive Gas	No corrosive gas
	Operating Altitude	Less than 2 000 m above sea level
Mechanical Operating Conditions	Vibration Resistance	10 to 57 Hz with half-amplitude of 0 075 mm 57 to 150 Hz at fixed acceleration of 9 8 m/s^2 10 sweeps for 8 minutes each in X, Y, and Z directions (sweep period 1 octave/min) (conforming to JIS B 3502)
	Shock Resistance	Peak acceleration of 147 m/s^2 twice for 11 ms in X, Y, and Z directions (conforming to JIS B 3502)
Electrical Operating Conditions	Noise Resistance	Impulse noise ±1,000 V Fast transient burst noise Level 3 (1,000 V)

Item		Specifications
Installation Requirements	Ground	Ground (to less than 0 1Ω) the FG terminal of the AC input to the main external power supply (24 VDC)
	Configuration	Individual unit mounting The Modules can be mounted in three directions, although the max operating temperature will be lower with some mounting directions Refer to *5 1 2 Mounting Orientation* for details
	Cooling Method	Natural cooling
	Mass	Listed in each Remote I/O Module's performance specifications
	Dimensions	Listed in each Remote I/O Module s performance specifications

5.1.2 Mounting Orientation

⚠ Caution

- **Install the Module in the correct orientation**

  The Module may fall, fail, or malfunction if it is not installed in the proper orientation

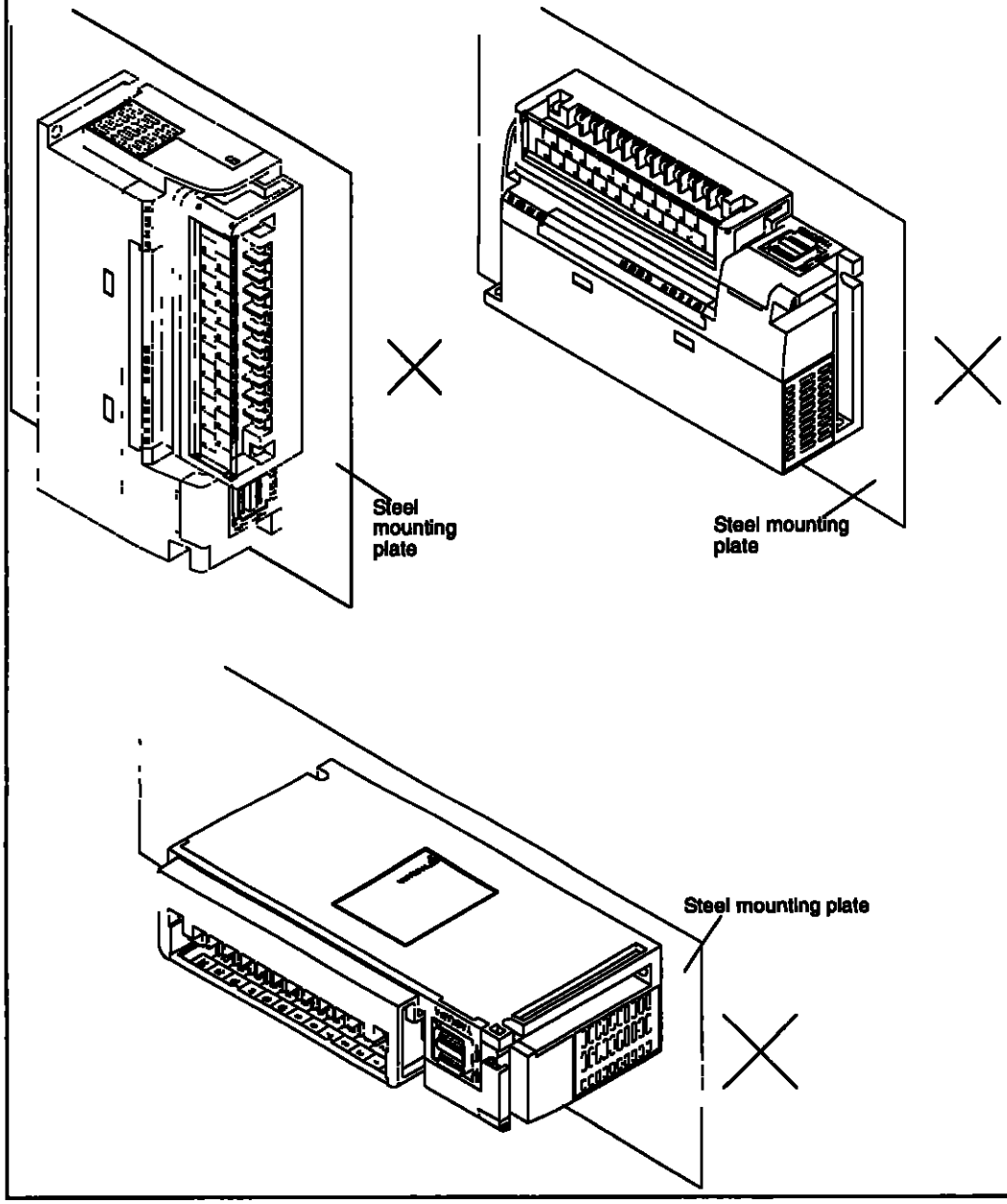
- **The ambient operating temperature will be limited with some mounting orientations**

  Failure to observe this caution may result in failures and malfunctions of the Module

⃠ Prohibited

- The mounting orientations shown in the following diagrams are prohibited Be sure to mount the Module in the correct orientation

The Module may fall, fail, or malfunction if it is not installed in the proper orientation

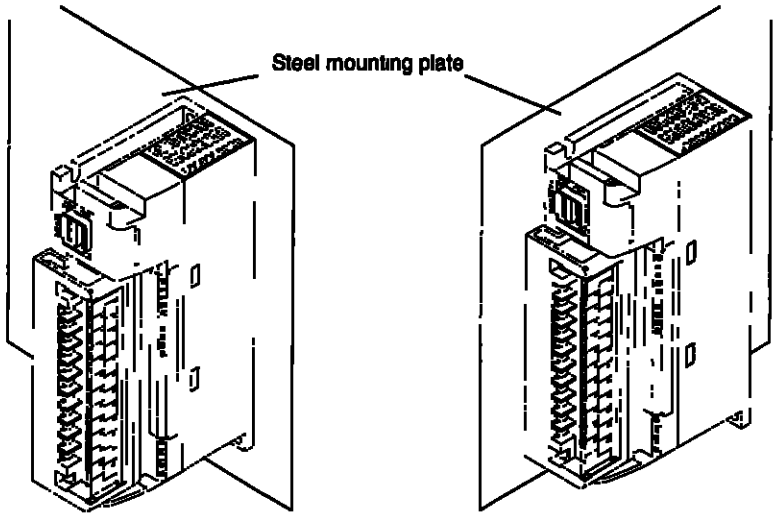


The Remote I/O Module can be mounted in three directions The max ambient operating temperature will be lower with some mounting directions

The following diagrams show the allowed mounting orientations and the corresponding ambient operating temperature ranges

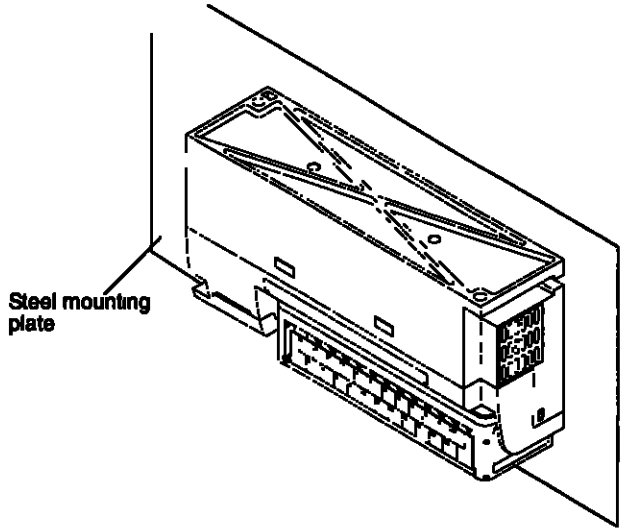
■ Mounting Orientation 1

The ambient operating temperature range is 0 to 60°C when the Module is mounted in the following orientation



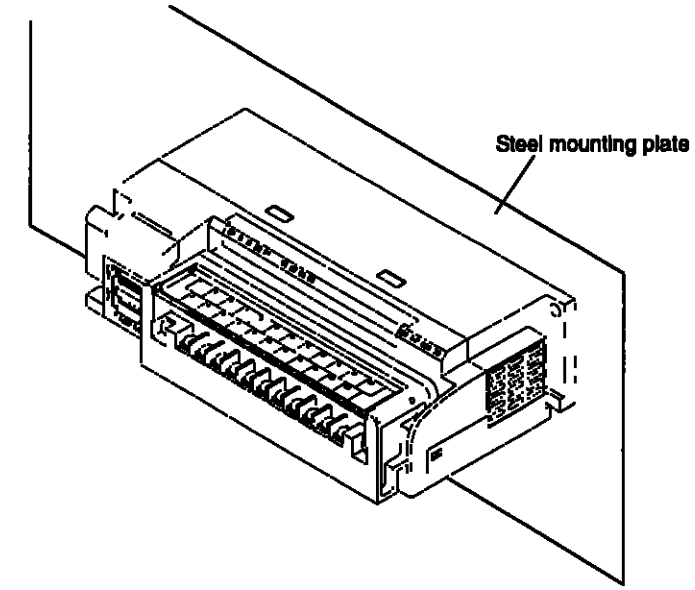
■ Mounting Orientation 2

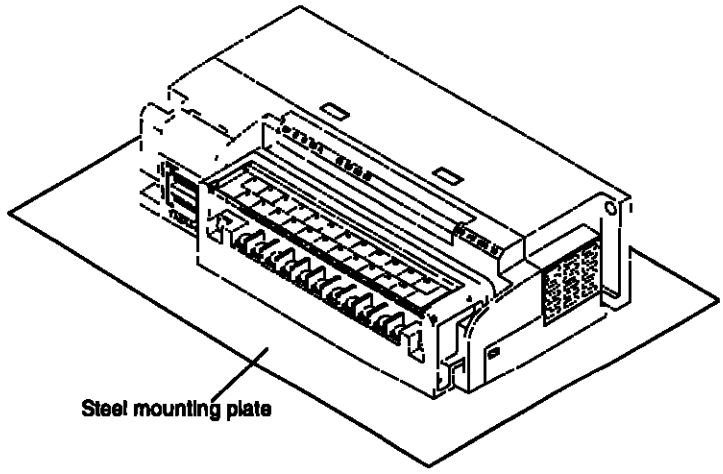
The ambient operating temperature range is 0 to 55°C when the Module is mounted in the following orientation



■ Mounting Orientation 3

The ambient operating temperature range is 0 to 55°C when the Module is mounted in the following orientation



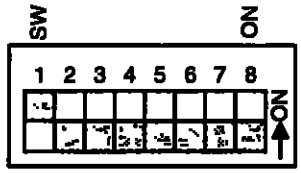


5.1.3 DIP Switch Settings

The DIP switch settings for the Digital I/O Modules are explained below

■ DIP Switch Functions

The DIP switch consists of 8 pins The pins are numbered 1 to 8 as shown in the diagram



Each pin turns ON when it is moved to the upper position

The setting of each pin becomes effective as soon as it is changed

Each pin's function is shown in the following table

Table 5 1 DIP Switch Functions

Pin No	Setting	Function
1 to 5	ON	Pins 1 through 5 set the Digital I/O Module's slave address (See the table on the following page)
	OFF	
6	ON	Sets the Digital I/O Module s baud rate to 1 Mbps
	OFF	Sets the Digital I/O Module s baud rate to 4 Mbps
7	ON	• With a Digital Output Module, the user can select the status of output data when communications are stopped This setting retains the status of the outputs that existed before communications stopped • Pin 7 is not used on Digital Input Modules Leave pin 7 OFF
	OFF	• With a Digital Output Module the user can select the status of output data when communications are stopped This setting turns OFF all outputs when communications stop • Pin 7 is not used on Digital Input Modules Leave pin 7 OFF
8	ON	Reserved for future use Leave pin 8 OFF
	OFF	

■ Slave Address Settings

Up to 30 slave stations can be connected to a Remote I/O Driver Module Each slave station must have a unique slave address

Set the slave address with pins 1 to 5 on the DIP switch on the front of the Digital I/O Module

Refer to the following table and set slave addresses as required

Table 5 2 Slave Address Settings

Pin No					Slave Address
1	2	3	4	5	
0	0	0	0	0	Not used
1	0	0	0	0	1
0	1	0	0	0	2
1	1	0	0	0	3
0	0	1	0	0	4
1	0	1	0	0	5
0	1	1	0	0	6
1	1	1	0	0	7
0	0	0	1	0	8
1	0	0	1	0	9
0	1	0	1	0	10
1	1	0	1	0	11
0	0	1	1	0	12
1	0	1	1	0	13
0	1	1	1	0	14
1	1	1	1	0	15
0	0	0	0	1	16
1	0	0	0	1	17
0	1	0	0	1	18
1	1	0	0	1	19
0	0	1	0	1	20
1	0	1	0	1	21
0	1	1	0	1	22
1	1	1	0	1	23
0	0	0	1	1	24
1	0	0	1	1	25
0	1	0	1	1	26
1	1	0	1	1	27
0	0	1	1	1	28
1	0	1	1	1	29
0	1	1	1	1	30
1	1	1	1	1	Not used

IMPORTANT

- Set slave addresses between 1 and 30 The Digital I/O Module will not communicate properly if its slave address is outside of this range
- Do not duplicate a slave address within one communications circuit The Digital I/O Modules with the same slave address will not communicate properly
- A new slave address setting on pins 1 to 5 becomes effective as soon as it is changed

■ Baud Rate Setting

Set the Digital I/O Module's baud rate with pin 6 on the DIP switch on the front of the Digital I/O Module

Refer to the following table and set the baud rate as required

Table 5 3 Baud Rate Setting

Pin No	Setting	Function
6	ON	Sets the Digital I/O Module s baud rate to 1 Mbps
	OFF	Sets the Digital I/O Module's baud rate to 4 Mbps

IMPORTANT

A new setting on pin 6 becomes effective as soon as it is changed

■ Timeout Output Setting

With a Digital Output Module, the user can select the status of output data when communications are stopped

The setting on pin 7 determines the status of the outputs when the Digital Output Module's communications stop (timeout output) Refer to the following table and set the timeout output as required

Table 5 4 Timeout Output Setting

Pin No	Setting	Function
7	ON	• With a Digital Output Module, this setting retains the status of the outputs that existed before communications stopped • Pin 7 is not used on Digital Input Modules Leave pin 7 OFF
	OFF	• With a Digital Output Module, this setting turns OFF outputs when communications stop • Pin 7 is not used on Digital Input Modules Leave pin 7 OFF

IMPORTANT

A new setting on pin 7 becomes effective as soon as it is changed

■ Factory Settings

Digital Input Module

Digital Input Modules are shipped with the following settings on the Module s DIP switch Change these settings as required to suit your application

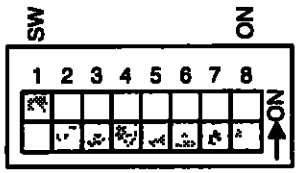


Table 5 5 Factory Settings

Pin No	Setting	Function
1	ON	Sets the slave address to 1
2 to 5	OFF	
6	OFF	Sets the baud rate to 4 Mbps
7	OFF	Not used Leave pin 7 OFF
8	OFF	Reserved for future use Leave pin 8 OFF

Digital Output Module

Digital Output Modules are shipped with the following settings on the Module's DIP switch Change these settings as required to suit your application

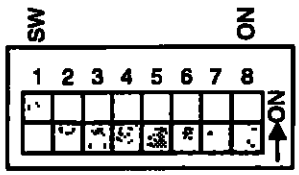


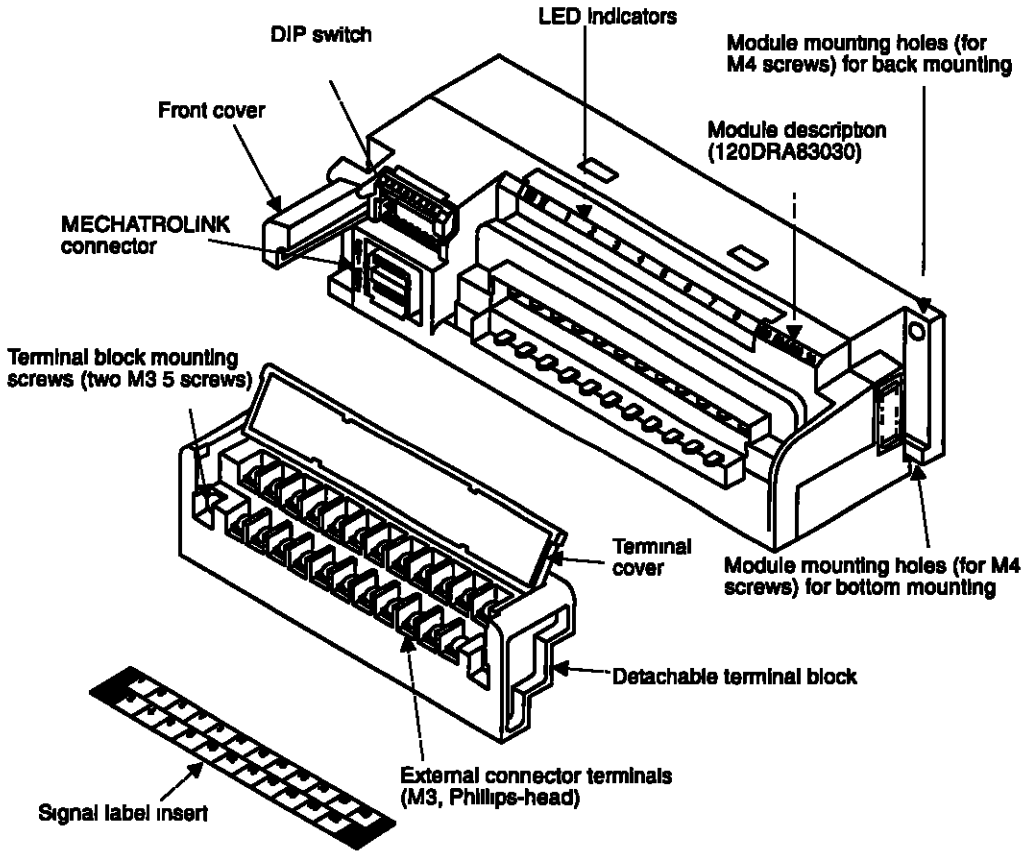
Table 5 6 Factory Settings

Pin No	Setting	Function
1	ON	Sets the slave address to 1
2 to 5	OFF	
6	OFF	Sets the baud rate to 4 Mbps
7	OFF	Sets the Module to turn outputs OFF when communications stop
8	OFF	Reserved for future use Leave pin 8 OFF

5.2 Relay Contact 8-point Output Module (120DRA83030)

5.2 1 External Appearance and Configuration

The following diagram shows the Relay Contact 8-point Output Module s external parts



■ LED Indicators

RUN	TX	1	2	3	4	5	6	7	8

Indicator Name	Indicator Color	Meaning When Lit
RUN	Green	The external power is being supplied normally
TX	Green	Sending data.
1 to 8	Green	The corresponding indicator is lit when that input signal is ON

■ DIP Switch

The DIP switch on the front of the Digital I/O Module must be set in order to use the Module

See *5 1 3 DIP Switch Settings* for details on the pin settings

5.2.2 Performance Specifications

The performance specifications of Relay Contact 8-point Output Module are shown below

Item		Specifications
Name		Relay Contact 8-point Output Module
Model Description		V_RELAY-8P
Model Number		JAMSC-120DRA83030
Contact Specifications	Rated Voltage/Current	200 VAC 1 A, resistive load 24 VDC, 1 A, resistive load
	Maximum Switching Power	AC load 750 VA DC load 90 W
	Maximum Switching Voltage	264 VAC, 125 VDC
	Minimum Switching Voltage/ Current	100 mVDC 0 1 mA
	Contact Resistance	100 mΩ max
	Electrical Contact Life	30 VDC, 5 A resistive load 100 000 operations min 250 VDC, 3 A resistive load 150,000 operations min
	Mechanical Contact Life	20,000 000 operations min
Output Delay Times		OFF to ON 10 ms max ON to OFF 15 ms max
Output Type		Relay contact outputs
External Connections		Removable terminal block with M3 screw terminals
Output Protection		Unprotected outputs (according to JIS B 3501)
Built-in Fuse		None
Surge Suppression		None
Other Output Protection		None
Number of Outputs		8 points
Output Signal Indication		One LED indicator for each output lit when output is ON Status saved in internal logic
Status Indication		External power supply normal RUN indicator lit Data being transmitted TX indicator lit
Output Circuit Isolation	Isolation Method	Relay
	Dielectric Strength	1,500 VAC for 1 minute between output terminals and internal circuits
	Insulation Resistance	100 MΩ min at 500 VDC between output terminals and internal circuits (at room temperature and humidity)
External Power Supply		100/200 VAC or 24 VDC supplied to drive loads Main external power supply 24 VDC (20 4 to 26 4 VDC), 100 mA when all outputs are ON
Derating Conditions		The maximum ambient operating temperature is limited with some mounting directions Refer to *5 1 2 Mounting Orientation* for details
Maximum Heating Value		2 64 W
Hot Swapping		Terminal block Not permitted Communications connector Permitted
Mass		Approx 300 g
Dimensions (mm)		152 × 44 × 71 8 (W × H × D)

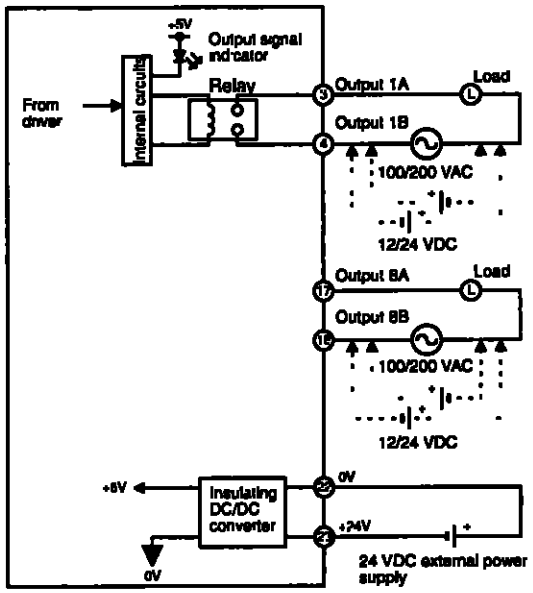
5.2.3 Circuit Configuration

⚠ Caution

- **Connect a fuse appropriate for the load specifications in series with the load The Relay Contact 8-point Output Module is not equipped with a built-in fuse**

  Failure to connect a fuse may result in fire, damage to equipment, or damage to the output circuits if there is a load short-circuit or overload

The following illustration shows the circuit configuration



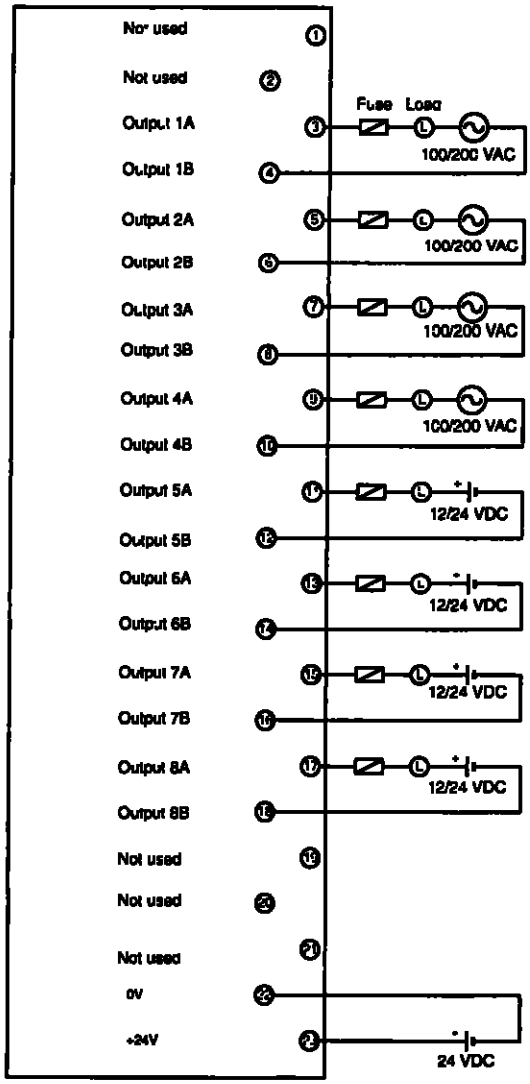
5 2.4 Connection Example

⚠ Caution

- Connect a fuse appropriate for the load specifications in series with the load The Relay Contact 8-point Output Module is not equipped with a built-in fuse

  Failure to connect a fuse may result in fire, damage to equipment or damage to the output circuits if there is a load short-circuit or overload

The following illustration shows an example of terminal connections



Note Terminals 1, 2, 19 20, and 21 are not used

IMPORTANT

- Use crimp terminals that fit M3 screws for terminal block wiring
- Use wire with the following gauge when connecting wire to the terminal block

  20 AWG (0 5 mm^2) to 16 AWG (1 3 mm^2)

  For the common wire, use wire that is 16 AWG (1 3 mm^2) or heavier
- Do not use terminal 1 as a relay terminal

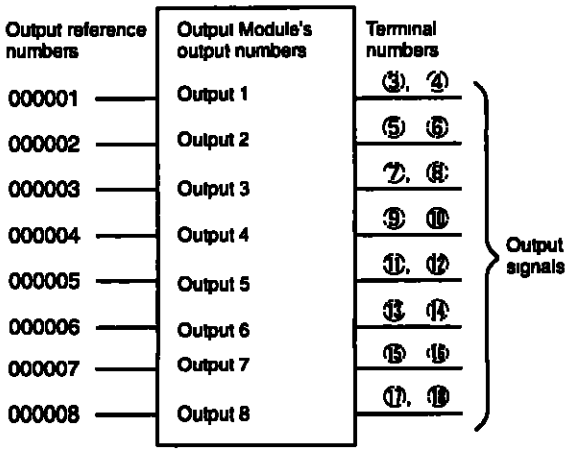
5 2 5 I/O Allocations

The leading register number of the I/O registers used by the Output Module is set in the I/O Allocation Tab in the MECHATROLINK definitions window Output register numbers (output coils) are allocated to output signals in ascending order

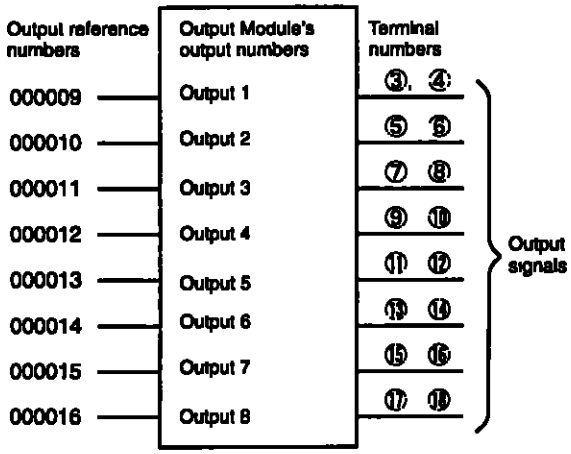
Refer to *Chapter 3 I/O Allocations* for details on allocating I/O to MECHATROLINK Modules

The following example shows how output coils are allocated

- Eight output coils allocated from 000001



- Eight output coils allocated from 000009



5.3 100-VAC 8-point Input Module (120DAI53330)

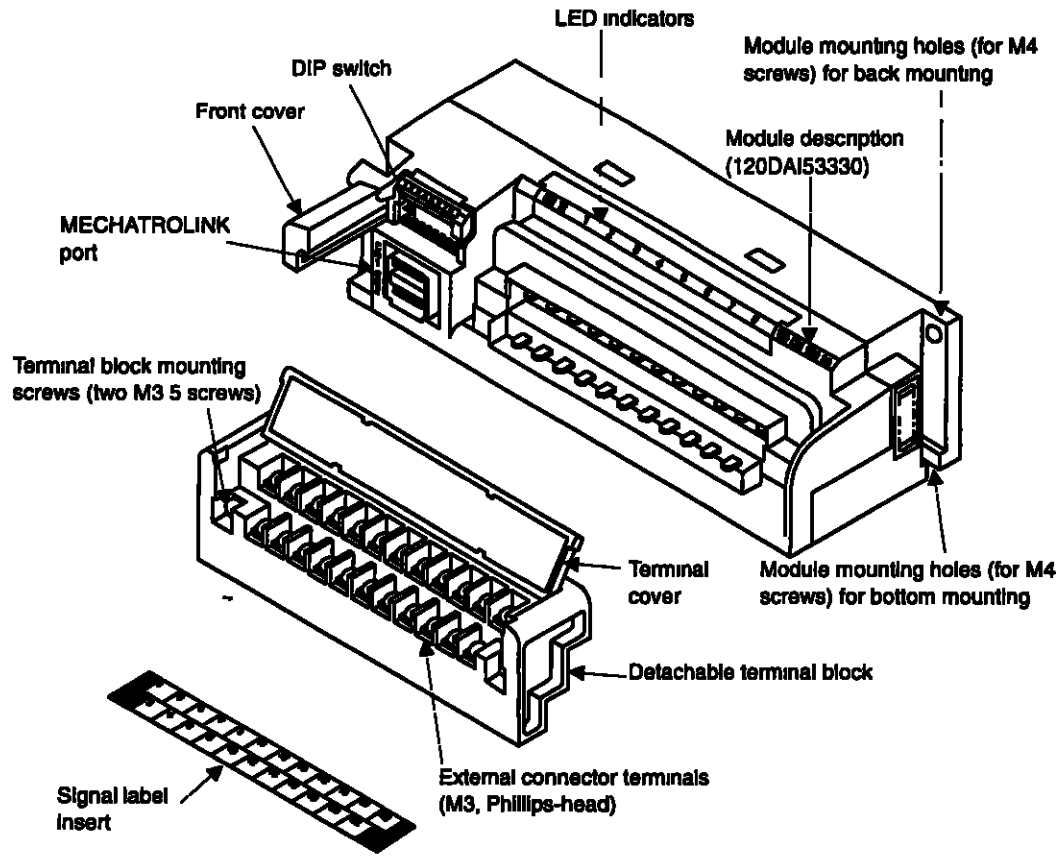
⚠ Caution

- **Do not change the DIP switch settings while a Digital I/O Module is operating**

  New settings on the Digital I/O Module's DIP switch become effective as soon as they are changed. Change the DIP switch settings only when the Module's main external power supply (24 VDC) is OFF. Changing the Module's DIP switch settings during operation may cause the Module to malfunction.

5.3.1 External Appearance and Configuration

The following diagram shows the 100-VAC 8-point Input Module's external parts.



■ LED Indicators

RUN	TX	1	2	3	4	5	6	7	8

Indicator Name	Indicator Color	Meaning When Lit
RUN	Green	The external power is being supplied normally
TX	Green	Sending data
1 to 8	Green	The corresponding indicator is lit when that input signal is ON

■ DIP Switch

The DIP switch on the front of the Digital I/O Module must be set in order to use the Module

See *5 1 3 DIP Switch Settings* for details on the pin settings

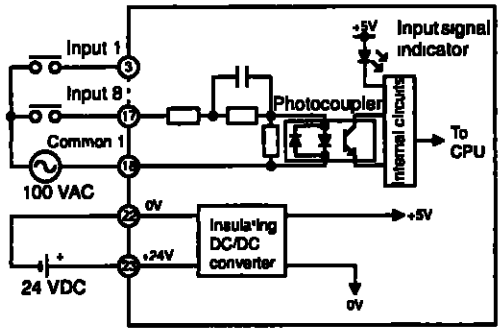
5.3.2 Performance Specifications

The performance specifications of 100-VAC 8-point Input Module are shown below

Item		Specifications
Name		100-VAC 8-point Input Module
Model Description		V_AC100IN-8P
Model Number		JAMSC-120DAI53330
Rated Voltage		100 VAC
Maximum Allowable Voltage		132 VAC
Rated Frequency		50 or 60Hz
Allowable Frequency Range		47 to 63 Hz
Inrush Current		160 mA
Rated Current		7 mA (100 VAC, 50Hz)
Input Impedance		14 3 kΩ (50 Hz) 12 5 kΩ (60 Hz)
Standard Operating Ranges		ON voltage range 74 to 132 VAC OFF voltage range 30 VAC max
Input Type		AC type 2 (according to JIS B 3501)
Input Delay Times		OFF to ON 20 ms max ON to OFF 35 ms max
Number of Commons		1
Number of Inputs per Common		8 points/common
External Connections		Removable terminal block with 23 M3 screw terminals
Number of Inputs		8 points
Input Signal Indication		One LED indicator for each input, lit when input is ON Status saved in internal logic
Status Indication		External power supply normal RUN in indicator lit Data being transmitted TX indicator lit
Input Circuit Isolation	Isolation Method	Photocoupler
	Dielectric Strength	1 500 VAC for 1 minute between input terminals and internal circuits
	Insulation Resistance	100 MΩ min at 500 VDC between input terminals and internal circuits (at room temperature and humidity)
External power supply		Input signal power supply 100 VAC Main external power supply 24 VDC (20 4 to 26 4 VDC) 80 mA max when all inputs are ON
Derating Conditions		The maximum ambient operating temperature is limited with some mounting directions Refer to *5 1 2 Mounting Orientation* for details
Maximum Heating Value		1 92 W
Hot Swapping		Terminal block Not permitted Communications connector Permitted
Mass		Approx 300 g
Dimensions (mm)		152 × 44 × 71 8 (W × H × D)

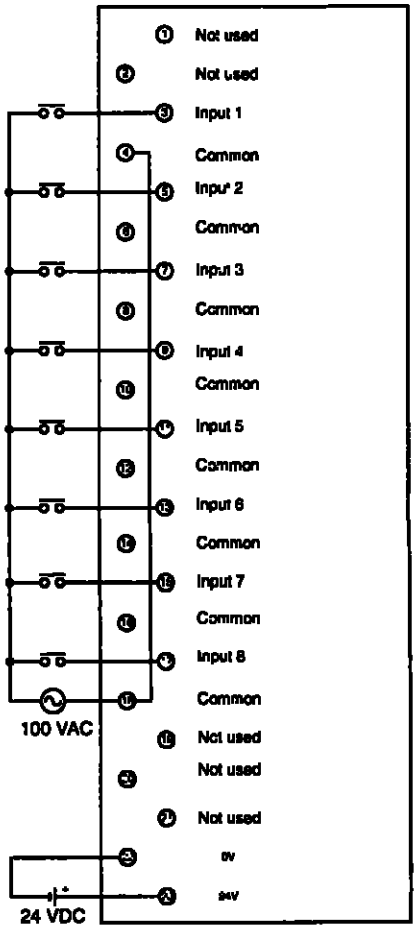
5.3.3 Circuit Configuration

The following illustration shows the circuit configuration



5.3.4 Connection Example

The following illustration shows an example of terminal connections



Note 1 Pins 4, 6, 8, 10, 12, 14, 16, and 18 are connected internally

2 Pins 1, 2, 19, 20, and 21 are not used

IMPORTANT

- Use crimp terminals that fit M3 screws for terminal block wiring
- Use wire with the following gauge when connecting wire to the terminal block

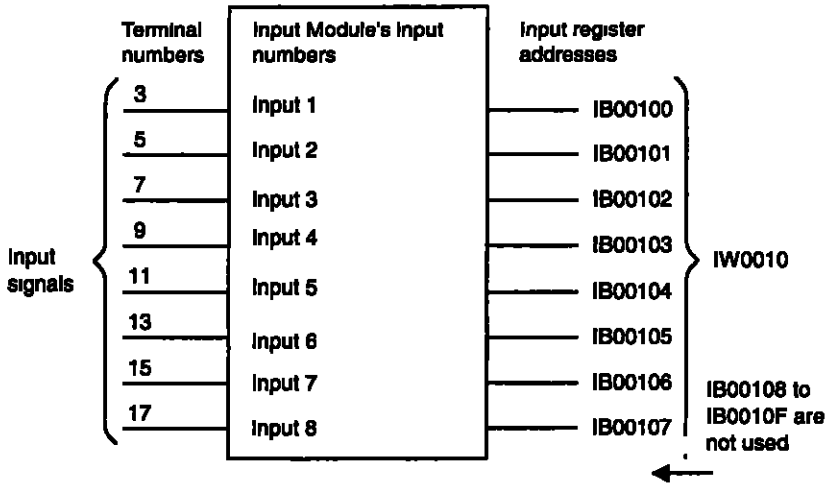
  20 AWG (0 5 mm^2) to 16 AWG (1 3 mm^2)
- Do not use terminal 1 as a relay terminal

5.3.5 I/O Allocations

The leading register number of the I/O registers used by the Input Module is set in the I/O Allocation Tab in the MECHATROLINK definitions window

Refer to *Chapter 3 I/O Allocations* for details on allocating I/O to MECHATROLINK Modules

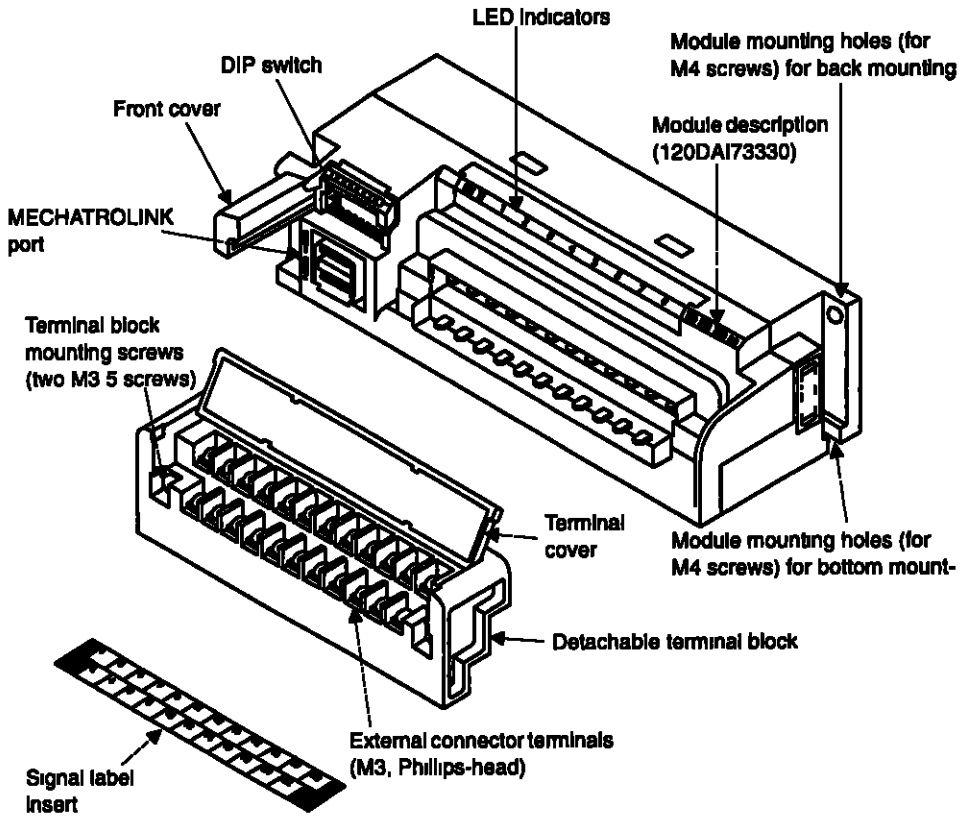
The following example shows how 8 input relays are allocated from IW0010



5.4 200-VAC 8-point Input Module (120DAI73330)

5.4.1 External Appearance and Configuration

The following diagram shows the 200-VAC 8-point Input Module's external parts



■ LED Indicators

RUN	TX	1	2	3	4	5	6	7	8

Indicator Name	Indicator Color	Meaning When Lit
RUN	Green	The external power is being supplied normally
TX	Green	Sending data
1 to 8	Green	The corresponding indicator is lit when that input signal is ON

■ DIP Switch

The DIP switch on the front of the Digital Input Module must be set in order to use the Module

See *5 1 3 DIP Switch Settings* for details on the pin settings

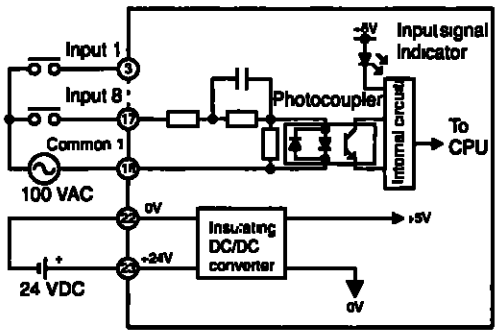
5.4 2 Performance Specifications

The performance specifications of 200-VAC 8-point Input Module are shown below

Item		Specifications
Name		200-VAC 8-point Input Module
Model Description		V_AC200IN-8P
Model Number		JAMSC-120DAI73330
Rated Voltage		200 VAC
Maximum Allowable Voltage		264 VAC
Rated Frequency		50 or 60Hz
Allowable Frequency Range		47 to 63 Hz
Inrush Current		320 mA
Rated Current		7 mA (200 VAC, 50Hz)
Input Impedance		28 6 kΩ (50 Hz) 23 1 kΩ (60 Hz)
Standard Operating Ranges		ON voltage range 159 to 264 VAC OFF voltage range 40 VAC max
Input Type		AC type 2 (according to JIS B 3501)
Input Delay Times		OFF to ON 20 ms max ON to OFF 35 ms max
Number of Commons		1
Number of Inputs per Common		8 points/common
External Connections		Removable terminal block with 23 M3 screw terminals
Number of Inputs		8 points
Input Signal Indication		One LED Indicator for each input, lit when input is ON Status saved in internal logic
Status Indication		External power supply normal RUN indicator lit Data being transmitted TX indicator lit
Input Circuit Isolation	Isolation Method	Photocoupler
	Dielectric Strength	1 500 VAC for 1 minute between input terminals and internal circuits
	Insulation Resistance	100 MΩ min at 500 VDC between input terminals and internal circuits (at room temperature and humidity)
External Power Supply		Input signal power supply 200 VAC Main external power supply 24 VDC (20 4 to 26 4 VDC) 80 mA max when all inputs are ON
Derating Conditions		The maximum ambient operating temperature is limited with some mounting directions Refer to *5 1 2 Mounting Orientation* for details
Maximum Heating Value		1 92 W
Hot Swapping		Terminal block Not permitted Communications connector Permitted
Mass		Approx 300 g
Dimensions (mm)		152 × 44 × 71 8 (W × H × D)

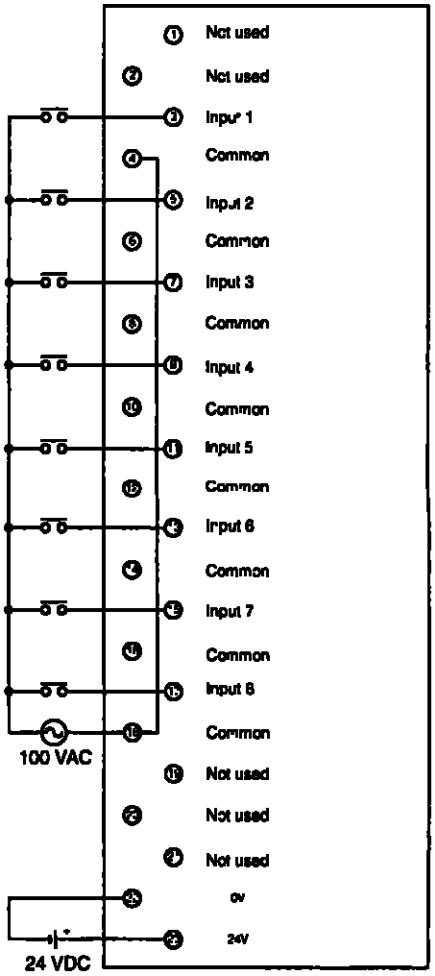
5 4 3 Circuit Configuration

The following illustration shows the circuit configuration



5.4.4 Connection Example

The following illustration shows an example of terminal connections



Note 1 Pins 4, 6 8, 10, 12 14, 16, and 18 are connected internally

2 Pins 1, 2, 19, 20, and 21 are not used

IMPORTANT

- Use crimp terminals that fit M3 screws for terminal block wiring
- Use wire with the following gauge when connecting wire to the terminal block

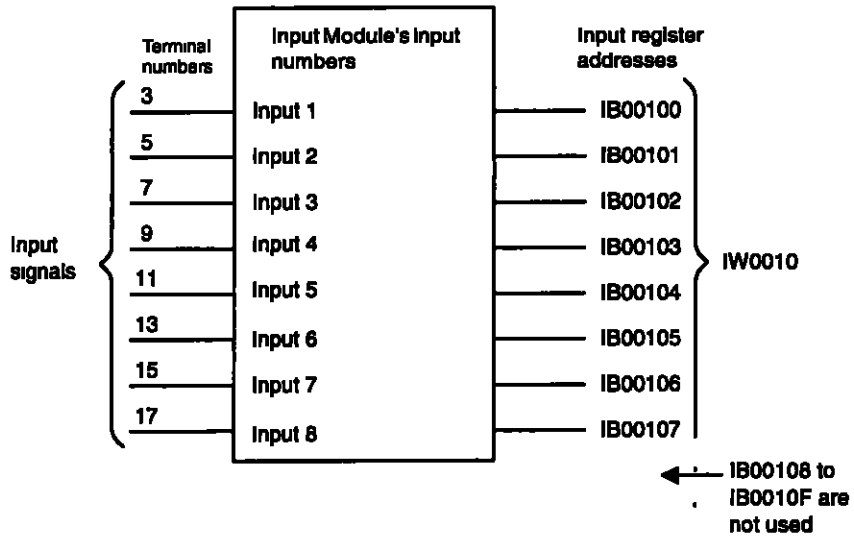
  20 AWG (0 5 mm^2) to 16 AWG (1 3 mm^2)
- Do not use terminal 1 a relay terminal

5.4.5 I/O Allocations

The leading register number of the I/O registers used by the Input Module is set in the I/O Allocation Tab in the MECHATROLINK definitions window

Refer to *Chapter 3 I/O Allocations* for details on allocating I/O to MECHATROLINK Modules

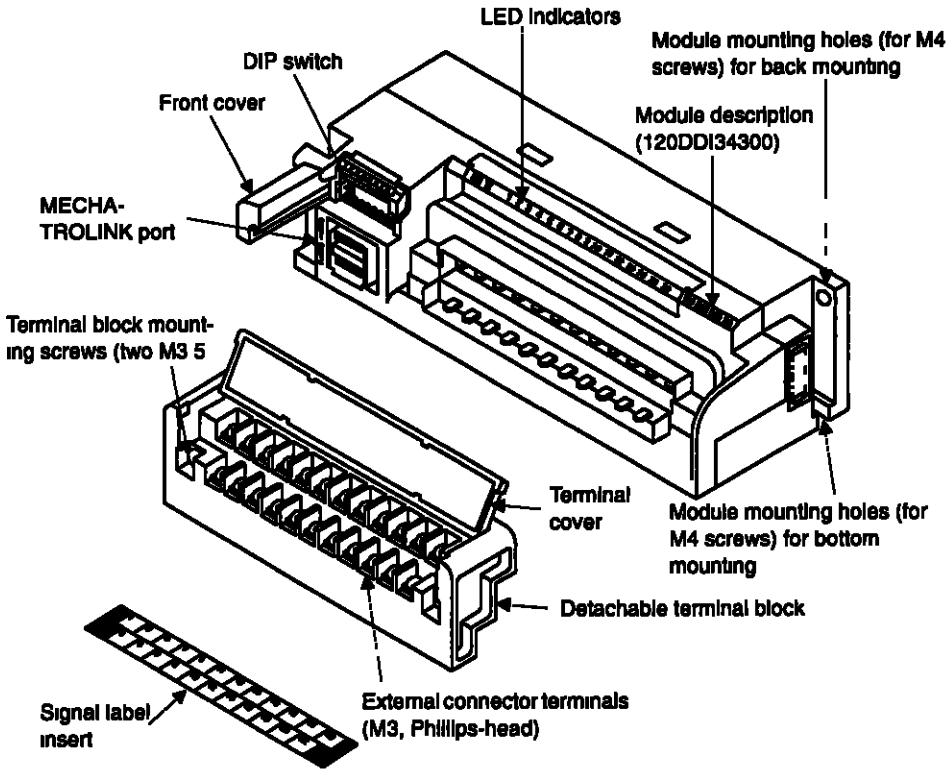
The following example shows how 8 input relays are allocated from IW0010



5.5 24-VDC 16-point Input Module (12DDI34330)

5.5.1 External Appearance and Configuration

The following diagram shows the 24-VDC 16-point Input Module's external parts



■ LED Indicators

RUN	TX	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Indicator Name	Indicator Color	Meaning When Lit
RUN	Green	The external power is being supplied normally
TX	Green	Sending data
1 to 16	Green	The corresponding LED is lit when that input signal is ON

■ DIP Switch

The DIP switch on the front of the Digital Input Module must be set in order to use the Module

See *5 1 3 DIP Switch Settings* for details on the pin settings

5 5 2 Performance Specifications

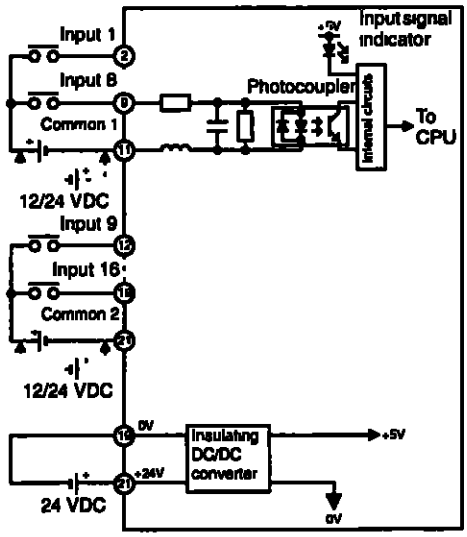
The performance specifications of 24-VDC 16-point Input Module are shown below

When 12-VDC power is used, the Module does not comply with JIS B3501

Item		Specifications	
Operating Voltage		12 VDC	24 VDC
Name		24-VDC 16-point Input Module	
Model Description		V_DC24VIN-16P	
Model Number		JAMSC-120DDI34300	
Rated Voltage		12 or 24 VDC	
Maximum Allowable Voltage		30 VDC	
Input Format		Sourcing and sinking	
Rated Current		2 5 mA	5 mA
Input Impedance		4 8 kΩ	
Standard Operating Ranges		Minimum ON voltage 9 VDC Maximum OFF voltage 5 VDC	
Input Type		Not compliant with JIS B 3501 standards	DC type 2 (according to JIS B 3501)
Input Delay Times		OFF to ON 5 ms max ON to OFF 5 ms max	
Number of Commons		2	
Number of Inputs per Common		8 points/common	
External Connections		Removable terminal block with 23 M3 screw terminals	
Number of Inputs		16 points	
Input Signal Indication		One LED indicator for each input lit when input is ON Status saved in internal logic	
Status Indication		External power supply normal RUN indicator lit Data being transmitted TX indicator lit	
Input Circuit Isolation	Isolation Method	Photocoupler	
	Dielectric Strength	1,500 VAC for 1 minute between input terminals and internal circuits	
	Insulation Resistance	100 MΩ min at 500 VDC between input terminals and internal circuits (at room temperature and humidity)	
External Power Supply		Input signal power supply 12 VDC	Input signal power supply 24 VDC
		Main external power supply 24 VDC (20 4 to 26 4 VDC), 90 mA max when all inputs are ON	
Derating Conditions		The maximum ambient operating temperature is limited with some mounting directions Refer to *5 1 2 Mounting Orientation* for details	
Maximum Heating Value		2 16 W	
Hot Swapping		Terminal block Not permitted Communications connector Permitted	
Mass		Approx 300 g	
Dimensions (mm)		152 × 44 × 71 8 (W × H × D)	

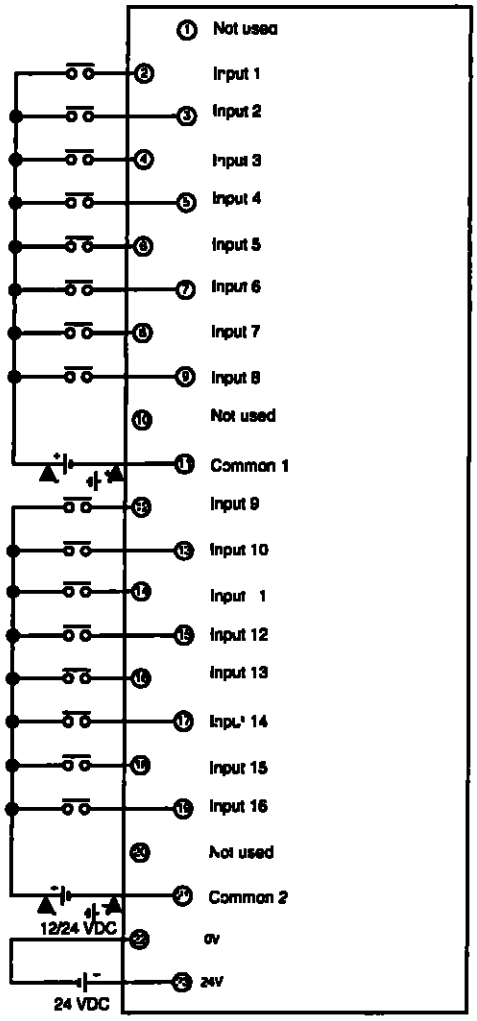
5.5 3 Circuit Configuration

The following illustration shows the circuit configuration



5.5.4 Connection Example

The following illustration shows an example of terminal connections



Note Terminal 1, 10, and 20 are not used

IMPORTANT

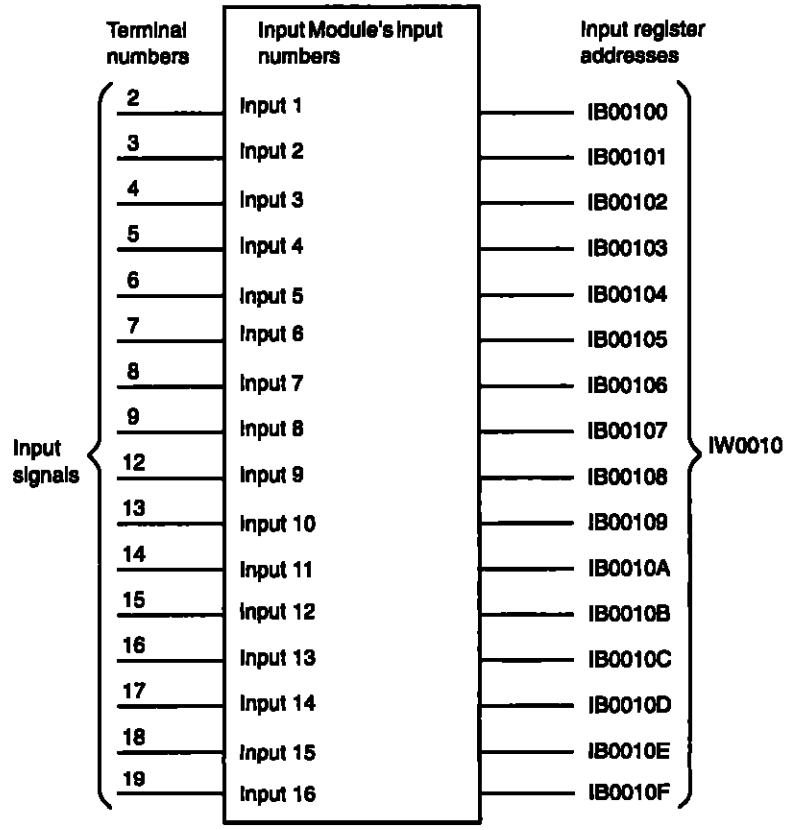
- Use crimp terminals that fit M3 screws for terminal block wiring
- Use wire between 24 AWG (0 2 mm^2) and 18 AWG (0 8 mm^2) when connecting wire to the terminal block
- The polarity of the external signal power supply can be connected in either direction
- Do not use terminal 1 as a relay terminal

5 5 5 I/O Allocations

The leading register number of the I/O registers used by the Input Module is set in the I/O Allocation Tab in the MECHATROLINK definitions window

Refer to *Chapter 3 I/O Allocations* for details on allocating I/O to MECHATROLINK Modules

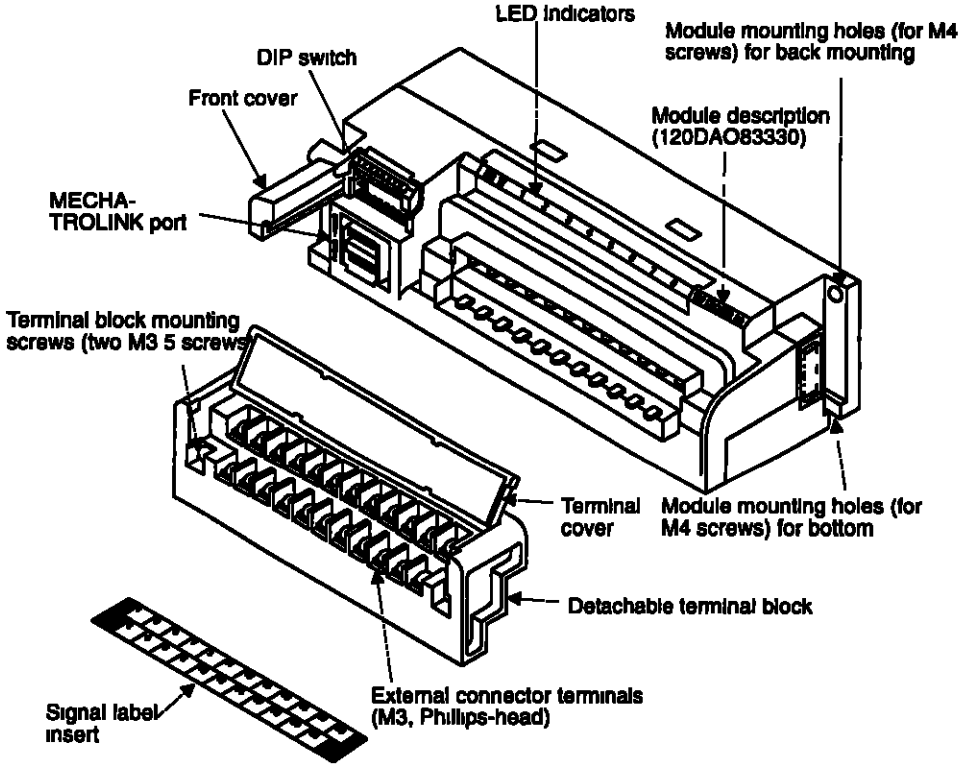
The following example shows how 16 input relays are allocated from IW0010



5.6 100/200-VAC 8-point Output Module (120DAO83330)

5.6.1 External Appearance and Configuration

The following diagram shows the 100/200-VAC 8-point Output Module's external parts



■ LED Indicators

RUN TX ERR	1	2	3	4	5	6	7	8

Indicator Name	Indicator Color	Meaning When Lit
RUN	Green	The external power is being supplied normally
TX	Green	Sending data
ERR	Red	Blown fuse or disconnected load power supply
1 to 8	Green	The corresponding indicator is lit when that output signal is ON

■ DIP Switch

The DIP switch on the front of the Digital Output Module must be set in order to use the Module

See *5 1 3 DIP Switch Settings* for details on the pin settings

5 6 2 Performance Specifications

The performance specifications of 100/200-VAC 8-point Output Module are shown below

Item		Specifications
Name		100/200-VAC 8-point Output Module
Model Description		V_ACOUT-8P
Model Number		JAMSC-120DAO83330
Rated Voltage		100/200 VAC
Allowable Voltage Range		80 to 264 VAC
Rated Frequency		50 or 60 Hz
Allowable Frequency Range		47 to 63 Hz
Maximum Load Current		0 6 Arms/output, 2 4 A/common
Output Voltage Drop		1 0 V rms
Output Delay Times		OFF to ON 10 ms max ON to OFF $^1/_2$ cycle + 5 ms max
Leakage Current when OFF		2 mA max at 240 VAC, 50 Hz
Minimum Switching Voltage/Current		10 mA rms
Output Type		Triac outputs
Number of Commons		1
External Connections		Removable terminal block with M3 screw terminals
Output Protection Type		Unprotected outputs (according to JIS B 3501)
Built-in Fuse		One 3-A fuse (1 fuse/common) (Opening time 1 second max at 200% of rated current)
Surge Suppression		Varistor
Other Output Protection		None
Number of Outputs		8 points
Output Signal Indication		One LED indicator for each output lit when output is ON Status saved in internal logic
Status Indication		External power supply normal RUN indicator lit Data being transmitted TX indicator lit Blown fuse or load power supply disconnected ERR indicator lit.
Output Circuit Isolation	Isolation Method	Phototriac
	Dielectric Strength	1,500 VAC for 1 minute between output terminals and internal circuits
	Insulation Resistance	100 MΩ min at 500 VDC between input terminals and internal circuits (at room temperature and humidity)
External Power Supply		100/200 VAC supplied to drive loads Main external power supply 24 VDC (20 4 to 26 4 VDC), 100 mA when all outputs are ON
Derating Conditions		The maximum ambient operating temperature is limited with some mounting directions Refer to *5 1 2 Mounting Orientation* for details
Maximum Heating Value		2 4 W
Hot Swapping		Terminal block Not permitted Communications connector Permitted
Mass		Approx 300 g
Dimensions (mm)		152 × 44 × 71 8 (W × H × D)

5.6.3 Circuit Configuration

⚠ Caution

- The built-in fuse is not meant to protect output elements Connect a fuse appropnate for the load specfications in series with the load

  If an external fuse is not connected an output short-circuit or overload may cause fire, destruction of the equipment, or damage to the output circuit

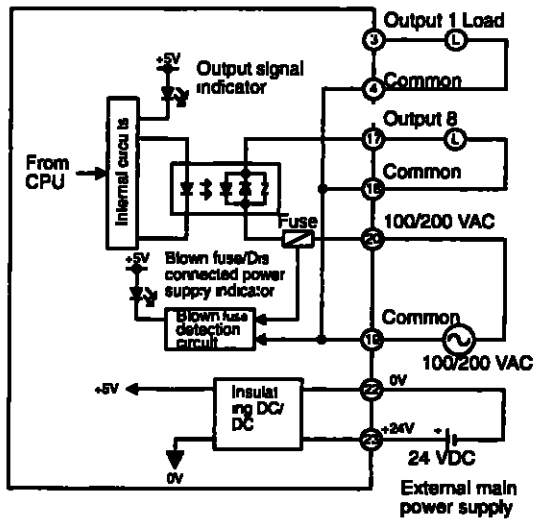
⃠ Prohibited

- The customer must not replace the built-in fuse

  If the customer replaces the built-in fuse, the Output Module may malfunction or break down Customer-replacement of the fuse will also void the warranty

  The built-in fuse must always be replaced by Yaskawa service staff

The following illustration shows the circuit configuration



IMPORTANT Communications with the master will stop when the load power supply is OFF or the fuse blows

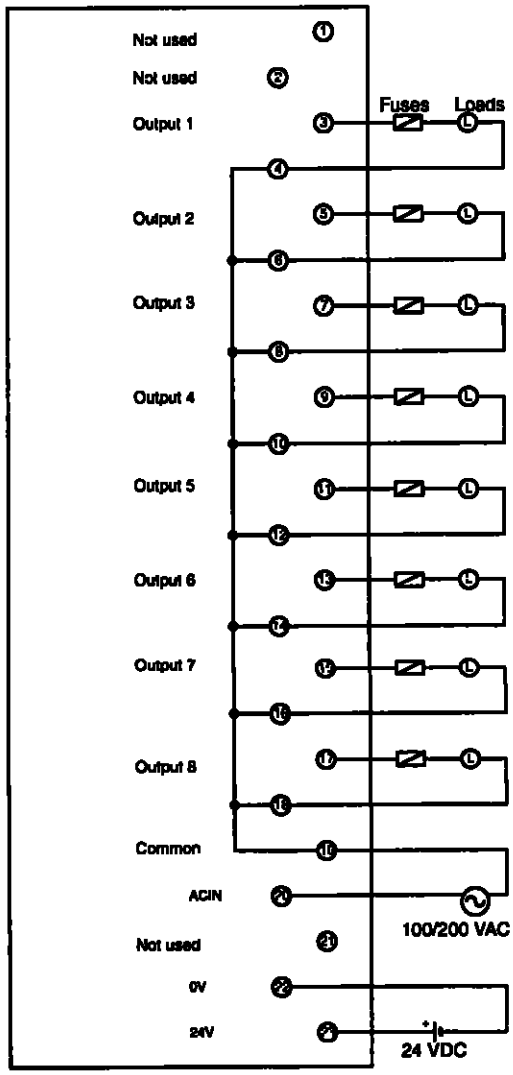
5.6.4 Connection Example

⚠ Caution

- **The built-in fuse is not meant to protect output elements Connect a fuse appropriate for the load specifications in series with the load**

  If an external fuse is not connected, an output short-circuit or overload may cause fire destruction of the equipment, or damage to the output circuit

The following illustration shows an example of terminal connections



Note 1 Pins 4, 6, 8, 10, 12, 14, 16, 18, and 19 are connected internally

2 Pins 1, 2, and 21 are not used

IMPORTANT

- Use crimp terminals that fit M3 screws for terminal block wiring
- Use wire with the following gauge when connecting wire to the terminal block

  20 AWG (0 5 mm^2) to 16 AWG (1 3 mm^2)

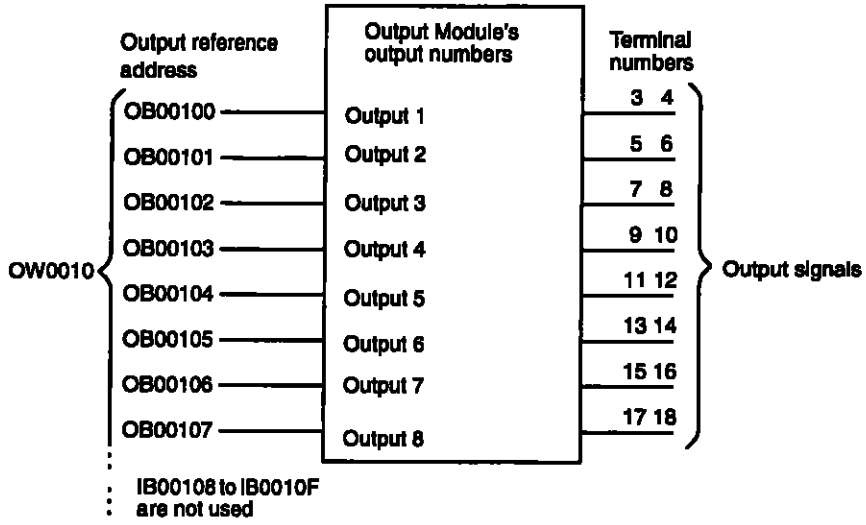
  For the common wire, use wire that is 16 AWG (1 3 mm^2) or heavier
- Do not use terminal 1 as a relay terminal

5.6.5 I/O Allocations

The leading register number of the I/O registers used by the Output Module is set in the I/O Allocation Tab in the MECHATROLINK definitions window

Refer to *Chapter 3 I/O Allocations* for details on allocating I/O to MECHATROLINK Modules

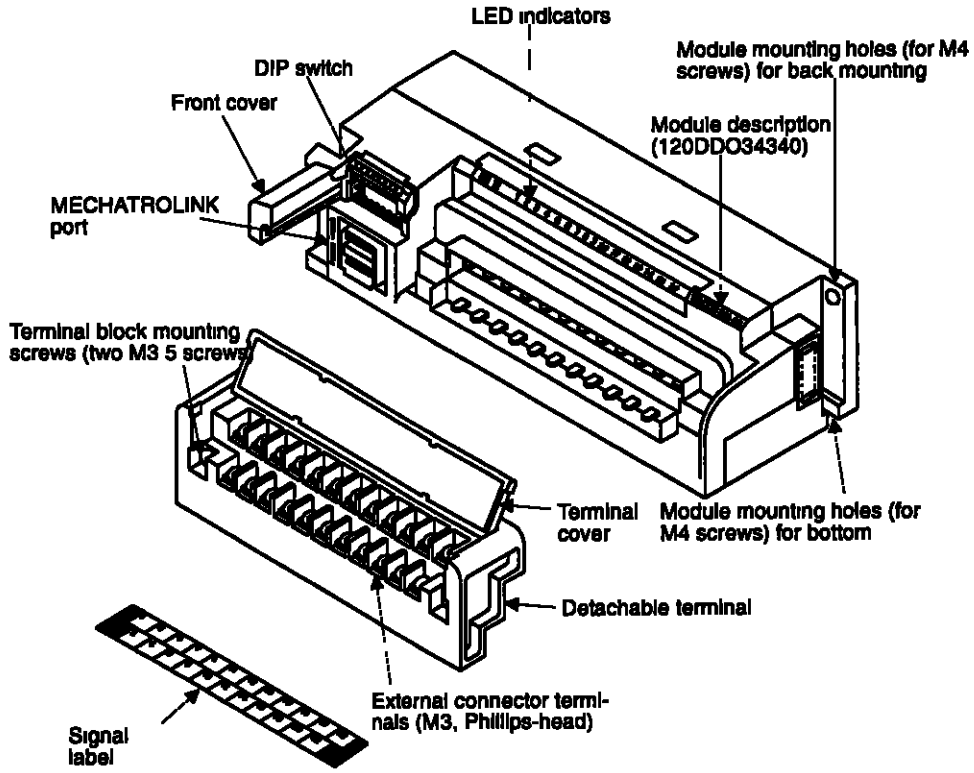
The following example shows how 8 of the Output Module's output coils are allocated from IW0010



5.7 24-VDC 16-point Output Module (120DDO34340)

5.7.1 External Appearance and Configuration

The following diagram shows the 24-VDC 16-point Output Module's external parts



■ LED Indicators

RUN	TX	ERR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Indicator Name	Indicator Color	Meaning When Lit
RUN	Green	The external power is being supplied normally
TX	Green	Sending data
ERR	Red	Blown fuse or disconnected load power supply
1 to 16	Green	The corresponding indicator is lit when that input signal is ON

■ DIP Switch

The DIP switch on the front of the Digital Output Module must be set in order to use the Module

See *5 1 3 DIP Switch Settings* for details on the pin settings

5.7 2 Performance Specifications

The performance specifications of 24-VDC 16-point Output Module are shown below

Item		Specifications
Name		24-VDC 16-point Output Module (Sinking)
Model Description		V_DC24OUT-16P
Model Number		JAMSC-120DDO34340
Rated Voltage		12/24 VDC
Allowable Voltage Range		10 2 to 30 VDC
Output Format		Sinking
Maximum Load Current		0 3 A/output
Output Voltage Drop		1 5 V max (0 3 A)
Output Delay Times		OFF to ON 1 ms max ON to OFF 1 ms max
Leakage Current when OFF		1 mA max at 24 VDC
Output Type		Transistor outputs
Number of Commons		2
Number of Outputs per Common		8 points/common
External Connections		Removable terminal block with 23 M3 screw terminals
Output Protection Type		Unprotected outputs (according to JIS B 3501)
Built-in Fuse		Two 3 5-A fuses (1 fuse/common) (Opening time 5 seconds max at 200% of rated current)
Surge Suppression		None
Other Output Protection		None
Number of Outputs		16 points
Output Signal Indication		One LED indicator for each output lit when output is ON Status saved in internal logic
Status Indication		External power supply normal RUN indicator lit Data being transmitted TX indicator lit Blown fuse or load power supply disconnected ERR indicator lit
Output Circuit Isolation	Isolation Method	Photocoupler
	Dielectric Strength	1,500 VAC for 1 minute between output terminals and internal circuits
	Insulation Resistance	100 MΩ min at 500 VDC between input terminals and internal circuits (at room temperature and humidity)
External Power Supply		12/24 VDC supplied to drive loads Main external power supply 24 VDC (20 4 to 26 4 VDC), 110 mA when all outputs are ON
Derating Conditions		The maximum ambient operating temperature is limited with some mounting directions Refer to *5 1 2 Mounting Orientation* for details
Maximum Heating Value		2 64 W
Hot Swapping		Terminal block Not permitted Communications connector Permitted
Mass		Approx 300 g
Dimensions (mm)		152 × 44 × 71 8 (W × H × D)

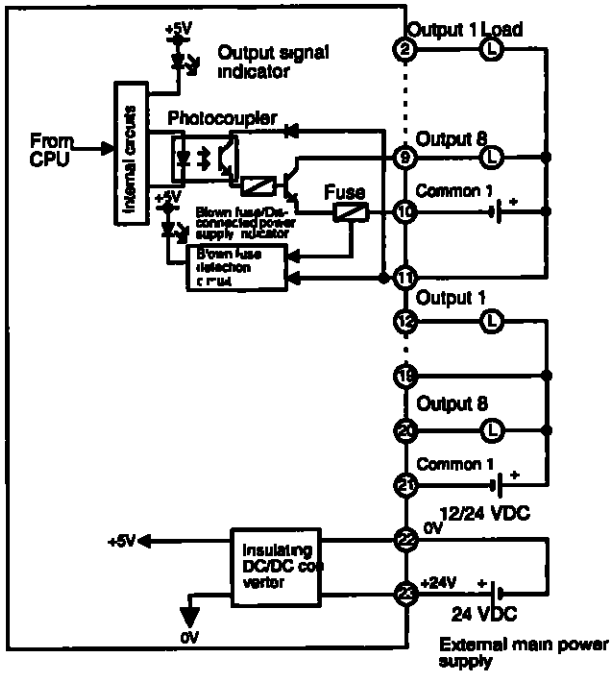
5.7 3 Circuit Configuration

⚠ Caution

- **The built-in fuse is not meant to protect output elements Connect a fuse appropriate for the load specifications in series with the load**

  Failure to connect a fuse may result in fire, damage to equipment, or damage to the output circuits if there is a load short-circuit or overload

The following illustration shows the circuit configuration



IMPORTANT Communications with the master will stop when the load power supply is OFF or the fuse blows

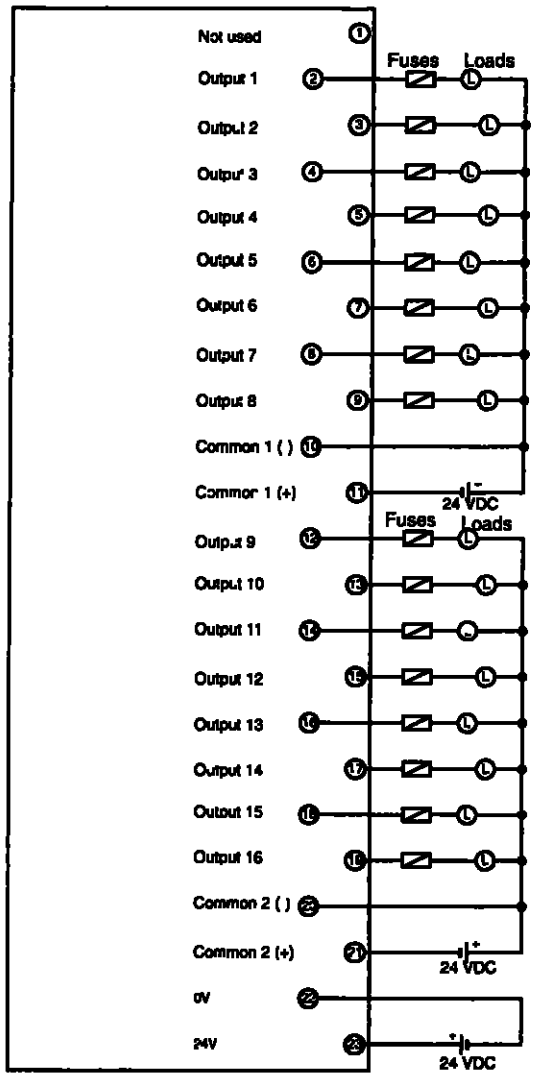
5.7 4 Connection Example

⚠ Caution

- **The built-in fuse is not meant to protect output elements Connect a fuse appropriate for the load specifications in series with the load**

  Failure to connect a fuse may result in fire, damage to equipment, or damage to the output circuits if there is a load short-circuit or overload

The following illustration shows an example of terminal connections



IMPORTANT

- Use crimp terminals that fit M3 screws for terminal block wiring
- Use wire with the following gauge when connecting wire to the terminal block

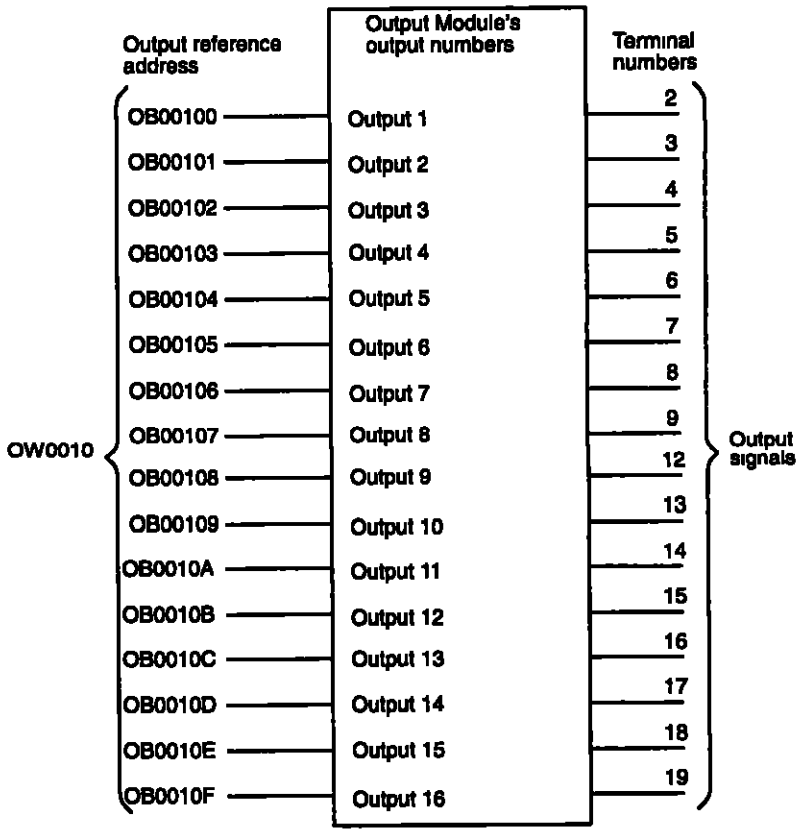
  24 AWG (0 2 mm^2) to 18 AWG (0 8 mm^2)
- Do not use terminal 1 as a relay terminal

5.7.5 I/O Allocations

The leading register number of the I/O registers used by the Output Module is set in the I/O Allocation Tab in the MECHATROLINK definitions window

Refer to *Chapter 3 I/O Allocations* for details on allocating I/O to MECHATROLINK Modules

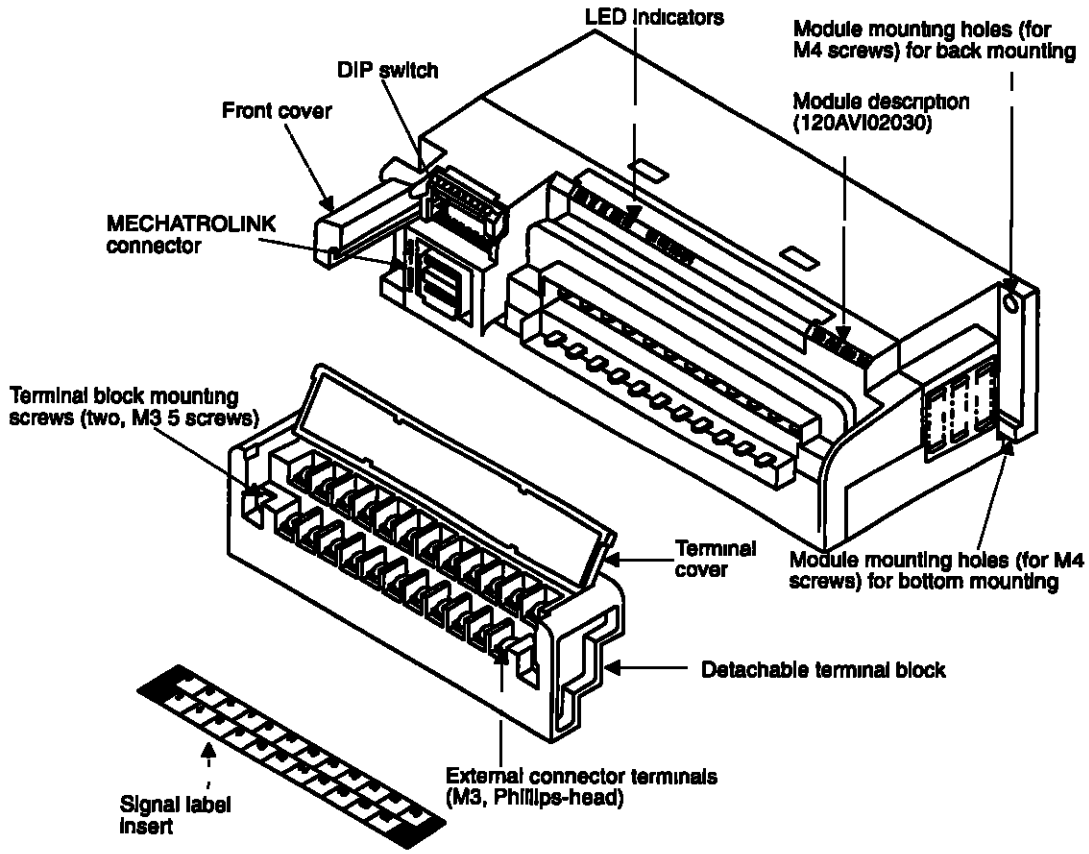
The following example shows how 16 of the Output Module's output coils are allocated from IW0010



5.8 Analog Input Module (±10 V, 4 CH) (120AVI02030)

5.8.1 External Appearance and Configuration

The following diagram shows the Analog Input Module's external parts



■ LED Indicators

RDY	TX	RX	ERR	FLT	CH1	CH2	CH3	CH4

Indicator Name	Indicator Color	Meaning When Lit or Flashing	
RDY	Green	Lit	The Module is operating normally
		Flashing	The transmission cable is disconnected or the Module is waiting for communications with the master
TX	Green	Lit	Sending data
RX	Green	Lit	Receiving data
ERR	Red	Lit	A communications error occurred

Indicator Name	Indicator Color	Meaning When Lit or Flashing	
FLT	Red	Lit	Offset/gain setting error
		Flashing	Self-diagnostic error
CH1 to CH4	Green	Lit	Each LED indicates that the input is out-of-range for that channel Out-of-range inputs are as follows +10 02 V < Channel input signal Channel input signal < -10 02 V

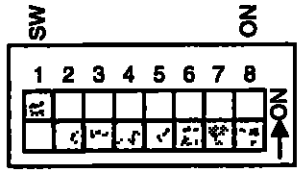
■ DIP Switch

The DIP switch on the front of the Analog I/O Module must be set in order to use the Module

The DIP switch settings are explained below

DIP Switch Functions

The DIP switch consists of 8 pins The pins are numbered 1 to 8, as shown in the diagram



Each pin turns ON when it is moved to the upper position

The setting of each pin becomes effective when the Module's main external power supply (24 VDC) is turned ON

Each pin's function is shown in the following table

Table 5 7 DIP Switch Functions

Pin No	Setting	Function
1 to 5	ON	Pins 1 through 5 set the Analog I/O Module's slave address (See the table on the following page)
	OFF	
6	ON	Sets the Analog I/O Module's baud rate to 1 Mbps
	OFF	Sets the Analog I/O Module's baud rate to 4 Mbps
7	ON	• With an Analog Output Module, the user can select the status of output data when communications are stopped This setting retains the status of the outputs that existed before communications stopped • With an Analog Input Module, the user can select the software filter This setting sets the software filter to 5 time averaging
	OFF	• With an Analog Output Module, the user can select the status of output data when communications are stopped This setting clears the outputs to 0 when communications stop • With an Analog Input Module, the user can select the software filter This setting disables the software filter (no filtering)
8	ON	Reserved for future use Leave pin 8 OFF
	OFF	

Slave Address Settings

Up to 30 slave stations can be connected to a Remote I/O Driver Module Each slave station must have a unique slave address

Set the slave address with pins 1 to 5 on the DIP switch on the front of the Analog I/O Module

Refer to the following table and set slave addresses as required

Table 5 8 Slave Address Settings

Pin No					Slave Address
1	2	3	4	5	
0	0	0	0	0	Not used
1	0	0	0	0	1
0	1	0	0	0	2
1	1	0	0	0	3
0	0	1	0	0	4
1	0	1	0	0	5
0	1	1	0	0	6
1	1	1	0	0	7
0	0	0	1	0	8
1	0	0	1	0	9
0	1	0	1	0	10
1	1	0	1	0	11
0	0	1	1	0	12
1	0	1	1	0	13
0	1	1	1	0	14
1	1	1	1	0	15
0	0	0	0	1	16
1	0	0	0	1	17
0	1	0	0	1	18
1	1	0	0	1	19
0	0	1	0	1	20
1	0	1	0	1	21
0	1	1	0	1	22
1	1	1	0	1	23
0	0	0	1	1	24
1	0	0	1	1	25
0	1	0	1	1	26
1	1	0	1	1	27
0	0	1	1	1	28
1	0	1	1	1	29
0	1	1	1	1	30
1	1	1	1	1	Not used

IMPORTANT

- Set slave addresses between 1 and 30 The Analog I/O Module will not communicate properly if its slave address is outside of this range
- Do not duplicate a slave address within one communications circuit The Analog I/O Modules with the same slave address will not communicate properly
- When the slave address setting has been changed, the new setting will become effective when the Module's main external power supply (24 VDC) is turned OFF, and then ON again

Baud Rate Setting

Set the Analog I/O Module's baud rate with pin 6 on the DIP switch on the front of the Module

Refer to the following table and set the baud rate as required

Table 5 9 Baud Rate Setting

Pin No	Setting	Function
6	ON	Sets the Analog I/O Module baud rate to 1 Mbps
	OFF	Sets the Analog I/O Module baud rate to 4 Mbps

IMPORTANT

A new setting on pin 6 becomes effective when the Module s main external power supply (24 VDC) is turned ON

When changing the setting, turn the Module's main external power supply (24 VDC) OFF and then ON again

Timeout Output Setting

With an Analog Output Module, the user can select the status of output data when communications are stopped

The setting on pin 7 determines the status of the outputs when the Analog Output Module's communications stop (timeout output) Refer to the following table and set the timeout output as required

Table 5 10 Timeout Output Setting

Pin No	Setting	Function
7	ON	This setting retains the status of the outputs that existed before communications stopped
	OFF	This setting clears the outputs to 0 when communications stop

IMPORTANT A new setting on pin 7 becomes effective when the Module s main external power supply (24 VDC) is turned ON When changing the setting, turn the Module's main external power supply (24 VDC) OFF and then ON again

Software Filter Setting

With an Analog Input Module, the user can enable software filtering by turning ON pin 7 Refer to the following table and enable software filtering when required

Table 5 11 Software Filter Setting

Pin No	Setting	Function
7	ON	Enables the five-time averaging software filter The five-time averaging function takes five consecutive input signals, discards the lowest and highest, calculates the average of the remaining three signals, and transmits this value to the Master Module
	OFF	This setting disables software filtering When this setting is selected the Analog Input Module reads input signals and transmits these values to the Master Module each communications cycle

IMPORTANT A new setting on pin 7 becomes effective when the Module s main external power supply (24 VDC) is turned ON When changing the setting, turn the Module s main external power supply (24 VDC) OFF and then ON again

Factory Settings

- Analog Input Module

  Analog Input Modules are shipped with the following settings on the Module's DIP switch

  Change these settings as required to suit your application

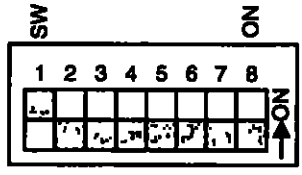


Table 5 12 Factory Settings

Pin No	Setting	Function
1	ON	Sets the slave address to 1
2 to 5	OFF	
6	OFF	Sets the baud rate to 4 Mbps
7	OFF	Disables software filtering
8	OFF	Reserved for future use Leave pin 8 OFF

- Analog Output Module

  Analog Output Modules are shipped with the following settings on the Module s DIP switch

  Change these settings as required to suit your application

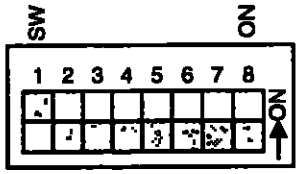


Table 5 13 Factory Settings

Pin No	Setting	Function
1	ON	Sets the slave address to 1
2 to 5	OFF	
6	OFF	Sets the baud rate to 4 Mbps
7	OFF	Clears outputs to 0 when communications stop
8	OFF	Reserved for future use Leave pin 8 OFF

5.8.2 Performance Specifications

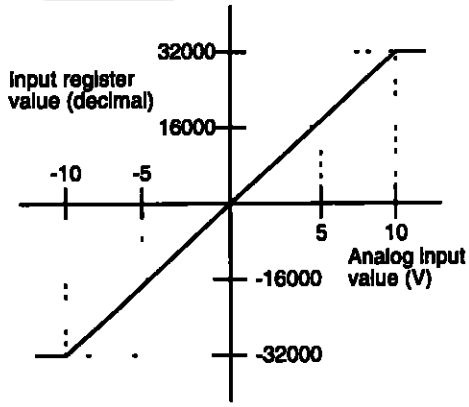
The performance specifications of Analog Input Module (±10 V, 4 CH) are shown below

Item		Specifications		
Name		Analog Input Module (±10 V, 4 CH)		
Model Description		V_AD-VOL-4CH		
Model Number		JAMSC-120AVI02030		
Input Signal Range		-10 to 10V		
Special Inputs		None		
Number of Input Channels		4 channels, isolated as a group		
Input Impedance		1 MΩ min		
Maximum Allowable Overload		-20 to 20 V		
Digital Resolution		16 bits		
Data Format		Binary (2s complement) -32,000 to 32 000		
Error		±0 5% F S (at 25°C) ±1 0% F S (at 0 to 60°C)		
Input Delay Time		4 ms max		
Sampling Interval		Input data is refreshed every communications cycle		
Input Filter Characteristics		Software filter		
Number of Allocated Words		5 words/Module		
Maintenance/Diagnostic Functions		Watchdog timer		
External Connections		Removable terminal block with 23 M3 screw terminals		
Status Indication		RDY (green)	Lit	Normal Module status
			Flashing	Transmission cable disconnected or waiting for communications from the master
		TX (green)	Lit	Sending data
		RX (green)	Lit	Receiving data
		ERR (red)	Lit	Communications error
		FLT (red)	Lit	Error in offset/gain settings
			Flashing	Error detected in self-diagnostics
		CH1 to CH4	Lit	The input at the corresponding channel is out-of-range (An input is out-of-range when it is below -10 02 V or above +10 02 V)
Input Circuit Isolation	Isolation Method	Photocoupler (There is no isolation between input channels)		
	Dielectric Strength	1,500 VAC for 1 minute between input terminals and internal circuits		
	Insulation Resistance	100 MΩ min at 500 VDC between input terminals and internal circuits (at room temperature and humidity)		
External Power Supply		Main external power supply 24 VDC (20 4 to 26 4 VDC), 120 mA max		
Derating Conditions		The maximum ambient operating temperature is limited with some mounting directions Refer to *5 1 2 Mounting Orientation* for details		
Maximum Heating Value		2 88 W		
Hot Swapping		Terminal block Not permitted Communications connector Permitted		
Mass		Approx 300 g		
Dimensions (mm)		161 × 44 × 79 (W × H × D)		

5.8.3 Input Characteristics

The following table shows the Module's input characteristics

Input Voltage (V)	Input Register Value (Decimal)
≤-10 00	-32,000
-10 00	-32 000
-5 00	-16 000
0 00	0
5 00	16,000
10 00	32,000
≥ 10 00	32,000

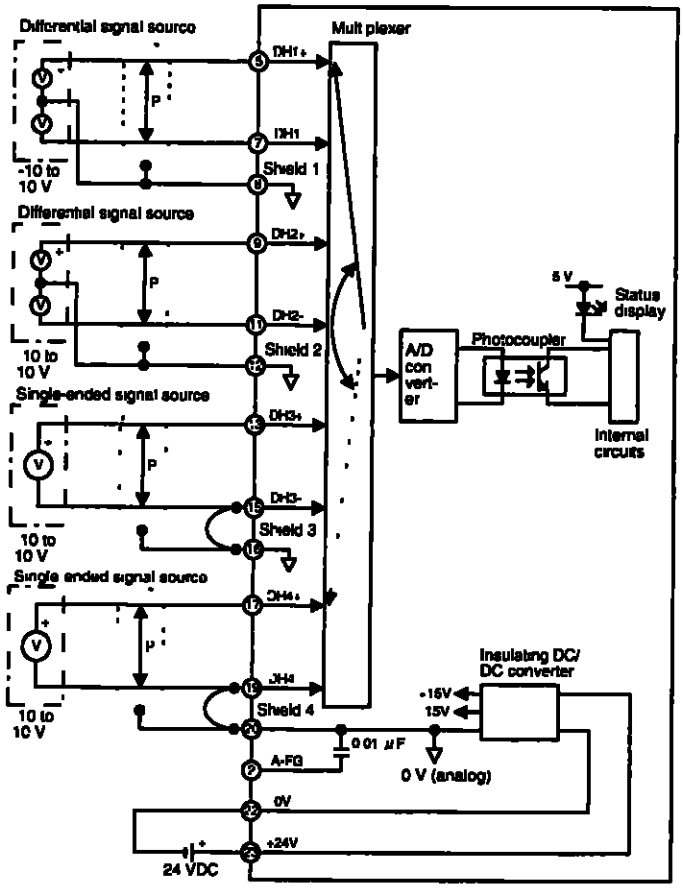


INFO

If the input value is below -10 00 V, the value in the input register will remain at -32,000 If the input value is above 10 00 V the value in the input register will remain at 32 000

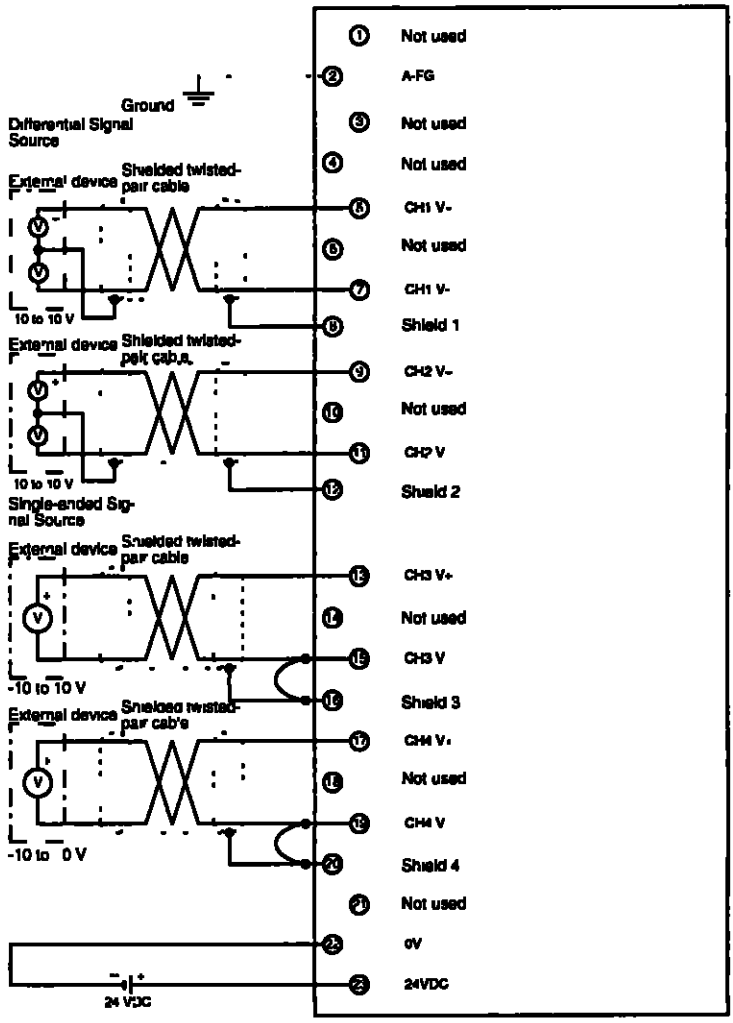
5.8.4 Circuit Configuration

The following illustration shows the circuit configuration



5.8 5 Connection Example

The following illustration shows an example of terminal connections



Note Terminals 1, 3, 4, 6, 10, 14, 18, and 21 are not used

IMPORTANT

- Isolation between Input Channels
  There is no isolation provided between the input circuit channels
  If isolation between channels is required use a commercial isolation amplifier for each channel
- Recommended Wire
  Use shielded two-conductor twisted-pair cable with 20 AWG (0 5 mm^2) to 16 AWG (1 3 mm^2) wire to connect to the terminal block
- Connecting Differential Signal Sources
  - Connect the positive side of a differential signal to the Module's "+" terminal
  - Connect the negative side of a differential signal to the Module's "-" terminal
  - At the Module end, connect the shield of the cable to the shield terminal of the Module
  - At the signal source end, connect the shield of the cable to the 0 V of the differential signal source An improper connection will make the input signal unstable and cause malfunction
- Connecting Single-ended Signal Sources
  - Connect the positive side of the single-ended signal to the Module's "+" terminal
  - Connect the negative side of the single-ended signal to the Module's "-" terminal
  - Connect the shield of the cable to the shield terminal of the Module and short the shield terminal to the "-" terminal
    An improper connection will make input signal unstable and cause malfunction
- Unused Input Circuits
  For an unused input circuit, short its "+" terminal to its "-" terminal and also short one of these terminals to its shield terminal
  An improper connection will make input signal unstable and cause malfunction
- A-FG Terminal
  Depending upon the ambient noise better performance may be possible by grounding the A-FG terminal
- Crimp Terminals
  Use crimp terminals that fit M3 screws for terminal block wiring
- Do not use terminal 1 as a relay terminal

5.8 6 I/O Allocations

The leading register numbers of the I/O registers used by the Input Module are set in the I/O Allocation Tab in the MECHATROLINK definitions window

Refer to *Chapter 3 I/O Allocations* for details on allocating I/O to MECHATROLINK Modules

The following example shows the allocation of the 7 words of input registers and 2 words of output registers used by the Analog Input Module

■ Output Registers (2 words)

Output Register No	Contents
OWxxxx	Reserved for the system
OWxxxx+1	Not used

IMPORTANT Registers reserved for the system must not be overwritten from the ladder program or other means The Module will not operate normally if registers are overwritten

■ Input Registers (7 words)

Input Register No	Contents
IWxxxx	Reserved for the system
IWxxxx+1	Reserved for the system
IWxxxx+2	Analog input value of CH1 (-32,000 to 32 000)
IWxxxx+3	Analog input value of CH2 (-32 000 to 32,000)
IWxxxx+4	Analog input value of CH3 (-32,000 to 32,000)
IWxxxx+5	Analog input value of CH4 (-32,000 to 32,000)
IWxxxx+6	Input signal status

■ Input Signal Status

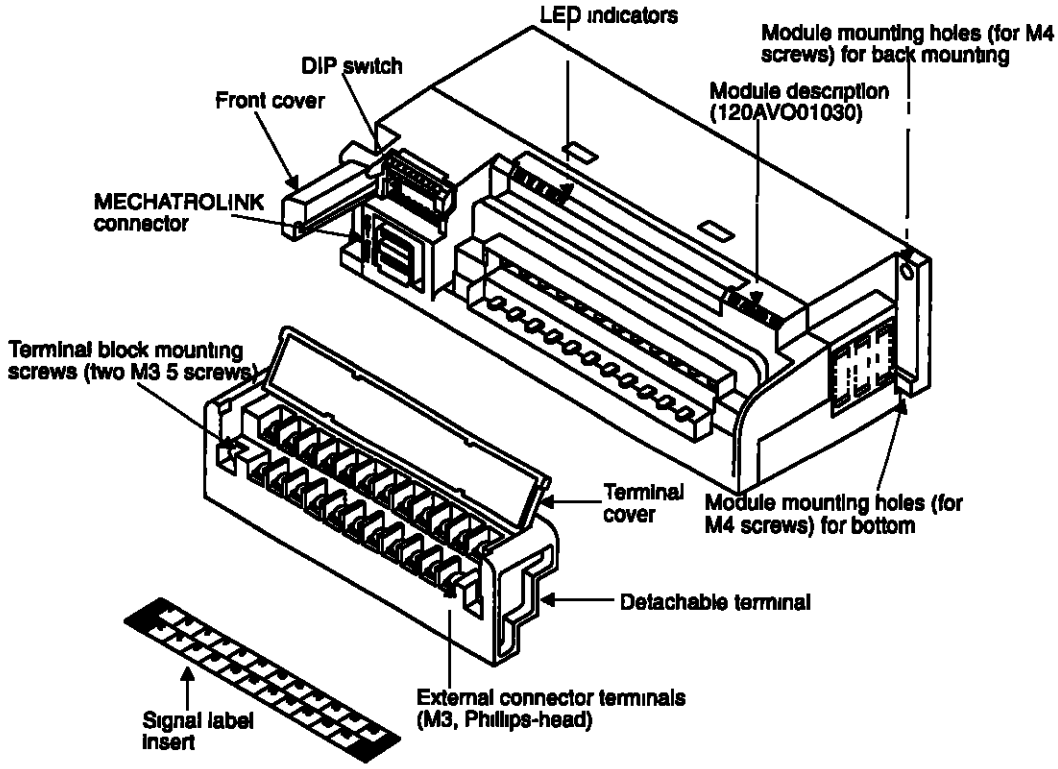
The Analog Input Module produces an error signal when an input signal is outside of the input signal range

Input Register No	Bit	Contents
IWxxxx+6	0	ON (1) when the CH1 input signal is below -10 2 V or above 10 2 V
	1	ON (1) when the CH2 input signal is below -10 2 V or above 10 2 V
	2	ON (1) when the CH3 input signal is below -10 2 V or above 10 2 V
	3	ON (1) when the CH4 input signal is below -10 2 V or above 10 2 V
	4 to F	Not used

5.9 Analog Output Module (±10 V, 2 CH) (120AVO01030)

5 9.1 External Appearance and Configuration

The following diagram shows the Analog Output Module's external parts



■ LED Indicators

RDY TX RX ERR FLT

Indicator Name	Indicator Color	Meaning When Lit or Flashing	
RDY	Green	Lit	The Module is operating normally
		Flashing	The transmission cable is disconnected or the Module is waiting for communications with the master
TX	Green	Lit	Sending data
RX	Green	Lit	Receiving data
ERR	Red	Lit	A communications error occurred
FLT	Red	Lit	Offset/gain setting error
		Flashing	Self-diagnostic error

■ DIP Switch

The DIP switch on the front of the Analog I/O Module must be set in order to use the Module

Refer to the heading *DIP Switch* in *Chapter 5 8 Analog Input Module (±10 V, 4 CH) (120AVI02030)* for details on the DIP switch settings

5.9 2 Performance Specifications

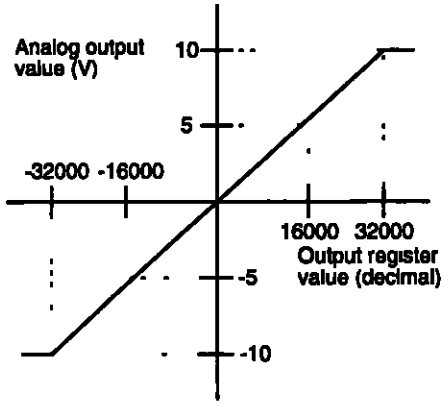
The performance specifications of Analog Output Module (±10 V, 2 CH) are shown below

Item		Specifications		
Name		Analog Output Module (±10 V, 2 CH)		
Model Description		V_DA-VOL-2CH		
Model Number		JAMSC-120AVI01030		
Input Signal Range		-10 to 10V		
Number of Output Channels		2 channels		
Maximum Allowable Load Current		±5 mA (2 kΩ)		
Digital Resolution		16 bits		
Data Format		Binary (2's complement) -32,000 to 32,000		
Error		±0 2% F S (at 25°C) ±0 5% F S (at 0 to 60°C)		
Output Delay Time		1 ms		
Number of Allocated Words		2 words/Module		
Maintenance/Diagnostic Functions		Watchdog timer		
Output Status when Master Stops		Status selected with the DIP switch Pin 7 OFF Clear outputs (Output 0 V) Pin 7 ON Retain prior output status		
External Connections		Removable terminal block with M3 screw terminals		
Status Indication		RDY (green)	Lit	Normal Module status
			Flashing	Transmission cable disconnected or waiting for communications from the master
		TX (green)	Lit	Sending data
		RX (green)	Lit	Receiving data
		ERR (red)	Lit	Communications error
		FLT (red)	Lit	Error in offset/gain settings
			Flashing	Error detected in self-diagnostics
Output Circuit Isolation	Isolation Method	Photocoupler (There is no isolation between channels)		
	Dielectric Strength	1,500 VAC for 1 minute between output terminals and internal circuits		
	Insulation Resistance	100 MΩ min at 500 VDC between input terminals and internal circuits (at room temperature and humidity)		
External Power Supply		Main external power supply 24 VDC (20 4 to 26 4 VDC), 120 mA max		
Derating Conditions		The maximum ambient operating temperature is limited with some mounting directions Refer to *5 1 2 Mounting Orientation* for details		
Maximum Heating Value		2 88 W		
Hot Swapping		Terminal block Not permitted Communications connector Permitted		
Mass		Approx 300 g		
Dimensions (mm)		161 × 44 × 79 (W × H × D)		

5.9 3 Output Characteristics

The following table shows the Module s output characteristics

Output register value (decimal)	Output voltage (V)
≤ -32,000	-10 00
-32,000	-10 00
-16,000	-5 00
0	0 00
16 000	5 00
32,000	10 00
≥ 32,000	10 00

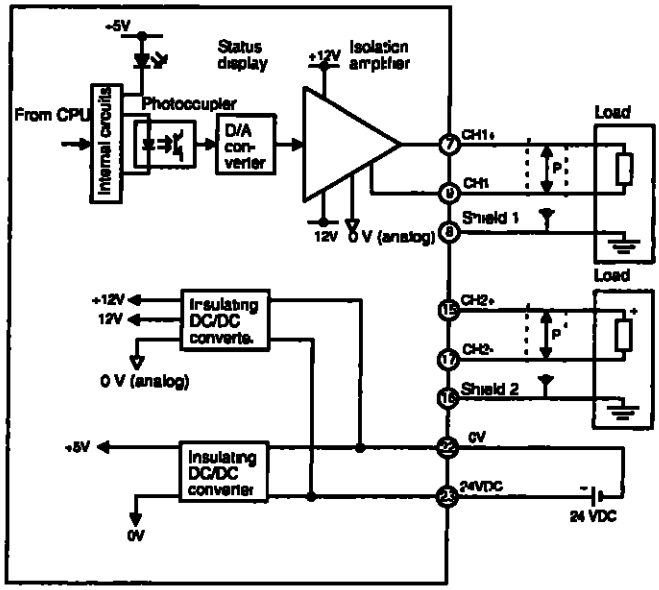


INFO

The analog output value will remain at -10 00 V even if the output register value falls below -32,000
The analog output value will remain at 10 00 V even if the output register value rises above 32,000

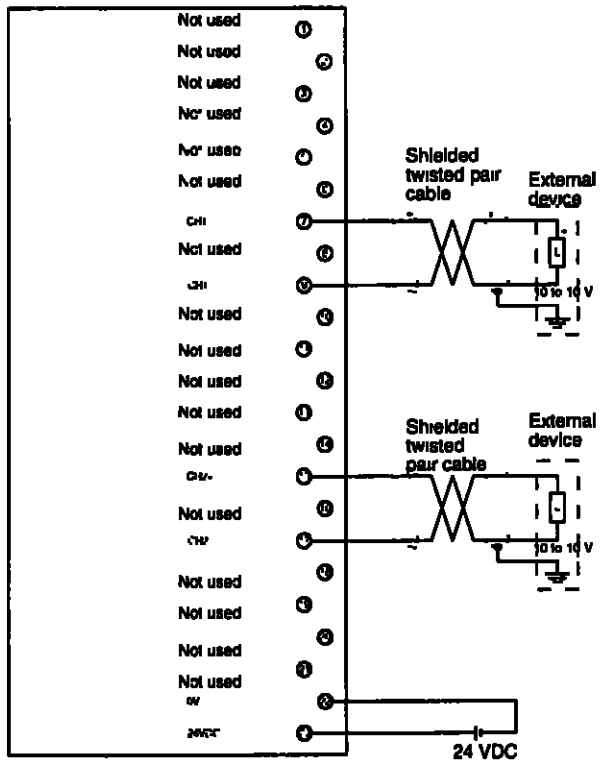
5.9.4 Circuit Configuration

The following illustration shows the circuit configuration



5.9.5 Connection Example

The following illustration shows an example of terminal connections



Note Terminals 1 to 6, 10 to 14, and 18 to 21 are not used

IMPORTANT

- The output circuit's output channels are not isolated from each other
- Recommended Wire

  Use shielded two-conductor twisted-pair cable with 20 AWG (0 5 mm^2) to 16 AWG (1 3 mm^2) wire to connect to the terminal block
- Ground the Shield at One Point

  As a rule, connect the shield at one point on the load end However, better output characteristics may be obtained by grounding the shield on the Module end rather than on the load end, so test which configuration is better for the actual situation An improper connection will make output signal unstable and cause malfunction
- Grounding at the Module

  The Module's unused terminals are not connected to anything within the Module, so they can be used as relay terminals

  Do not use terminal 1 as a relay terminal
- Crimp Terminals

  Use crimp terminals that fit M3 screws for terminal block wiring

5.9.6 I/O Allocations

The leading register numbers of the I/O registers used by the I/O Module are set in the I/O Allocation Tab in the MECHATROLINK definitions window

Refer to *Chapter 3 I/O Allocations* for details on allocating I/O to MECHATROLINK Modules

The following example shows the allocation of the 4 words of output registers and 2 words of input registers used by the Analog Output Module

■ Output Registers (4 words)

Output Register No	Contents
OWxxxx	Reserved for the system
OWxxxx+1	Reserved for the system
OWxxxx+2	Analog output value of CH1
OWxxxx+3	Analog output value of CH2

IMPORTANT

- The analog output value will remain at -10 00 V even if the output register value falls below -32,000 The analog output value will remain at 10 00 V even if the output register value rises above 32,000
- Registers reserved for the system must not be overwritten from the ladder program or other means The Module will not operate normally if registers are overwritten

■ Input Registers (2 words)

Input Register No	Contents
IWxxxx	Reserved for the system
IWxxxx+1	Reserved for the system

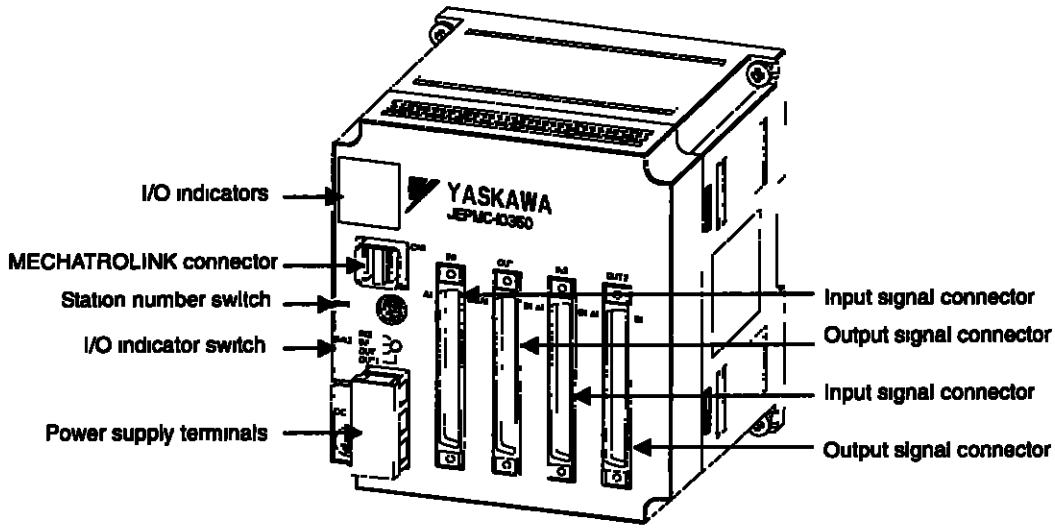
6 Other I/O Modules

This section provides an overview of other Digital I/O Modules

6.1 64-point I/O Module (JEPMC-IO350)

6 1.1 External Appearance and Configuration

The following diagram shows the 64-point I/O Module s external parts

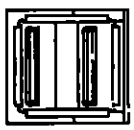


■ I/O Indicators

R	ACTIVE		F
1	9	17	25
2	10	18	26
3	11	19	27
4	12	20	28
5	13	21	29
6	14	22	30
7	15	23	31
8	16	24	32

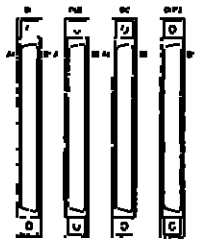
Indicator Name	Indicator Color	Meaning When Lit
R	Yellow	Not used (Stays lit)
ACTIVE	Yellow	Sending data through MECHA-TROLINK
F	Red	Blown fuse
1 to 32	Yellow	Input signal and output signal monitors The meaning of these indicators depends on the I/O indicator switch setting

■ MECHATROLINK Connector



Connect through a MECHATROLINK Cable such as a JEPMC-W6000-A3 or JEPMC-W6000-01

■ I/O Signal Connector



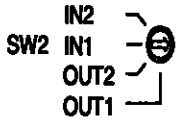
Connect the I/O Unit with external I/O signals through an I/O Cable such as a JEPMC-W5410-05
Number of I/O points 64 inputs and 64 outputs

■ Station Number Switch

SW1

Sets the Module's station number in the MECHATROLINK system
Setting range 1 to E
Use a unique station number for each Unit if two or more Units are connected

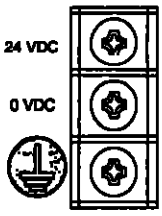
■ I/O Indicator Switch



Selects which 32 I/O points are monitored by the I/O indicators
IN1 Input signals 1 to 32
IN2 Input signals 33 to 64
OUT1 Output signals 1 to 32
OUT2 Output signals 33 to 64

■ External Wiring Terminals

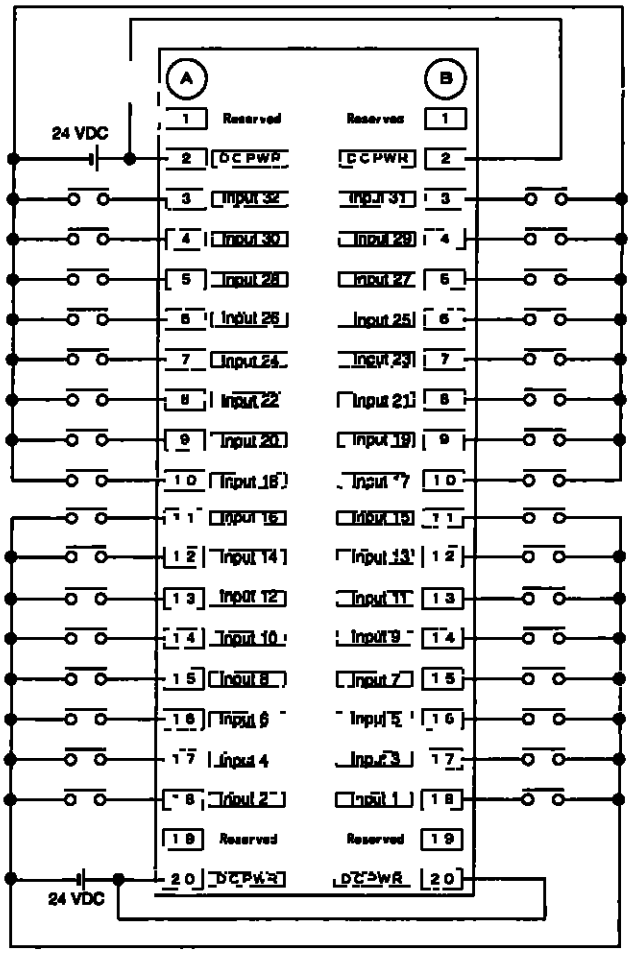
The external wiring terminal supplies 24 VDC to the IO350 Unit



Terminal Name	Function
DC24V	+24 VDC
DC0V	0 VDC
FG	Protective ground terminal

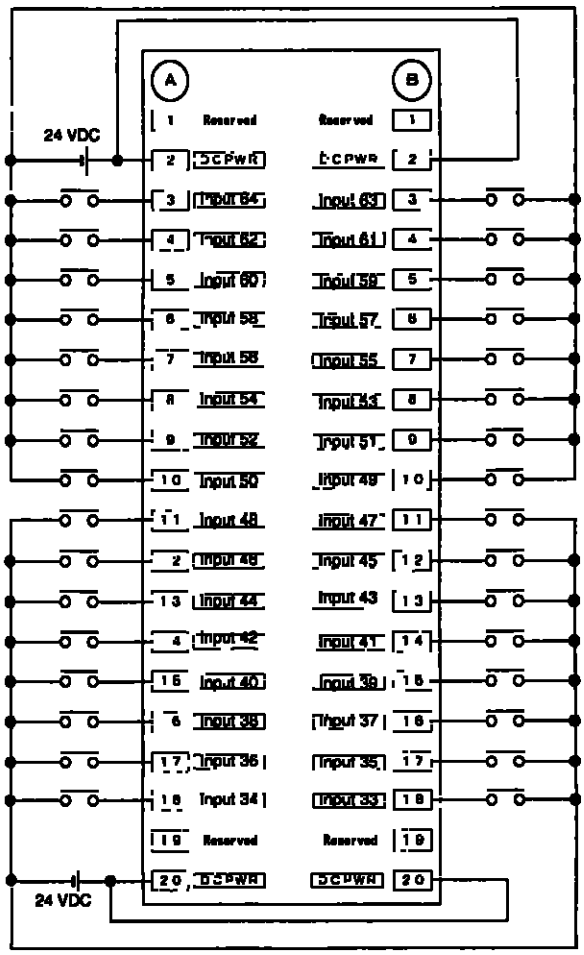
■ Input Signal Connector (IN1)

The following diagram shows the connector pin layout and signal names for the IO350 Unit's IN1 connector



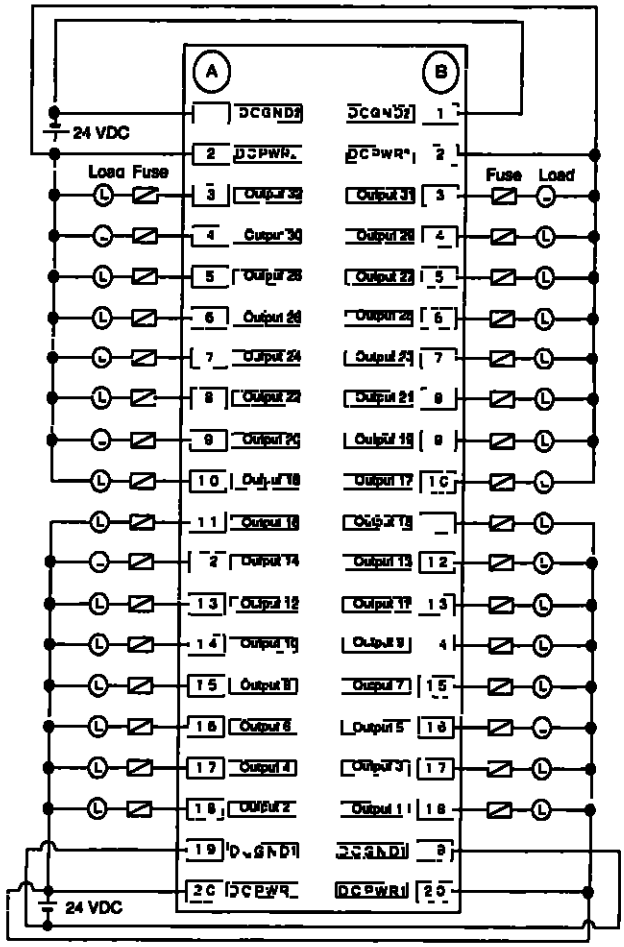
■ Input Signal Connector (IN2)

The following diagram shows the connector pin layout and signal names for the IO350 Unit's IN2 connector



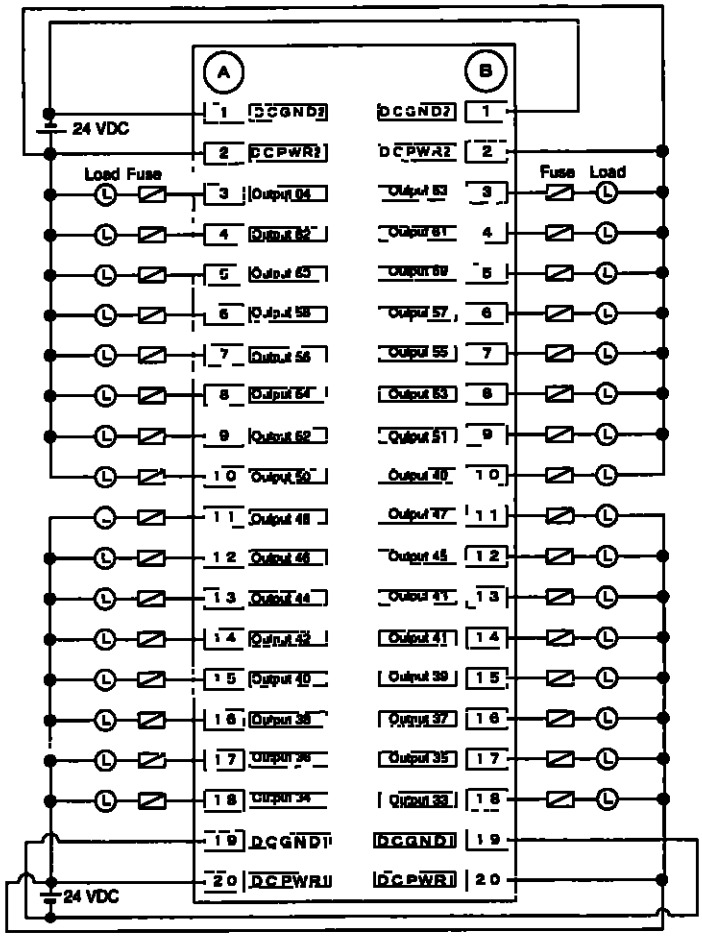
■ Output Signal Connector (OUT1)

The following diagram shows the connector pin layout and signal names for the IO350 Unit's OUT1 connector



■ Output Signal Connector (OUT2)

The following diagram shows the connector pin layout and signal names for the IO350 Unit s OUT2 connector



6 1.2 Hardware Specifications

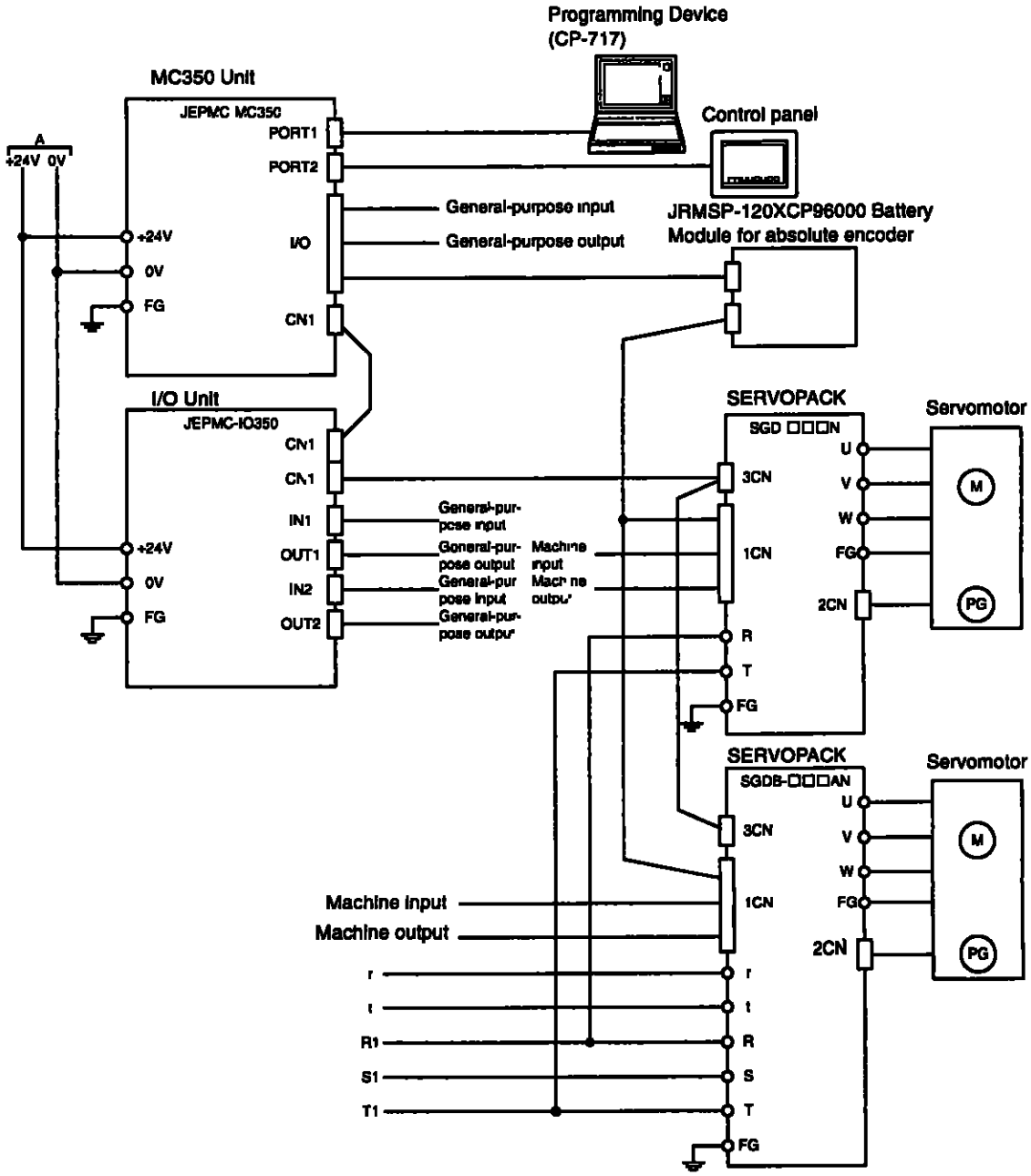
The hardware specifications of IO350 I/O Unit are shown below

Item	Specifications
Name	IO350 I/O Unit
I/O Signals	Inputs 64 points 24 VDC, 5 mA combined sinking/sourcing Outputs 64 points 24 VDC, 50 mA, sinking outputs (all points ON) * Connection method Connectors (FCN360 Series)
MC350 Unit Interface	MECHATROLINK (high-speed field network)
Module Power Supply	24 VDC (20 4 to 28 8 V) Rated current 0 5A inrush current 1 A
Dimensions (mm)	120 × 130 × 105 (W × H × D)

* The maximum rating per point is 100 mA (depending on derating conditions)

6 1.3 Example of System Connections

The following example shows the connections in a system that uses an MP930 Machine Controller



6.2 Wildcard I/O Modules (□□□□□I/O)

The Wildcard I/O Modules are virtual Remote I/O Modules that can represent other Modules such as ones that will be developed in the future A virtual Remote I/O Module can be used temporarily when the CP-717 Programming Panel software is not compatible The number of I/O points is not fixed so the user can set the number of I/O points as needed Up to 8 words of data can be set Refer to *Chapter 3 I/O Allocations* for details

7 Reversible Counter Module with Preset Function

This section provides an overview of the Reversible Counter Module with Preset Function (120EHC21140)

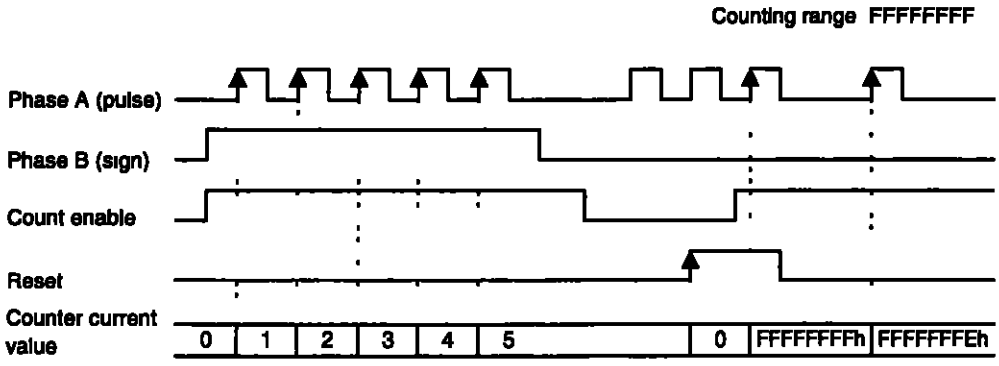
7.1 Summary of Module Functions

This section describes the operations that can be performed with the Counter Module

7.1.1 High-speed Pulse Counting Function

The Counter Module can count high-speed pulses input from a pulse source such as a rotary encoder

◀EXAMPLE▶ The following timing chart shows an example of high-speed counter operation



The high-speed pulse counting function has the following capabilities

■ Counting Method

- Phase-A and phase-B pulses (×1, ×2, or ×4 multiplication)
- Sign and pulse (×1 or ×2 multiplication)
- Increment and decrement pulses (×1 or ×2 multiplication)

■ Counting Speed

- 300 kpps (×1 multiplication)
- 600 kpps (×2 multiplication)
- 1,200 kpps (×4 multiplication)

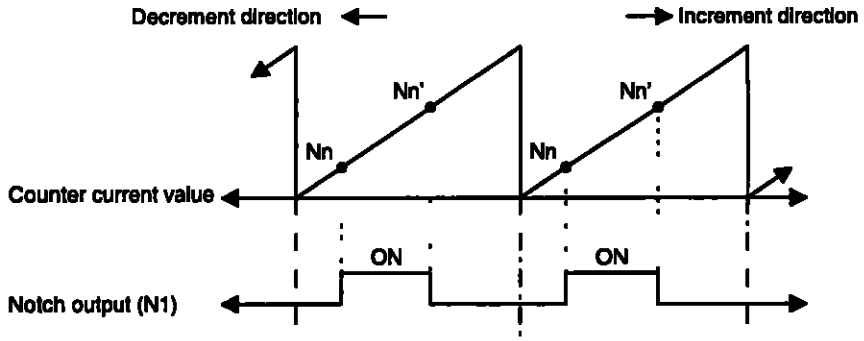
■ Counting Range

- 32 bits (0 to 4,294,967,295 (FFFFFFFF hexadecimal))

7.1.2 Notch Signal Output Function

The Counter Module can compare the pulse count with the notch point set value (set in advance) and output a digital notch signal to an external device such as a relay

◀EXAMPLE▶ The following timing chart shows an example of the notch signal output function

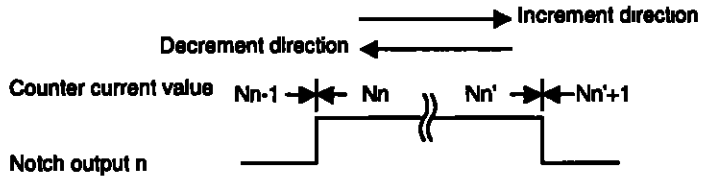


The notch signal output function has the following capabilities

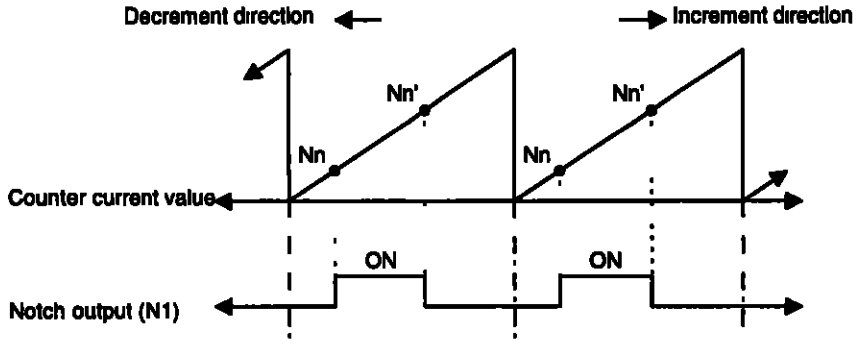
■ Output Mode

There are two output modes State mode and latch mode Select either mode

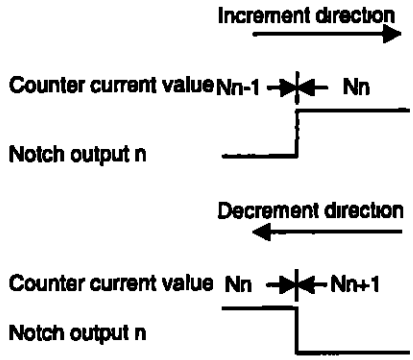
State Mode



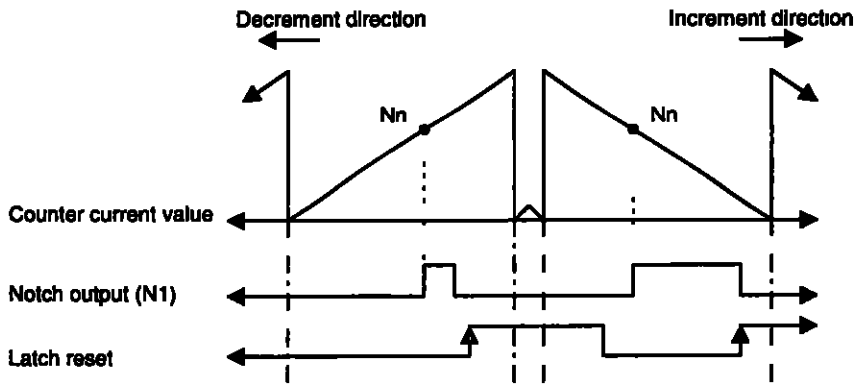
The following timing chart shows the output pattern of the notch output signal when the function is in state mode and Nn < Nn'



Latch Mode



The following timing chart shows the output pattern of the notch output signal when the function is in latch mode



■ Number of Outputs

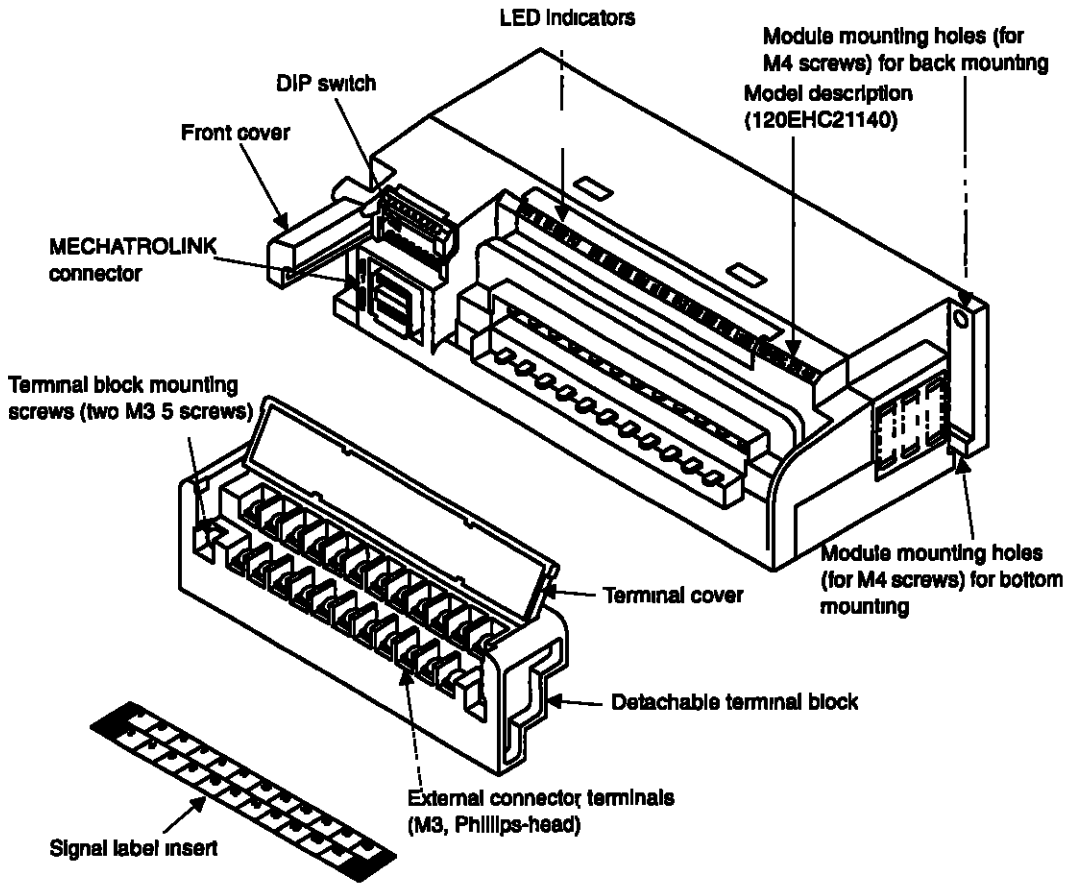
The number of outputs is 1 output/channel

7 1.3 Current Value Setting

The current value setting can be used to set the current value in the Counter Module The current value is set in the output registers and then set in the Counter Module using Current Value Set Output Coil

7.2 External Appearance and Configuration

The following diagram shows the Counter Module's external parts



■ LED Indicator

The following table shows the contents of the Counter Module's LED indicators

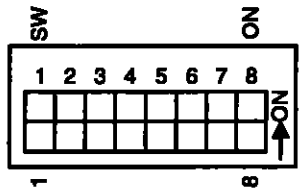
RDY	TX	RX	ERR	FLT	PA1	PB1	EN1	RS1	L1	N1	PA2	PB2	EN2	RS2	L2	N2

Indicator LED	Indicator Color	Status	Meaning When Lit or Flashing
RDY	Green	Lit	The Module is operating normally
		Flashing	The transmission cable is disconnected or the Module is waiting for communications with the master
TX	Green	Lit	Data is being transmitted
RX	Green	Lit	Data is being received
ERR	Red	Lit	A communications error occurred
FLT	Red	Lit	A setting error occurred
		Flashing	A self-diagnostic error occurred
PA1	Green	Lit	The counter 1 phase-A pulse is being input
PB1	Green	Lit	The counter 1 phase-B pulse is being input
EN1	Green	Lit	Counter 1 counting is enabled
RS1	Green	Lit	The counter 1 external reset input is being input
L1	Green	Lit	The counter 1 external latch input is being input *
N1	Green	Lit	The counter 1 notch output is being output
PA2	Green	Lit	The counter 2 phase-A pulse is being input
PB2	Green	Lit	The counter 2 phase-B pulse is being input
EN2	Green	Lit	The counter 2 counting is enabled
RS2	Green	Lit	The counter 2 external reset input is being input
L2	Green	Lit	The counter 2 external latch input is being input *
N2	Green	Lit	The counter 2 notch output is being output

* The LED indicator will remain lit even after the external latch input goes OFF as long as its data is retained in the Module. The indicator can be turned OFF by turning ON the L-RESn Bit for the digital output.

■ DIP Switch Settings

The settings for the Counter Module's DIP switch are explained below.



Pin No	Function	Settings	
		OFF	ON
1 to 5	Slave address 1 to 30	See the following table	
6	Baud rate 4 Mbps or 1 Mbps	4 Mbps	1 Mbps
7	Stop/continue counting when communications are interrupted	Stop counting	Continue counting
8	Used by the system	Set to OFF	

IMPORTANT

New settings on pins 6 and 7 become effective when the main external power supply (24 VDC) is turned ON

When changing the setting, turn the Module's main external power supply (24 VDC) OFF and then ON again

The following table shows the possible slave address settings

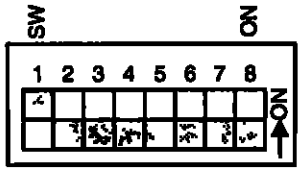
Slave Address	DIP Switch Pin					Slave Address	DIP Switch Pin				
	1	2	3	4	5		1	2	3	4	5
Not used	0	0	0	0	0	16	0	0	0	0	0
1	1	0	0	0	0	17	1	0	0	0	0
2	0	1	0	0	0	18	0	1	0	0	0
3	1	1	0	0	0	19	1	1	0	0	0
4	0	0	1	0	0	20	0	0	1	0	0
5	1	0	1	0	0	21	1	0	1	0	0
6	0	1	1	0	0	22	0	1	1	0	0
7	1	1	1	0	0	23	1	1	1	0	0
8	0	0	0	1	0	24	0	0	0	1	0
9	1	0	0	1	0	25	1	0	0	1	0
10	0	1	0	1	0	26	0	1	0	1	0
11	1	1	0	1	0	27	1	1	0	1	0
12	0	0	1	1	0	28	0	0	1	1	0
13	1	0	1	1	0	29	1	0	1	1	0
14	0	1	1	1	0	30	0	1	1	1	0
15	1	1	1	1	0	Not used	1	1	1	1	0

Note ON is 1 OFF is 0

■ Factory Settings

The Module is shipped with the following DIP switch settings

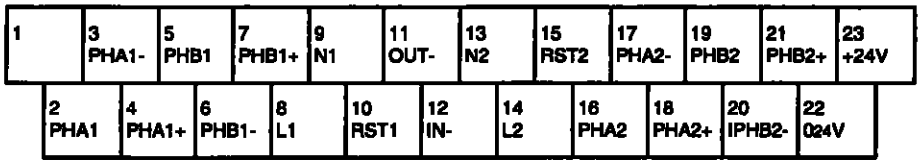
Change these settings as required to suit your application



Pin No	Setting	Function
1	ON	Sets the slave address to 1
2 to 5	OFF	
6	OFF	Sets the baud rate to 4 Mbps
7	OFF	With this setting, the Module stops counting when communications stop
8	OFF	Reserved Leave pin 8 OFF

■ Terminal Block Terminal Layout

The following diagram shows the layout of terminals on the Counter Module's terminal block.



Terminal No	Signal Name	Signal Function
1	(open)	---
2	PHA1	Counter 1 phase-A input
3	PHA1-	
4	PHA1+	
5	PHB1	Counter 2 phase-B input
6	PHB1-	
7	PHB1+	
8	L1	Counter 1 latch input
9	N1	Counter 1 notch output
10	RST1	Counter 1 reset input
11	OUT-	Counters 1 and 2 external output common
12	IN-	Counters 1 and 2 external input common
13	N2	Counter 2 notch output
14	L2	Counter 2 latch output
15	RST2	Counter 2 reset input
16	PHA2	Counter 2 phase-A input
17	PHA2-	
18	PHA2+	
19	PHB2	Counter 2 phase-B input
20	PHB2-	
21	PHB2+	
22	024V	Main external power supply 0 V
23	+24V	Main external power supply +24 V

7.3 System Configuration

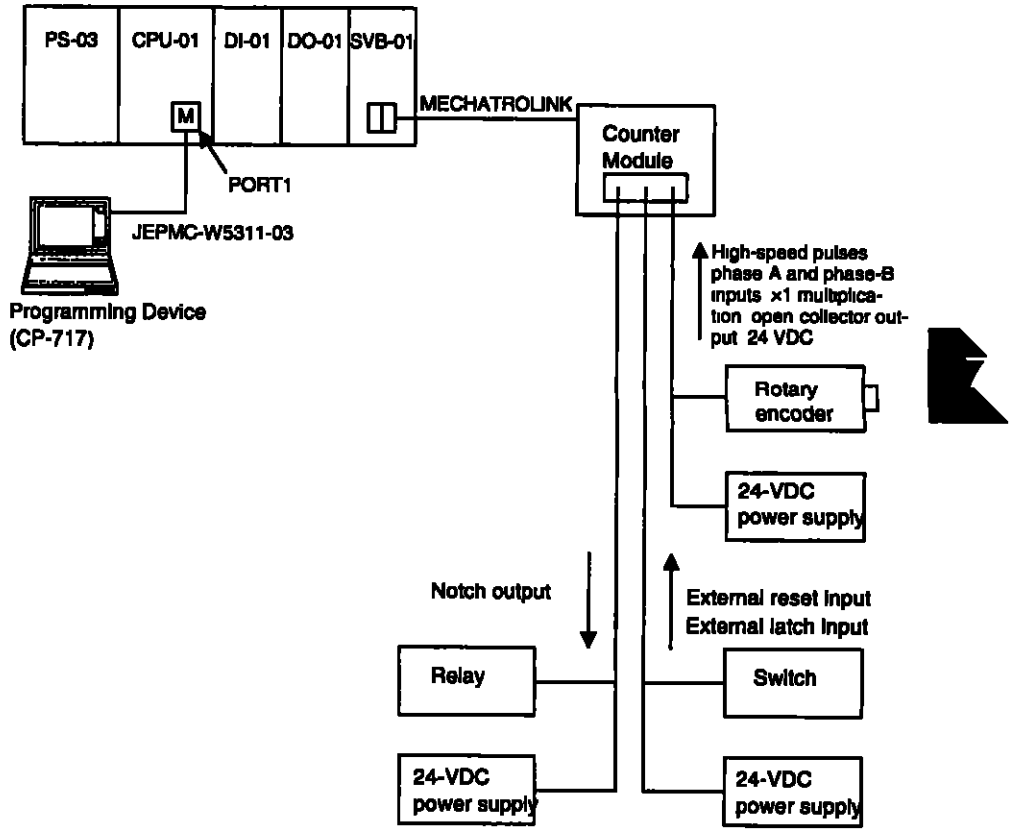
7 3.1 Example of System Configuration

The following table lists the models to which the Counter Module can be connected and the allowable connection port(s)

Machine Controller	Connection Port
MP910	JAPMC-MC101 Board MECHATROLINK connector (port 1 or 2)
MP920 CPU-01	SVB-01 Module MECHATROLINK connector (CN1)
MP920 CPU-02	SVB-01 Module MECHATROLINK connector (CN1)
MP930	JEPMC-MC300 Module MECHATROLINK connector (CN1)

The following diagram shows an example system configured for the Counter Module to count high-speed pulses from a rotary encoder

An MP920 is used in this example



PS-03 Power Supply Module
CPU-01 MP920 CPU Module
DI-01 24-VDC 64-point Input Module
DO-01 24-VDC 64-point Output Module
SVB-01 MECHATROLINK Interface Module
JEPMC-W5311-03 MEMOBUS cable

■ Maximum Number of Modules

Up to 14 Modules can be connected to a MECHATROLINK communications line

For the overall system, the actual number of possible Modules will be determined by the number of sets of the following CPU Module I/O registers that are available for allocation

- Seven consecutive words of input (I) registers

  2 working registers (IWxxxx)

  16 bits of input relays (IBxxxx0+20)

  4 input registers (IWxxxx+3)

- Eight consecutive words of output (O) registers

  2 working registers (OWxxxx)

  32 bits of output coils (OBxxxx0+20)

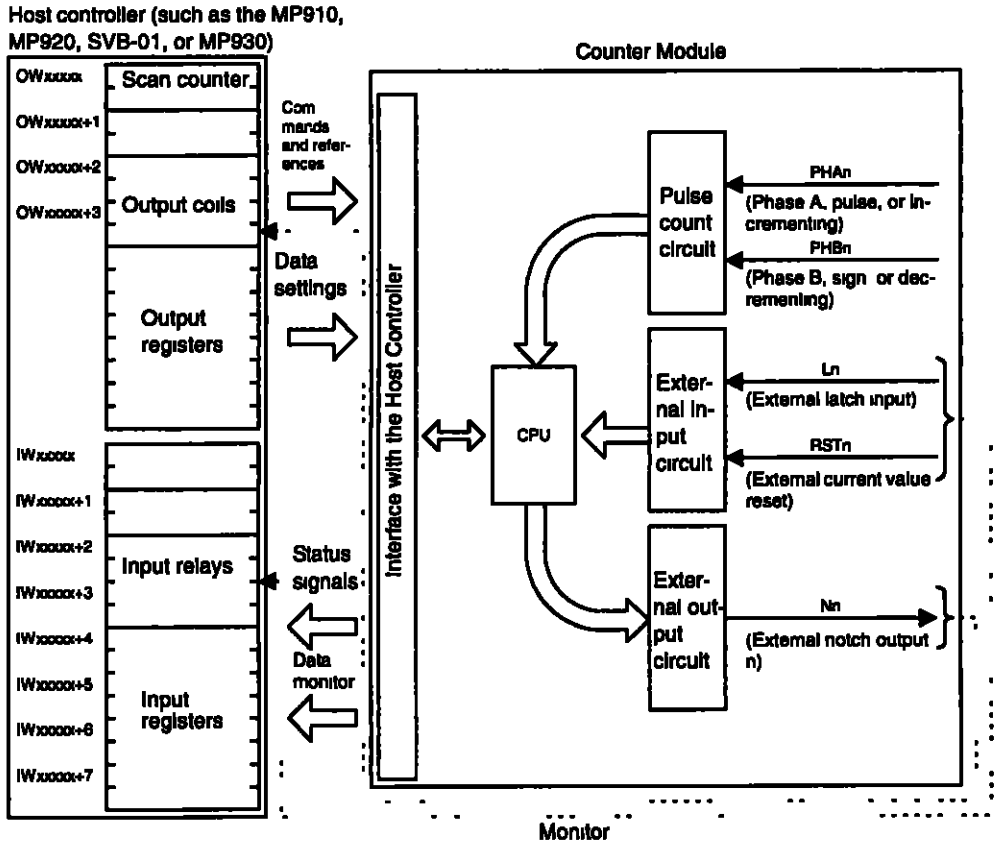
  4 output registers (OWxxxx+4)

■ Mounting Position

The Module can be connected at any position on the MECHATROLINK communications line

7.3.2 Interface with the Host Controller

The following diagram shows the interfaces between the Counter Module and the host controller and between the Counter Module and external devices



The following table explains the signals

Name	Explanation	Reference
Output coil	Contain the ON or OFF status of control signals from the host controller to the Module	*7 5 2 Output Coils*
Output register	Contain numerical signals that convey the host controller's control references to the Counter Module Used in combination with the output coils	*7 5 3 Output Registers*
Input relay	Contain the ON or OFF status of status signals from the Counter Module to the host controller	*7 5 4 Input Relays*
Input register	Contain numerical signals that convey the Counter Module's status to the host controller Used in combination with the output coils	*7 5 5 Input Registers*

7.4 Specifications

7.4.1 General Specifications

The general specifications of the Counter Module are shown below

Item		Specification
Environmental Conditions	Ambient Operating Temperature	0 to 60°C
	Storage Temperature	-25 to 85°C
	Operating Humidity	30% to 95% (with no condensation)
	Storage Humidity	5% to 95% (with no condensation)
	Pollution Level	Pollution level 1 according to JIS B 3501
	Corrosive Gas	No corrosive gas
	Operating Altitude	Less than 2,000 m above sea level
Mechanical Operating Conditions	Vibration Resistance	10 to 57 Hz with half-amplitude of 0.075 mm 57 to 150 Hz at fixed acceleration of 9.8 m/s^2 (1 G) 10 sweeps in X, Y and Z directions (sweep period: 1 octave/min) (conforming to JIS B 3502)
	Shock Resistance	Peak acceleration of 147 m/s^2 (15 G) twice for 11 ms in X, Y, and Z directions (conforming to JIS B 3502)
Electrical Operating Conditions	Noise Resistance	1,000 Vp-p in normal mode with pulse widths of 100 ns and 1 ms and rise time of 1 ns (with impulse noise simulator) (conforming to JIS B 3502)
Dielectric Strength		1,500 VAC for 1 min or 1,800 VAC for 1 s between the I/O terminals and internal circuits, between I/O commons
Insulation Resistance		100 MΩ min. at 500 VDC between I/O terminals and ground (at room temperature and humidity)
Installation Requirements	Ground	Ground to 100 Ω or less
	Configuration	The Module can be mounted in three directions. Refer to *5.1.2 Mounting Orientation* for details.
	Cooling Method	Natural cooling
	Mass	Approx. 300 g
	Dimensions (mm)	161 × 44 × 79 (W × H × D) (Not including the terminal block.)

7.4.2 Hardware Specifications

The hardware specifications of the Counter Module are shown below

Item		Specifications	
Name		Two-channel Counter Module	
Model Description		V_COUNT-2CH	
Model Number		JAMSC-120EHC21140	
Functions		Pulse counting and notch output	
Number of Circuits		2 circuits	
Communications Protocol		MFCHATROLINK	
I/O Allocations		32 output coils 4 output registers 16 input relays,4 input registers	
I/O Signal Indication		PA1 bit	Counter 1 phase-A pulse is being input
		PB1 bit	Counter 1 phase-B pulse is being input
		EN1 bit	Counter 1 counting is enabled
		RS1 bit	Counter 1 external reset input is being input
		L1 bit	Counter 1 external latch input is being input
		N1 bit	Counter 1 notch output is being output
		PA2 bit	Counter 2 phase-A pulse is being input
		PB2 bit	Counter 2 phase-B pulse is being input
		EN2 bit	Counter 2 counting is enabled
		RS2 bit	Counter 2 external reset input is being input
		L2 bit	Counter 2 external latch input is being input
		N2 bit	Counter 2 notch output is being output
Status Indication		RDY bit	The Module is operating normally
		RDY flashing	The transmission cable is disconnected or the Module is waiting for communications with the master
		TX bit	Data is being transmitted
		RX bit	Data is being received
		ERR bit	A communications error occurred
		FLT bit	A setting error occurred
		FLT flashing	A self-diagnostic error occurred
I/O Circuit Isolation	Insulation Method	Photocoupler	
	Dielectric Strength	1,500 VAC for 1 minute between the I/O terminals and internal circuits	
	Insulation Resistance	100 MΩ min at 500 VDC between input terminals and internal circuits (at room temperature and humidity)	
External Power Supply		Input signal power supply 24 VDC Load driving power supply 24 VDC Main external power supply 24 VDC (20.4 to 26.4 V), 120 mA	
Derating Conditions		The Module can be mounted in three directions. Refer to *5.1.2 Mounting Orientation* for details	
Maximum Heating Value		2.88 W	
Hot Swapping		Terminal block Not permitted Communications connector Permitted	

7.4.3 Performance Specifications

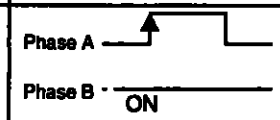
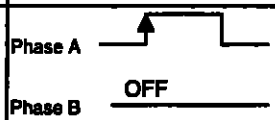
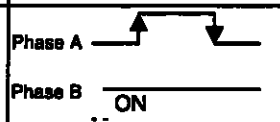
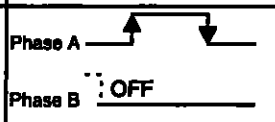
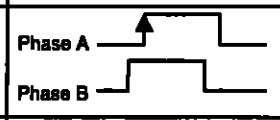
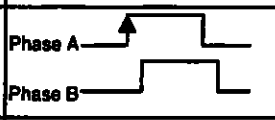
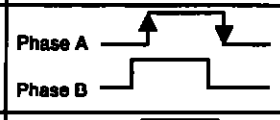
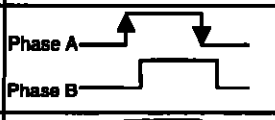
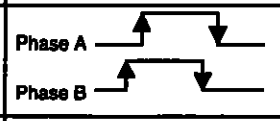
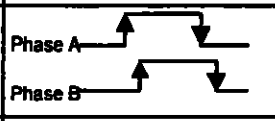
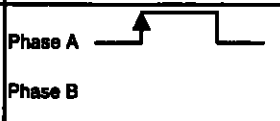
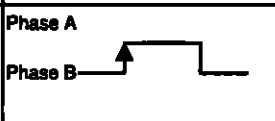
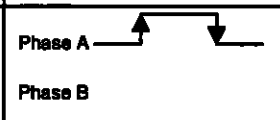
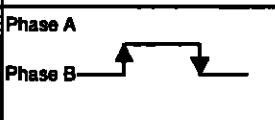
The performance specifications of the Counter Module are shown below

Item		Specifications
Pulse Counting	Pulse Input Methods	The following 7 pulse input methods can be used • A-sign and pulse ×1 multiplication • A-sign and pulse ×2 multiplication • Phase-A and phase-B pulses ×1 multiplication • Phase-A and phase-B pulses ×2 multiplication • Phase-A and phase-B pulses ×4 multiplication • Increment and decrement pulses ×1 multiplication • Increment and decrement pulses ×2 multiplication Using the control program make the initial setting of the pulse input method as the Pulse Input Mode
	Maximum Counting Speed	• ×1 multiplication counting 300 kpps • ×2 multiplication counting 600 kpps • ×4 multiplication counting 1 200 kpps
	Pulse Input Voltage	Compatible with 3, 5, 12, or 24 VDC pulse inputs The method used to make cable connections at the external terminals depends on the pulse input voltage being used
	Pulse Input Circuits	Compatible with pulses from open collector outputs, TTL outputs, and differential voltage outputs An external power supply is required when open collector outputs are used External power supply 5, 12, or 24 VDC (10 mA/circuit)
	Internal Control Signals	The following signals can be output to the Counter Module from the control program • Count Enable The Counter Module can count pulses while this signal is ON • Current Value Reset The Counter Module's current value will be reset when this signal is turned from OFF to ON
	External Control Signals	The following signals can be input to the Counter Module from external devices such as limit switches • External Current Value Reset The Counter Module's current value will be reset when this signal is turned from OFF to ON • External Latch The Counter Module's current value will be stored when this signal is turned from OFF to ON Input Circuit Specifications 24 VDC, photocoupler isolation 5 0 mA
	Number of Output Signals	One notch signal can be output to external devices such as relays
	Notch Output Mode	Set each notch signal's initial output mode to state mode or latch mode from the control program The notch signals set to state mode will be ON while the current value is within the range defined by the notch preset points The notch signals set to latch mode will turn ON when the current value of counter reaches the set notch point To turn these signals OFF, turn the latch reset signal ON from the control program

Item		Specifications
Notch Signal Output	Notch Point Set Value	Make the initial notch point settings from the control program The notch point setting determines the ON/OFF timing of the notch signal State mode Two notch point set values (range) Latch mode One notch point set value (1 point)
	Forced Output Function	Each notch signal can be forced ON or OFF from the control program
	External Output Circuit	Specifications of the output circuit of each notch signal Open-collector output, 24 VDC 100 mA
	Internal Control Signals	The following signals can be output to the Counter Module from the control program • Notch Output Enable The Counter Module can output notch signals while this signal is ON • Notch Reset The notch signals that were turned ON in latch mode can be turned OFF by turning this signal ON
Monitor Functions		The following signals can be monitored from the control program READY ON when the Counter Module is operating normally ACK ON when the Counter Module settings have been made successfully ERROR ON when a setting error has occurred NOTCH OUTPUT ON when the notch output is ON LATCH INPUT ON when external latch signal is ON CARRY ON for one scan when the pulse count has been incremented to the maximum count value and has rolled over to 0 BORROW ON for one scan when the pulse count has been decremented to 0 and has rolled over to the maximum count value

■ Pulse Timing and Counting

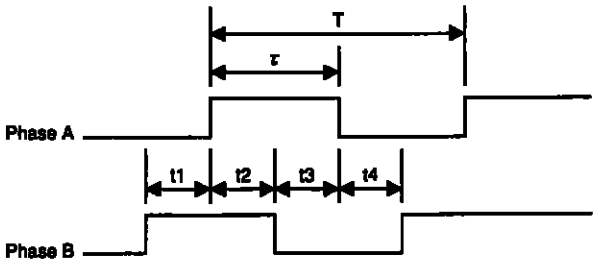
The following table shows the timing of input pulses and resulting incrementing or decrementing of the pulse count. The pulse count is incremented or decremented at the arrows (↑ or ↓).

Input Mode	Incrementing	Decrementing	Counting Speed
Sign and pulse, ×1 multiplication			300 kpps
Sign and pulse, ×2 multiplication			600 kpps
Phase-A and phase-B, ×1 multiplication			300 kpps
Phase-A and phase-B, ×2 multiplication			600 kpps
Phase-A and phase-B, ×4 multiplication			1 200 kpps
Incrementing and decrementing, ×1 multiplication			300 kpps
Incrementing and decrementing, ×2 multiplication			600 kpps

■ Pulse Waveform

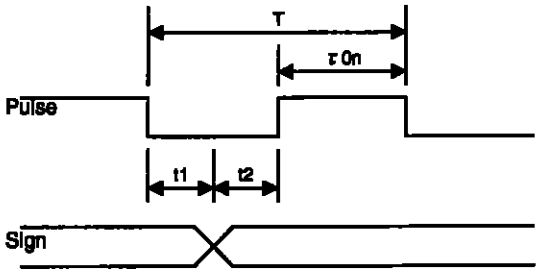
Input Pulse Cycle

- Phase A and Phase B Method



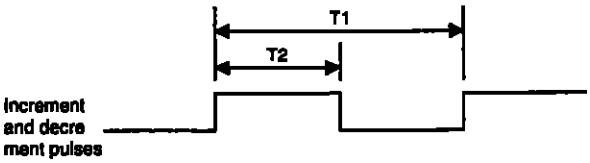
Cycle T ≥ 3 3 µs
Duty factor τ/T ≥ 40 to 60%
t1, t2, t3, and t4 ≥ 0 66 µs

- Sign and Pulse Method



Cycle T ≥ 3 3 µs
Pulse width τ On ≥ 1 33 µs
t1 and t2 ≥ 0 66 µs

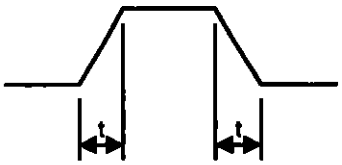
- Increment and Decrement Method



Cycle T1 ≥ 3 3 µs
Pulse width T2 ≥ 1 33 µs

Input Pascal Waveform

The pulse counting speed is affected by the pulse rise time and the pulse fall time The following diagram shows the maximum allowable rise and fall times



At 200 kpps t < 0 2 µs
At 50 kpps t < 0 8 µs
At 5 kpps t < 8 µs

■ External Input Signal Specifications

Phase-A and Phase-B Pulses

- Performance Specifications

  The performance specifications of the external I/O circuit (phase A and phase B) are shown below

Item		Specifications (Phase-A and Phase-B Pulses)			
	Voltage	3 VDC*1	5 VDC	12 VDC	24 VDC
Rated Voltage		3 VDC	5 VDC	12 VDC	24 VDC
Maximum Allowable Voltage		3 5 VDC	5 5 VDC	13 2 VDC	26 4 VDC
Input Format		Sourcing or sinking			
Rated Current		8 mA			
Input Impedance		180 Ω	430 Ω*2	1 3 kΩ*3	2 7 kΩ
Standard Operating Range	Min ON Voltage	3 0 VDC	4 5 VDC	10 2 VDC	20 4 VDC
	Max OFF Voltage	1 0 VDC	1 5 VDC	1 5 VDC	2 0 VDC
Input Delay Times	OFF to ON	0 3 µs max			
	ON to OFF	0 3 µs max			
External Power Supply (for Signals)		3 VDC	5 VDC	12 VDC	24 VDC
Input Signal Indicators	PHA	Lit when phase-A pulse is ON (internal logic)			
	PHB	Lit when phase-B pulse is ON (internal logic)			
Isolation Method		Photocoupler			
External Connections		Removable terminal block with M3 screw terminals			

* 1 Connection to differential outputs is possible

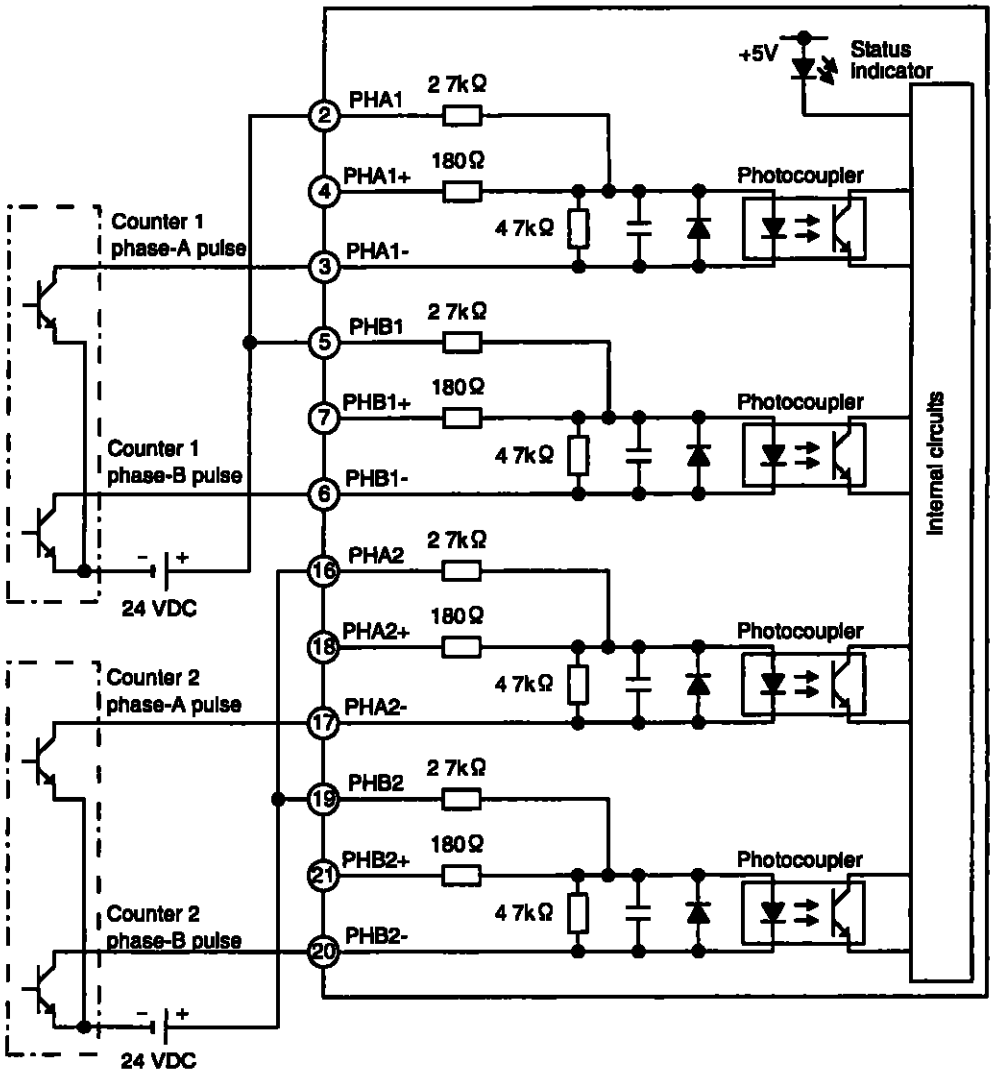
* 2 Combined resistance when a resistance of 330 Ω is connected externally

* 3 Combined resistance when a resistance of 2 2 kΩ is connected externally

The terminal connections must be selected based on the voltage level of the input pulse signals The specifications in the table above apply when the proper connection has been made for the voltage level

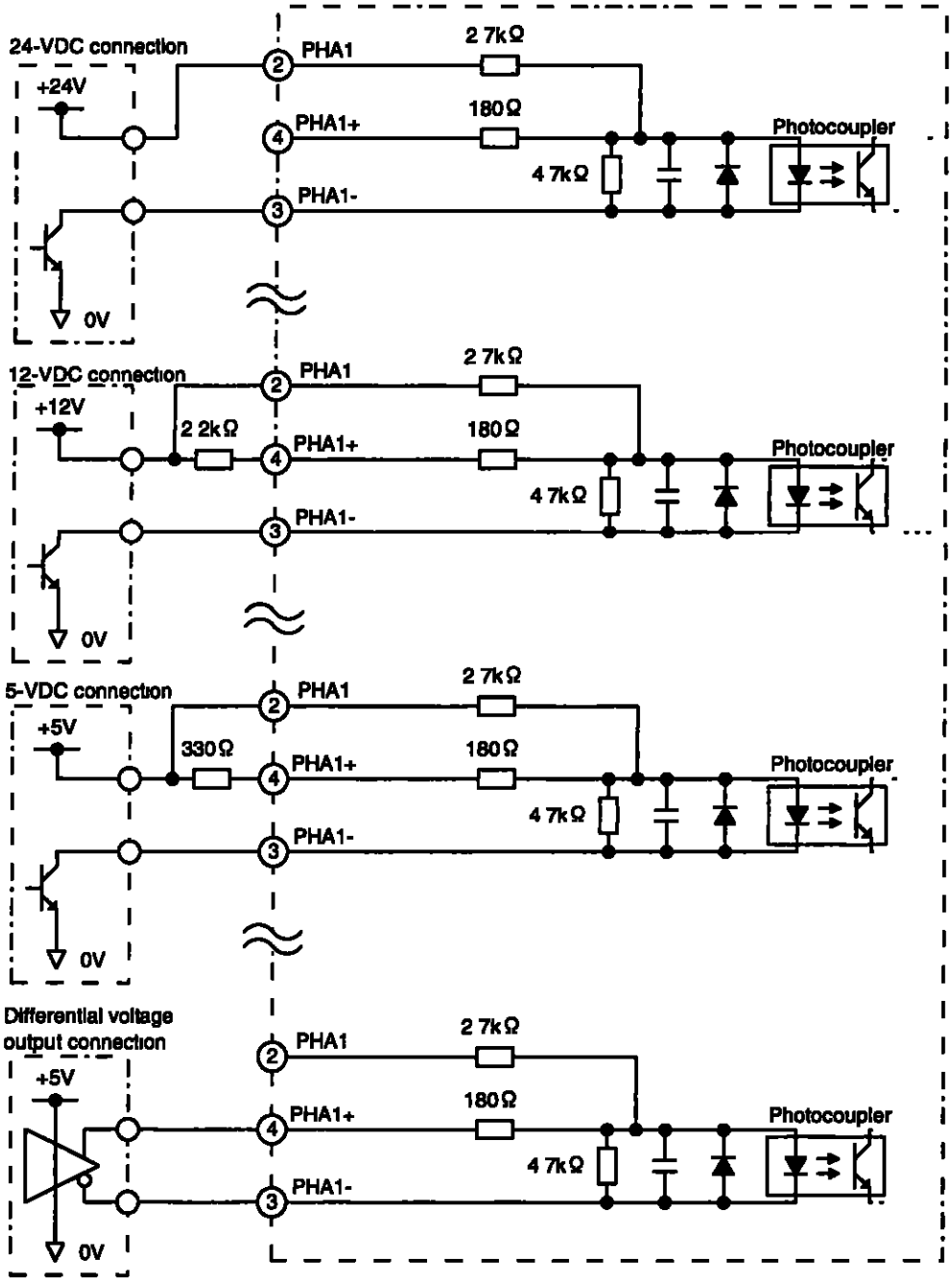
- Circuit Configuration

  The following table shows the circuit configuration



- Connecting Input Pulse Signals

The terminal connections must be selected based on the voltage level of the input pulse signals The following diagram shows the proper connection for each voltage level



External Latch and External Current Value Reset

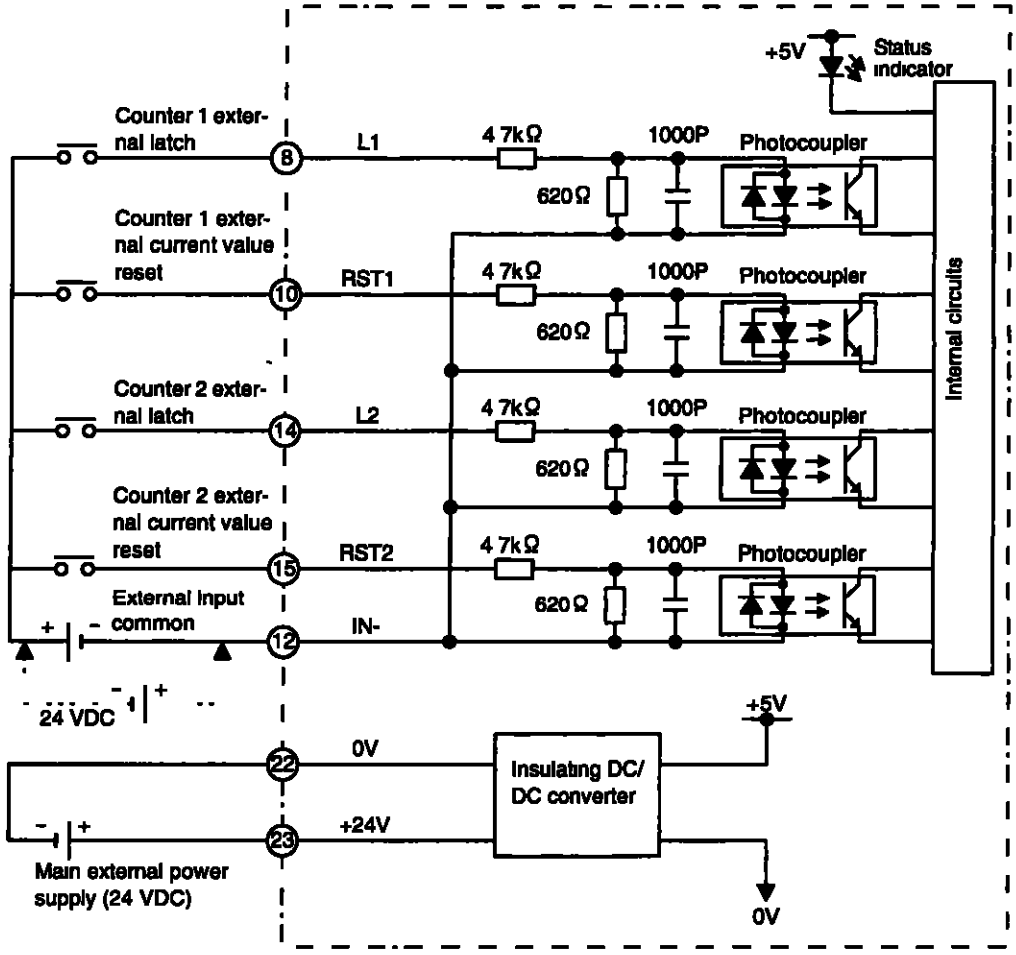
- Performance Specifications

The performance specifications of the external input circuits (external latch and external current value reset) are shown below

Item		Specifications
Rated Voltage		24 VDC
Maximum Allowable Voltage		26 4 VDC
Input Format		Sourcing or sinking
Rated Current		50 mA
Input Impedance		4 7 kΩ
Standard Operating Range	Min ON Voltage	10 2 VDC
	Max OFF Voltage	3 0 VDC
Input Delay Times	External Count Enable	OFF to ON 1 ms max ON to OFF 2 ms max
	External Current Value Reset	OFF to ON 2 ms max ON to OFF 2 ms max
External Power Supply (for Signals)		24 VDC
Input Signal Indicators	RSTn	Lit when external current value reset is ON
	Ln	Lit when external latch is ON
Isolation Method		Photocoupler
External Connections		Removable terminal block with M3 screw terminals

• Circuit Configuration

The following table shows the circuit configuration



■ External Output Signal Specifications

Performance Specifications

The performance specifications of the external I/O circuit (external notch output) are shown below

Item	Specifications
Rated Voltage	24 VDC
Allowable Voltage Range	10 2 to 30 0 VDC
Output Format	Sinking
Maximum Load Current	100 mA/point
Output Voltage Drop	1 5 V max (100 mA)
Output Delay Times	OFF to ON 1 ms max ON to OFF 1 ms max
Leakage Current when OFF	1 mA max (24 VDC)
Output Type	Transistor output
Number of Commons	1
Output Points per Common	2 points per common
External Connections	Removable terminal block with M3 terminal screws
Output Protection	Unprotected outputs according to JIS B 3501
Built-in Fuse	None
Surge Suppression Circuit	None
Other Output Protection	None
Output Points	Notch outputs 2
Output Signal Indicators	Indicator lit when each notch point is ON (internal logic)
Isolation Method	Photocoupler
Derating Conditions	None
External Power Supply	For driving loads 24 VDC

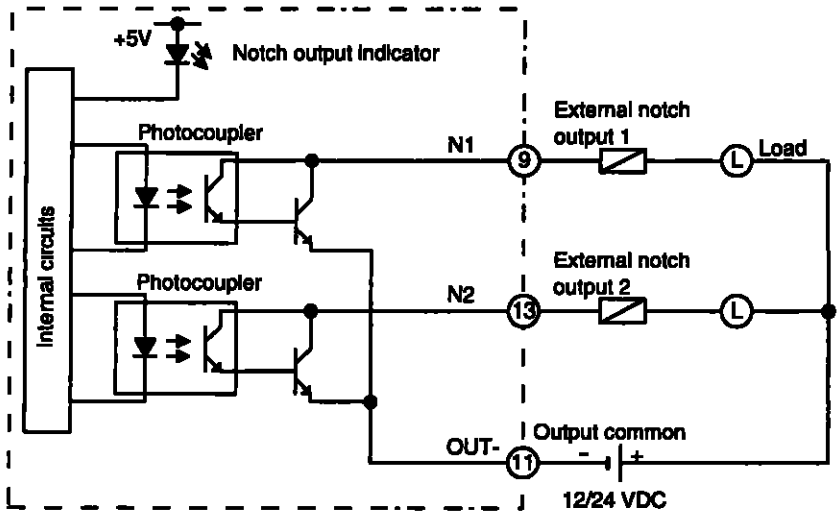
Circuit Configuration

⚠ Caution

- Connect a fuse which is appropriate for the load specifications in series with the load

The output circuit is not equipped with a built-in fuse. Failure to connect a fuse may result in fire, damage to equipment, or damage to the output circuits if there is a load short-circuit or overload.

The following diagram shows the circuit configuration.



7 4 4 External I/O Signals

The following table summarizes the external I/O signals

Signal Name		Details
Input Signals	PHAn PHBn	• Pulses input to the phase-A and phase-B terminals will be counted as the counter's current value Select the proper connection method based on the signal voltage level being used • Use one of the three counting methods listed below • Phase-A and phase-B pulses: The phase-A and phase-B pulse counting method supports ×1, ×2, and ×4 multiplication pulse counting • Sign and pulse: Input the sign signal to phase-B and the pulses to phase-A This method supports ×1 and ×2 multiplication pulse counting • Increment and decrement pulses: Input the increment pulses to phase-A and the decrement pulses to phase-B This method supports ×1 and ×2 multiplication pulse counting
		This setting is enabled when the Module is initialized
	RSTn (External current value reset)	• Sets the counter current value to 0 • Effective when the signal goes from OFF to ON • Performs the same function as that perform when the Present Value Reset Output Coil changes from OFF to ON
	Ln (External latch)	• Stores the current counter value • Effective when the signal goes from OFF to ON • You can monitor the latch data by selecting the external latch data monitor
Output Signals	Nn (Notch output)	Outputs are based on comparisons between the notch point setting value(s) and the counter's current value When the Notch Output Enable output coil is ON, it forces ON the notch output regardless of other conditions

Note The letter 'n' at the end of the signals donates counter number 1 or 2

7.5 References

7.5.1 I/O Allocations

This section explains the Counter Module's I/O allocations.

For details, refer to the *MP9□□ Machine Controller User's Manual Programming Panel Software (for simple operation/standard operation)* (SIEZ-C887-2.3 and SIEZ-C887-2.4) (to be prepared).

■ The Purpose of I/O Allocations

The correspondence between the Counter Module's internal signals and I/O registers must be defined in order for the Counter Module to input signals from input devices and the CPU Module or output signals to output devices and the CPU Module. Set the I/O register numbers to define this correspondence for the Counter Modules.

Allocate I/O with a Programming Device (CP-717). The results of the allocation are stored in the CPU Module's memory as an I/O allocation table.

■ I/O Allocation Settings

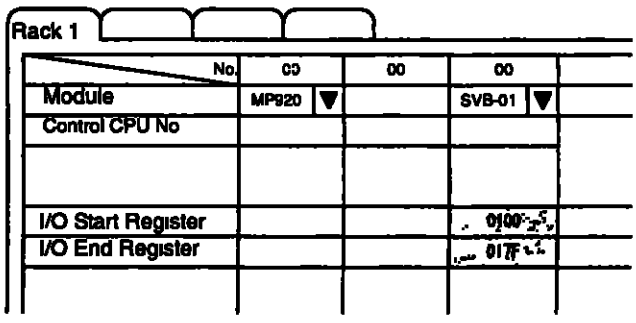
Setting the Leading and End I/O Register Numbers

The range of consecutive I/O register numbers allocated to the MECHATROLINK Driver Module are set in the Module configuration definitions window.

The names of the Driver Modules varies as shown in the following table, but the settings themselves are the same.

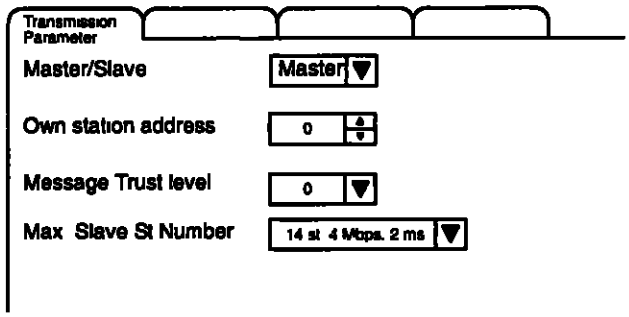
Model	Driver Module Name
MP910	SVB-01
MP920	SVB-01
MP930	MC350 or IO350
MP940	

◀EXAMPLE▶ In the example Module definitions window shown below, the I/O register range for an MP920 SVB-01 has been set to 0100 to 017F. The I/O registers allocated to the Counter Module are set within this range.



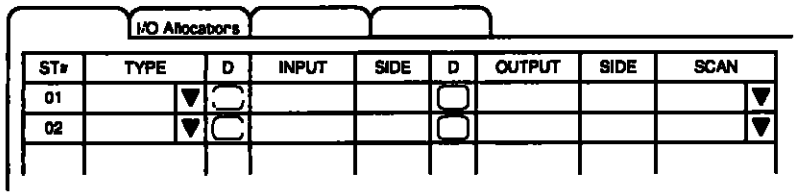
Transmission Cycle Settings

Set the MECHATROLINK transmission cycle in the **Parameter Settings** Tab of the MECHATROLINK definitions window Use the initial setting if there is no particular need to change the setting



Allocation of I/O Register Numbers

Set the Counter Module's leading I/O register number in the **I/O Allocations** Tab of the MECHATROLINK definitions window

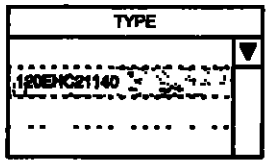


The following table shows the registers used for the interface between the CPU Module and the Counter Module

I/O Registers		Signal Direction	
Name	Points of Registers	CPU Module	Counter Module
Output coils	32	CPU Module → Output → Pulse Output Module; Input ←	
Output registers	4		
Input relays	16		
Input registers	4		

■ I/O Allocations

Set the following items in the **I/O Allocation** Tab

Item	Contents
ST#	Allocate station numbers to the devices connected to the MECHATROLINK network. Set station numbers in order beginning at 01.
TYPE	Set the model of MECHATROLINK Module connected at each station. Open the pull-down menu in the TYPE field and select 120EHC21140. 
D	This field enables or disables inputs. Click the box to display a check-mark and disable inputs. Click the box again to remove the check-mark and enable inputs.
INPUT SIZE	Set the leading input register number (IWxxxx). The number of registers in the SIZE field is set to 7 automatically.
D	This field enables or disables outputs. Click the box to display a check-mark and disable outputs. Click the box again to remove the check-mark and enable outputs.
OUTPUT SIZE	Set the leading output register number (OWxxxx). The number of registers in the SIZE field is set to 8 automatically.
SCAN	Adjusts I/O timing. • Select "High" for high-speed scan. • Select "Low" for low-speed scan.

7.5.2 Output Coils

An output coil is a control signal sent from the host controller to the Counter Module The following table lists the output coils

Address	Counter Number		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
OWxxxx +2	1	Lower-place byte	L-RES1	N-RES1	PRES-1	N-ENB1	C-ENB1	P-SET1	N-SET1	M-SET1
		Upper-place byte	L-RES2	N-RES2	PRES-2	N-ENB2	C-ENB2	P-SET2	N-SET2	M-SET2
OWxxxx +3	2	Lower-place byte	-	-	-	-	-	-	N-ON2	N-ON1
		Upper-place byte	-	-	-	-	-	MON3	MON2	MON1

Byte	Bit No	Symbol	Signal Name	Details
Lower-place byte (n=1) Upper-place byte (n=2)	0	M-SETn	Mode Set	This is the counter mode setting reference The following settings are made • Pulse count mode • Notch output mode • Notch input polarity
	1	N-SETn	Notch Point Set	This is the notch point set value preset reference Write the notch point setting in the corresponding output register in advance The notch point is set when this signal goes from OFF to ON
	2	P-SETn	Current Value Set	This is the Counter's current value preset reference Write the current value setting in the corresponding output register in advance The current value is set when this signal goes from OFF to ON
	3	C-ENBn	Count Enable	Input pulses can be counted when the Count Enable signal is ON This signal is effective when it is ON
	4	N-ENBn	Notch Output Enable	When the Notch Output Enable signal is ON, output of the external Notch Output is enabled This signal is effective when it is ON Outputs can be made using the Forced Outputs 0 to 3 signals even when the Notch Output Enable signal is OFF
	5	P-RESn	Current Value Reset	Resets the Counter's current value to 0 The current value is reset to 0 when this signal goes from OFF to ON
	6	N-RESn	Notch Output Reset	Resets the latch status of the notch output that specified the latch mode The notch output is reset when this signal goes from OFF to ON
	7	L-RESn	Count Value Hold Reset	Resets the external latch input status The external latch is reset when this signal goes from OFF to ON
Lower-place byte	0 (n = 1) 1 (n = 2)	N-Onn	Forced Notch Output	The Notch Output is turned ON when the Forced Notch Output signal is ON, regardless of other conditions This signal is effective when it is ON

Byte	Bit No	Symbol	Signal Name	Details
Upper-place byte	0	MON1	Monitor 1	The status of MON1, MON2, and MON3 determines which data is monitored Refer to the following table.
	1	MON2	Monitor 2	
	2	MON3	Monitor 3	

Note The letter "n" at the end of the signal denotes counter number 1 or 2

The following table shows which data is monitored for each combination of MON1, MON2, and MON3

Output Coil Status			Monitored Data
MON3	MON2	MON1	
OFF	OFF	OFF	Counter current value
OFF	OFF	ON	External latch data
OFF	ON	OFF	Status
OFF	ON	ON	Counter mode
ON	OFF	OFF	(Reserved for future use)
ON	OFF	ON	Counter 1 notch point set value
ON	ON	OFF	Counter 2 notch point set value
ON	ON	ON	Current value set value

7.5.3 Output Registers

Output registers are used together with output coils when setting numeric values from the host controller to the Counter Module

Output registers are used to make the following settings

- Counter Mode Settings
- Notch Point Settings
- Current Value Setting

IMPORTANT The same output registers are used to set different data at different times so be careful that the setting signals do not overlap

The following table lists the output registers

Register Address	Output Register No	Setting		
		Mode Set	Notch Point Set	Current Value Set
OWxxxxx+4	1st byte	Mode setting	Notch point Pm (lower bytes)	Current value set value (lower bytes)
	2nd byte	Reserved (always 0)		
OWxxxxx+5	3rd byte	Reserved (always 0)	Notch point Pm (upper bytes)	
	4th byte	Reserved (always 0)		

Register Address	Output Register No	Setting		
		Mode Set	Notch Point Set	Current Value Set
OWxxxxx+6	5th byte	Mode setting	Notch point Pm' (lower bytes)	Current value set value (upper bytes)
	6th byte	Reserved (always 0)		
OWxxxxx+7	7th byte	Reserved (always 0)	Notch point Pm' (upper bytes)	
	8th byte	Reserved (always 0)		

Note 1 The mode setting for counter 1 is in the 1st byte and the mode setting for counter 2 is in the 5th byte

2 Notch point settings and current value settings are shared by Counters 1 and 2 and can be set at the same time

7.5.4 Input Relays

Input relays are status signals sent from the Counter Module to the host controller

The following table lists the input relays

Address	Counter No		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
IWxxxx+2	1	Lower byte						ERR	ACK	RDY
		Upper byte	L2	N2	BORW2	CARY2	L1	N1	BDRW1	CARY1

Byte	Bit No	Symbol	Signal Name	Details
Lower byte	0	RDY	Ready	Indicates the results of the Module's self-diagnostic tests Normal ON Abnormal OFF
	1	ACK	Settings normal	Indicates that the setting operation was completed normally The ACK signal stays ON while the set signal is ON
	2	ERR	Error	Indicates that an error occurred in the setting operation This ERR signal stays ON while the set signal is ON
Upper byte	0 (n = 1) 4 (n = 2)	CARYn	Carry	This signal stays ON for one scan only when the Counter's current value is incremented past the counter upper limit value and rolls over to 0
	1 (n = 1) 5 (n = 2)	BORWn	Borrow	This signal stays ON for one scan only when the Counter's current value is decremented past 0 and rolls over to the counter upper limit value
	2 (n = 1) 6 (n = 2)	Nn	Notch output status	Indicates the status of the external notch output The notch output signal goes ON when the external notch output signal goes ON
	3 (n = 1) 7 (n = 2)	Ln	Latch input status	Indicates that the external latch signal has been input The latch input signal goes ON when the external latch input signal goes ON

Note The letter n" at the end of the signal denotes counter number 1 or 2

7 5 5 Input Registers

Input registers are used when monitoring various kinds of information in the Counter Module

Input registers are used for monitoring the following information

- Mode Settings
- Notch Point Settings
- Current Value Setting
- Current Value
- Latch Data
- Status

IMPORTANT The same input registers are used to monitor different data at different times, so be careful that the monitor signals do not overlap

The input registers are listed in the following tables

Monitoring Status

Register Address	Monitored Data		
	Current Value Monitor	Latch Data Monitor	Status Monitor
lwxxxxx+4	Counter 1 current value lower bytes	Counter 1 latch data lower bytes	---
lwxxxxx+5	Counter 1 current value upper bytes	Counter 1 latch data upper bytes	---
lwxxxxx+6	Counter 2 current value lower bytes	Counter 2 latch data lower bytes	---
lwxxxxx+7	Counter 2 current value upper bytes	Counter 2 latch data upper bytes	---

Monitoring Set Values

Register Address	Monitored Data			
	Mode Settings Monitor	Notch Point Monitor	Notch Point Monitor	Current Value Setting Monitor
lwxxxxx+4	Counter 1 mode	Counter 1 notch point n (lower bytes)	Counter 2 notch point n (lower bytes)	Counter 1 current value set value (lower bytes)
lwxxxxx+5	---	Counter 1 notch point n (upper bytes)	Counter 2 notch point n (upper bytes)	Counter 1 current value set value (upper bytes)
lwxxxxx+6	Counter 2 mode	Counter 1 notch point n' (lower bytes)	Counter 2 notch point n' (lower bytes)	Counter 2 current value set value (lower bytes)

Register Address	Monitored Data			
	Mode Settings Monitor	Notch Point Monitor	Notch Point Monitor	Current Value Setting Monitor
Iwxxxxx+7	---	Counter 1 notch point n (upper bytes)	Counter 2 notch point n' (upper bytes)	Counter 2 current value set value (upper bytes)

7.5.6 Monitoring Data

■ Overview

The following seven kinds of data in the Counter Module can be monitored

- Current value
- External latch data
- Status
- Mode settings
- Counter 1 notch point setting
- Counter 2 notch point setting
- Current set value

Input relays and output coils are used together to monitor data Eight consecutive bytes of input registers are used to monitor various types of data sent from the Counter Module to the host controller

■ Monitoring the Current Value

To monitor the current value, set the MON1, MON2, and MON3 output coils as follows

- MON1 OFF
- MON2 OFF
- MON3 OFF

The current values for counters 1 and 2 are monitored simultaneously

Monitored Data	Input Registers		
Current value	1st byte	Current value (lower word, lower byte)	Counter 1
	2nd byte	Current value (lower word, upper byte)	
	3rd byte	Current value (upper word, lower byte)	
	4th byte	Current value (upper word, upper byte)	
	5th byte	Current value (lower word, lower byte)	Counter 2
	6th byte	Current value (lower word, upper byte)	
	7th byte	Current value (upper word, lower byte)	
	8th byte	Current value (upper word upper byte)	

■ Monitoring the External Latch Data

To monitor the external latch data, set the MON1, MON2, and MON3 output coils as follows

- MON1 OFF
- MON2 OFF
- MON3 ON

External latch data for counters 1 and 2 is monitored simultaneously

Monitored Data	Input Registers		
External latch data	1st byte	External latch data (lower word lower byte)	Counter 1
	2nd byte	External latch data (lower word, upper byte)	
	3rd byte	External latch data (upper word, lower byte)	
	4th byte	External latch data (upper word upper byte)	
	5th byte	External latch data (lower word lower byte)	Counter 2
	6th byte	External latch data (lower word, upper byte)	
	7th byte	External latch data (upper word, lower byte)	
	8th byte	External latch data (upper word, upper byte)	

■ Monitoring the Status

To monitor the status, set the MON1, MON2, and MON3 output coils as follows

- MON1 OFF
- MON2 ON
- MON3 OFF

The status monitor will be added in future versions

The status data for counters 1 and 2 is monitored simultaneously

Monitored Data	Input Registers		
Status	1st byte	---	Counter 1
	2nd byte	---	
	3rd byte	---	
	4th byte	---	
	5th byte	---	Counter 2
	6th byte	---	
	7th byte	---	
	8th byte	---	

■ Monitoring the Mode Setting Value

To monitor the mode setting values, set the MON1 MON2, and MON3 output coils as follows

- MON1 OFF
- MON2 ON
- MON3 ON

The mode setting values for counters 1 and 2 are monitored simultaneously

Monitored Data	Input Registers		
Mode setting values	1st byte	Mode setting value	Counter 1
	2nd byte	Reserved for future use	
	3rd byte	Reserved for future use	
	4th byte	Reserved for future use	
	5th byte	Mode setting value	Counter 2
	6th byte	Reserved for future use	
	7th byte	Reserved for future use	
	8th byte	Reserved for future use	

■ Monitoring the Counter 1 Notch Points

To monitor the counter 1 notch points, set the MON1, MON2 and MON3 output coils as follows

- MON1 ON
- MON2 ON
- MON3 OFF

Monitored Data	Input Registers		
Counter 1 notch points	1st byte	Notch point Pm (lower word lower byte)	Counter 1
	2nd byte	Notch point Pm (lower word upper byte)	
	3rd byte	Notch point Pm (upper word, lower byte)	
	4th byte	Notch point Pm (upper word, upper byte)	
	5th byte	Notch point Pm (lower word lower byte)	
	6th byte	Notch point Pm (lower word, upper byte)	
	7th byte	Notch point Pm' (upper word, lower byte)	
	8th byte	Notch point Pm' (upper word, upper byte)	

■ Monitoring the Counter 2 Notch Points

To monitor the counter 2 notch points, set the MON1, MON2, and MON3 output coils as follows

- MON1 OFF
- MON2 OFF
- MON3 ON

Monitored Data	Input Registers		
Counter 2 notch points	1st byte	Notch point Pm (lower word, lower byte)	Counter 2
	2nd byte	Notch point Pm (lower word, upper byte)	
	3rd byte	Notch point Pm (upper word, lower byte)	
	4th byte	Notch point Pm (upper word, upper byte)	
	5th byte	Notch point Pm' (lower word lower byte)	
	6th byte	Notch point Pm' (lower word upper byte)	
	7th byte	Notch point Pm' (upper word, lower byte)	
	8th byte	Notch point Pm (upper word, upper byte)	

■ Monitoring the Current Value Set Value

To monitor the current value set value, set the MON1, MON2 and MON3 output coils as follows

- MON1 OFF
- MON2 OFF
- MON3 OFF

The current value set values for counters 1 and 2 are monitored simultaneously

Monitored Data	Input Registers		
Current value set values	1st byte	Current value set value (lower word, lower byte)	Counter 1
	2nd byte	Current value set value (lower word, upper byte)	
	3rd byte	Current value set value (upper word lower byte)	
	4th byte	Current value set value (upper word, upper byte)	
	5th byte	Current value set value (lower word, lower byte)	Counter 2
	6th byte	Current value set value (lower word, upper byte)	
	7th byte	Current value set value (upper word, lower byte)	
	8th byte	Current value set value (upper word, upper byte)	

■ Reserved for Future Use

The following MON1, MON2, and MON3 output coils settings are reserved for future use

- MON1 ON
- MON2 OFF
- MON3 OFF

Monitored Data	Input Registers		
Reserved	1st byte	---	Counter 1
	2nd byte	---	
	3rd byte	---	
	4th byte	---	
	5th byte	---	Counter 2
	6th byte	---	
	7th byte	---	
	8th byte	---	

7.6 Module Operation

7.6.1 Operation Settings

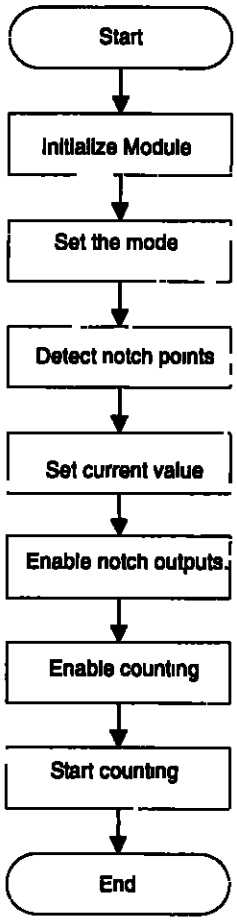
■ Overview

There are 4 operation settings, as listed below

- Data Setting Operations
- Data Monitoring Operations
- Permission Operations
- Forced Status Operations

■ Operation Flowchart

The following flowchart outlines the flow of operation for the Counter Module



■ Related References

Use the following I/O data to execute instructions

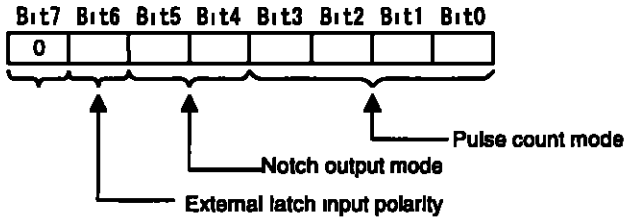
Output Coils

Symbol	Signal Name	Details
M-SETn	Mode Set	This is the counter mode setting reference The following settings are made • Pulse count mode • Notch output mode • Notch input polarity
N-SETn	Notch Point Set	This is the notch point set value preset reference Write the notch point setting in the corresponding output register in advance . The notch point is set when this signal goes from OFF to ON
P-SETn	Current Value Set	This is the Counter's current value preset reference Write the current value setting in the corresponding output register in advance The current value is set when this signal goes from OFF to ON

Note The letter "n" at the end of the signal denotes counter number 1 or 2

Command Data Configuration

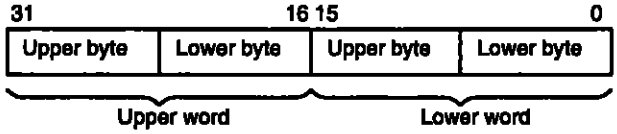
• Mode Set



Output Register No	Setting Details
1st byte	Mode setting (MSET1)
2nd byte	---
3rd byte	---
4th byte	---
5th byte	Mode setting (MSET2)
6th byte	---
7th byte	---
8th byte	---

Note Set the unused bytes (bytes 2, 3, 4, 6, 7, and 8) to 0

• Notch Point Set

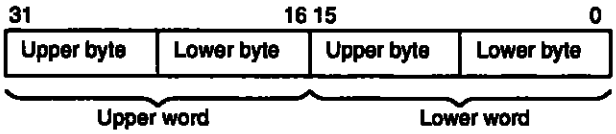


Output Register No	Setting Details
1st byte	Notch point Pm (lower bytes) (N-SETn)
2nd byte	
3rd byte	Notch point Pm (upper bytes) (N-SETn)
4th byte	
5th byte	Notch point Pm (lower bytes) (N-SETn)
6th byte	
7th byte	Notch point Pm' (upper bytes) (N-SETn)
8th byte	

Note 1 The letter "n" at the end of the signal denotes counter number 1 or 2

2 The notch point settings are shared by Counters 1 and 2 and can be set at the same time

• Current Value Set



Output Register No	Setting Details
1st byte	Current value set value (lower bytes) (P-SET1)
2nd byte	
3rd byte	
4th byte	
5th byte	Current value set value (upper bytes) (P-SET2)
6th byte	
7th byte	
8th byte	

■ Setting Procedure

The Counter Module's operations are detailed below

1 Set the mode setting

a) Set the output coils for the Mode Set (M-SETn)

b) Set the Mode Set (M-SET1) in the lower byte of output register OWxxxxx+4 or the Mode Set (M-SET2) in the lower byte of output register OWxxxxx+6

c) Set the pulse count mode

The following table shows the pulse count mode settings

Pulse Count Mode	Bit 3	Bit 2	Bit 1	Bit 0
Phase-A and phase-B pulses, ×1 multiplication*	0	0	0	0
Phase-A and phase-B pulses, ×2 multiplication	0	0	0	1
Phase-A and phase-B pulses, ×4 multiplication	0	0	1	0
Sign and pulse, ×1 multiplication	0	0	1	1
Sign and pulse, ×2 multiplication	0	1	0	0
Increment and decrement pulses, ×1 multiplication	0	1	0	1
Increment and decrement pulses, ×2 multiplication	0	1	1	0
Not used (Will cause a setting error)	0 1	1 1	1 1	1 1

* The phase-A and phase-B pulses ×1 multiplication setting is the mode set at the factory and the default mode. The pulse count mode will be reset to this mode automatically when the power is turned ON.

d) Set the notch output mode

The following table shows the notch output mode settings

Notch Output Mode	Bit 5	Bit 4
Latch mode *	0	0
State mode	0	1
Special state mode	1	0
Not used (Will cause a setting error)	1	1

* Latch mode is the mode set at the factory and the default mode. The notch output mode will be reset to latch mode automatically when the power is turned ON.

c) Set the external latch polarity

The following table shows the external latch polarity settings

External Latch Polarity	Bit 6
Operates when signal goes from OFF to ON *	0
Operates when signal goes from ON to OFF	1

* The default setting (set at the factory) The polarity will be reset to this setting automatically when the power is turned ON

IMPORTANT

When setting control references overlap or the set value exceeds the allowable range, the values will not be set in the Module In this case, ACK is not turned ON and ERR is turned ON Set the correct values and set the mode settings again

2 Set the notch point settings

a) Set the output coils for the Notch Point Set (N-SETn)

b) Make the following settings in the output registers

Register Address	Output Register No	Setting Details	Setting Range
Owxxxxx+4	1st byte	Notch point Pm (lower bytes)	0 to FFFFFFFF (hexadecimal)
	2nd byte		
Owxxxxx+5	3rd byte	Notch point Pm (upper bytes)	
	4th byte		
Owxxxxx+6	5th byte	Notch point Pm' (lower bytes)	0 to FFFFFFFF (hexadecimal)*
	6th byte		
Owxxxxx+7	7th byte	Notch point Pm (upper bytes)	
	8th byte		

* A setting range error will occur if the setting exceeds the upper limit of the counting range

3 Set the current value set value

a) Set the output coils for the Current Value Set (P-SETn)

b) Make the following settings in the output registers

Register Address	Output Register No	Setting	Setting Range
		Notch Point Setting	
Owxxxxx+4	1st byte	Current value set value (lower bytes) (P-SET1)	0 to FFFFFFFF (hexadecimal)
	2nd byte		
Owxxxxx+5	3rd byte		
	4th byte		

Register Address	Output Register No	Setting	Setting Range
		Notch Point Setting	
Owxxxxx+6	5th byte	Current value set value (upper bytes) (P-SET2)	0 to FFFFFFFF (hexa-decimal)
	6th byte		
Owxxxxx+7	7th byte		
	8th byte		

4 Enable the notch output

Turn the Notch Output Enable (N-ENBn) output coil from OFF to ON

5 Enable counting

Turn the Count Enable (C-ENBn) output coil from OFF to ON

Pulse counting will start

7 6.2 Ladder Programs

This section describes examples of ladder programming for the Counter Module

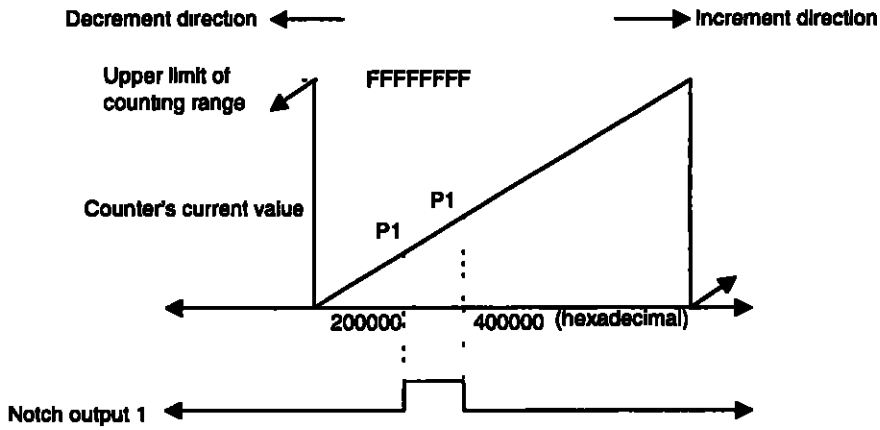
■ Setting the Mode and the Notch Points

Setting Details

The following table shows the settings to be made

Setting Name		Details
Mode settings	Pulse input mode	Phase-A and phase-B pulses, ×4 multiplication
	Notch output mode	State mode
	External latch input polarity	Enabled when turned from OFF to ON
Notch point settings	P1	200000
	P1'	400000 (hexadecimal)

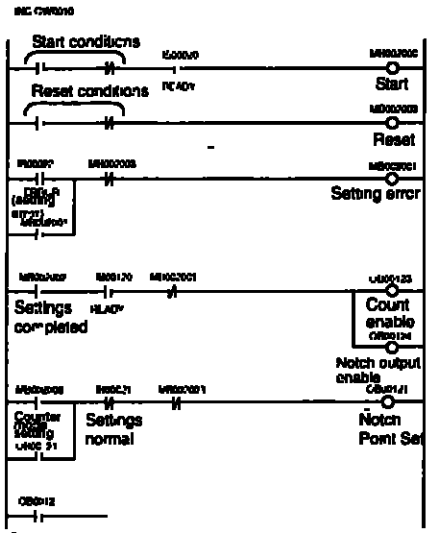
The following diagram shows the function of the settings



Ladder Program Example

◀EXAMPLE▶ The following table shows the I/O registers used in this example

Register Name	Register Address
Input register number allocation	IW0000 to IW0006
Output register number allocation	OW0010 to OW0017
Input relays	IB00020 to IB0002F
Input registers	IW0003 to IW0006
Output coils	OB00120 to OB0013F
Output registers	OW0014 to OW0017
Internal register	MW00200



Scan counter

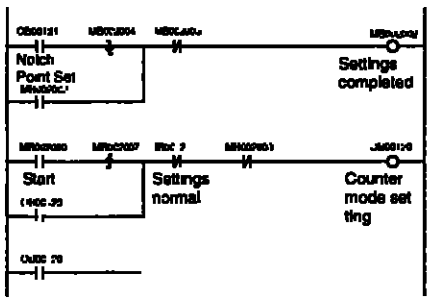
When the conditions for the settings operation are satisfied, MB00200 is turned ON and the settings operation starts
The Module won't be reset if one scan is shorter than the communications period
Keep the reset coil ON for longer than the communications period

If an error occurs in the settings operation, MB002001 will be turned ON and will remain ON

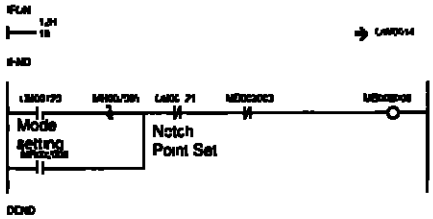
When the counter mode and notch point settings have been completed, counting and the notch output are enabled

Notch Point (P1) Set

Notch Point (P1) Set



The notch point setting process might not be completed if one scan is shorter than the communications period, so an interlock is set up when OB00021 goes from OFF to ON



Phase-A and phase-B, ×4 multiplication
Notch mode State mode
External latch polarity OFF to ON

Mode setting completed

Output Coil Timing Chart

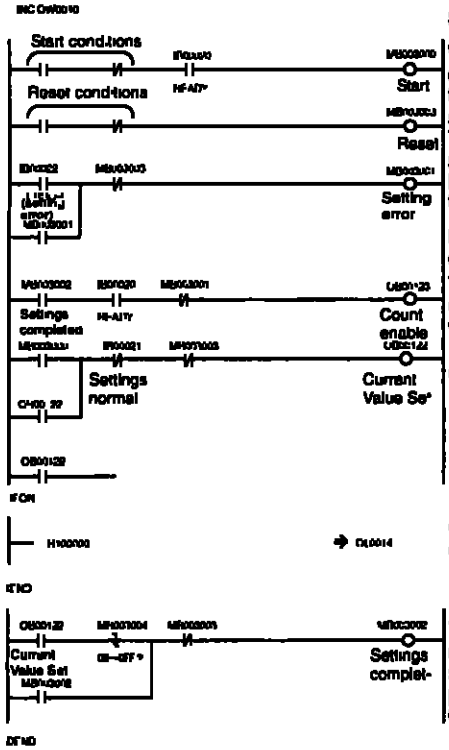
The following timing chart shows the status of output coils as the preceding ladder program is executed

■ Setting the Current Value

◀EXAMPLE▶ This section shows an example of a ladder program used to set the current value

The following table shows the I/O registers used in this example

Register Name	Register Number
Input relays	IB00020 to IB0002F
Input registers	IW0003 to IW0006
Output coils	OB00120 to OB0013F
Output registers	OW0014 to OW0017
Internal register	MW00300



Scan counter

When the conditions for the settings operation are satisfied, MB00300 is turned ON and the settings operation starts

The Module won't be reset if one scan is shorter than the communications period Keep the reset coil ON for longer than the communications period

If an error occurs in the settings operation, MB003001 will be turned ON and will remain ON

Counting is enabled when the current value setting has been completed

Counter value's preset reference

Current value setting data output

The current value setting process might not be completed if one scan is shorter than the communications period, so an interlock is set up when OB00022 goes from OFF to ON

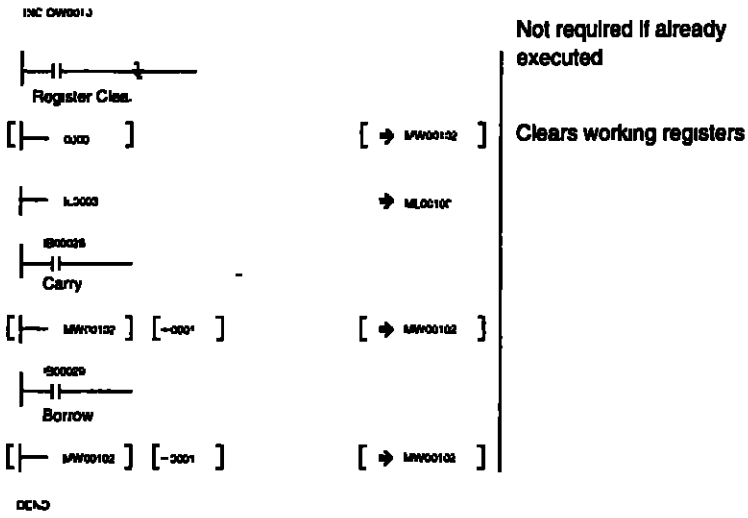
7 6.3 Increasing the Count Range

When the 32-bit count range (0 to 4,294,967,295 (FFFFFFFF (Hexadecimal))) is insufficient, the count range can be increased by counting Carry signals and Borrow signals from the Counter Module

An example of the ladder programming used to increase the count range is shown below

The following table shows the I/O registers used in this example

Register Name	Register No	
Input relays	IB00020 to IB0002F	
Input registers	IW0003 to IW0006	IW004 (Current value (Upper)) IW003 (Current value (Lower))
Registers used to store calculation results	MW00100 to MW00102	MW00102 (Current value (Upper)) MW00101 (Current value (Middle)) MW00100 (Current value (Lower))



8 Pulse Output Module

This section provides an overview of the Pulse Output Module (120MMB20230)

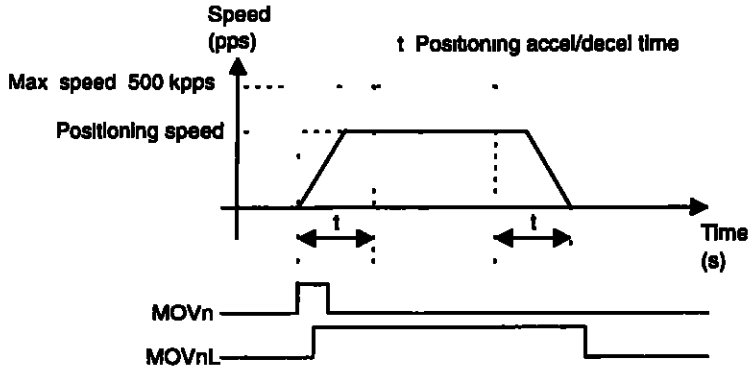
8.1 Summary of Module Functions

This section describes the operations that can be performed with the Pulse Output Module

■ Positioning Function

When the MOVn signal turns ON, pulses are output to move from the current position to the target position at the speed set in the parameters

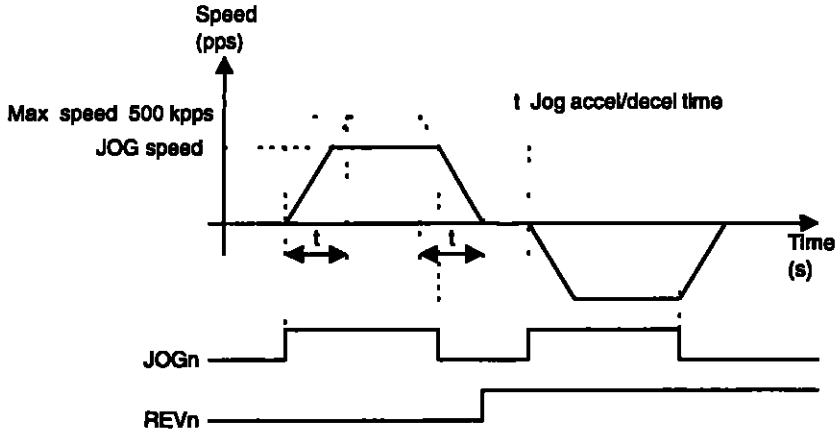
- The speed and acceleration/deceleration time are set in the parameters



■ Jog Operation Function

While the JOGn signal is ON pulses will be output at the set speed and direction set

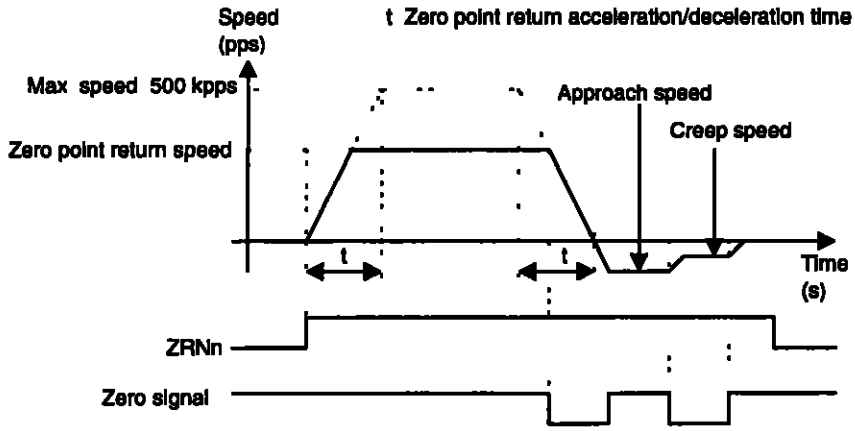
- The speed and acceleration/deceleration time are set in the parameters
- The JOG speed and JOG direction are specified by the RFVn signal



■ Zero Point Return Function

When the ZRNn signal turns ON pulses will be output at the set speed and direction

- The acceleration/deceleration time, approach time, and creep speed are set in the parameters
- The direction is specified by the REVn signal



■ Parameter Setting Function

The parameters set the operating conditions for the positioning, JOG operation, and zero point return functions

Set the following output coils

- Turn OFF MONSELn
- Set the parameter number in PRMn0 through PRMn3 (See the following table)
- Turn ON PSETn

The following table shows the parameters that are specified in output coils PRMn0 through PRMn3

Parameter No	Settings
1	Output mode
2	JOG speed
3	Zero point return speed, zero point return acceleration/deceleration time
4	Zero point return approach speed, zero point return creep speed
5	Positioning speed, positioning acceleration/deceleration time
6	---
7	---
8	Acceleration/declaration mode
9	Two-stage acceleration/deceleration speed, second-stage acceleration/ deceleration time
10	Asymmetrical acceleration/deceleration time, asymmetrical deceleration time
11	Asymmetrical acceleration/deceleration bias speed

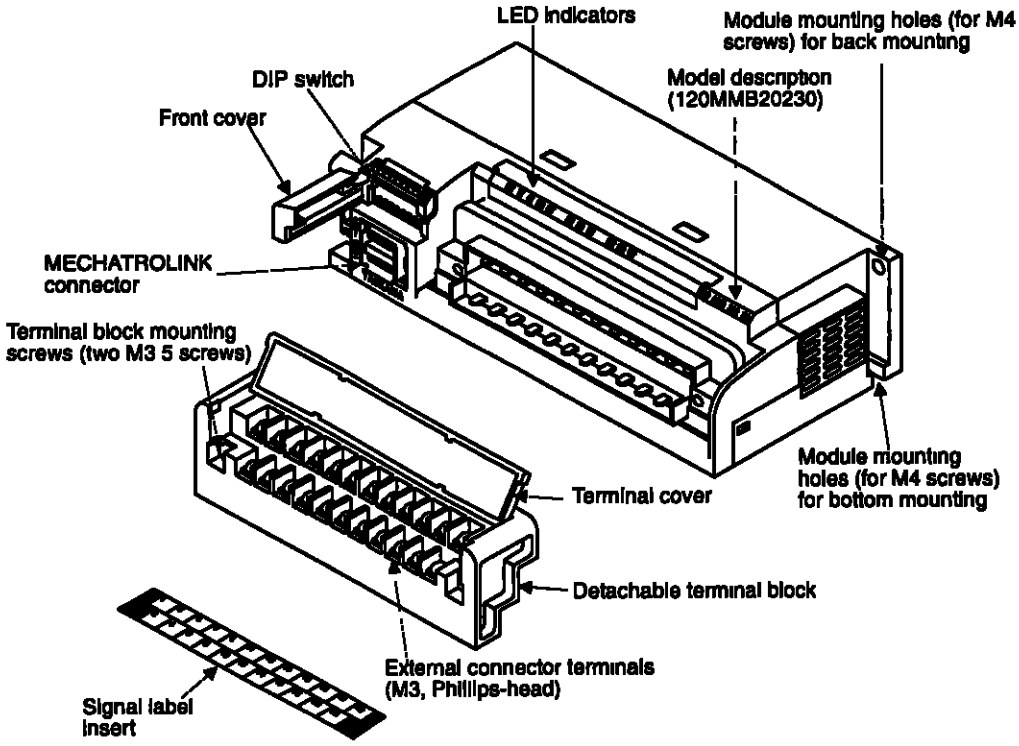
■ Monitoring Functions

The Pulse Output Module is equipped with the following three data monitoring functions

No	Monitor	Details
1	Current Position Monitor	Monitors the Pulse Output Module's current position
2	Alarm Monitor	Monitors the Pulse Output Module s alarm history
3	Parameter Monitor	Monitors the various parameter settings

8.2 External Appearance and Configuration

The following diagram shows the Pulse Output Module's external parts



■ LED Indicators

The following table shows the functions of the Counter Module's LED indicators

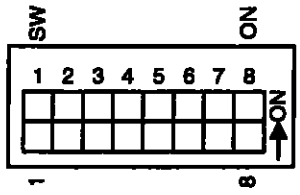
RUN	TX	RX	ERR	FLT	FW1	RV1	ER1	FW2	RV2	ER2

Indicator Name	Indicator Color	Meaning When Lit
RDY	Green	The Module is operating normally
TX	Green	Data is being transmitted through MECHATROLINK
RX	Green	Data is being received through MECHATROLINK
ERR	Red	A MECHATROLINK communications error occurred
FLT	Red	A Module error occurred
FW1	Green	Channel 1 is operating in the counterclockwise direction
RV1	Green	Channel 1 is operating in the clockwise direction
ER1	Red	Channel 1 operating error
FW2	Green	Channel 2 is operating in the counterclockwise direction

Indicator Name	Indicator Color	Meaning When Lit
RV2	Green	Channel 2 is operating in the clockwise direction
ER2	Red	Channel 2 operating error

■ DIP Switch Settings

The settings for the Pulse Output Module's DIP switch are explained below



Pin No	Function	Settings	
		OFF	ON
1 to 5	Slave address 1 to 30	See the following table	
6	Baud rate 4 Mbps or 1 Mbps	4 Mbps	1 Mbps
7	Not used	Set to OFF	
8	Used by the system	Set to OFF	

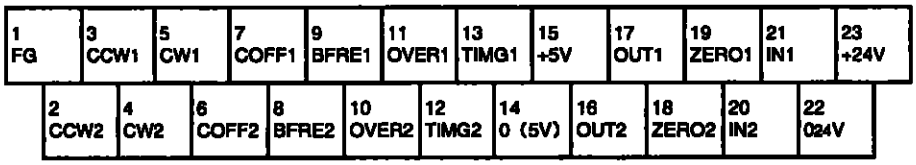
The following table shows the possible slave address settings

Slave Address	DIP Switch Pin					Slave Address	DIP Switch Pin				
	1	2	3	4	5		1	2	3	4	5
Not used	0	0	0	0	0	16	0	0	0	0	0
1	1	0	0	0	0	17	1	0	0	0	0
2	0	1	0	0	0	18	0	1	0	0	0
3	1	1	0	0	0	19	1	1	0	0	0
4	0	0	1	0	0	20	0	0	1	0	0
5	1	0	1	0	0	21	1	0	1	0	0
6	0	1	1	0	0	22	0	1	1	0	0
7	1	1	1	0	0	23	1	1	1	0	0
8	0	0	0	1	0	24	0	0	0	1	0
9	1	0	0	1	0	25	1	0	0	1	0
10	0	1	0	1	0	26	0	1	0	1	0
11	1	1	0	1	0	27	1	1	0	1	0
12	0	0	1	1	0	28	0	0	1	1	0
13	1	0	1	1	0	29	1	0	1	1	0
14	0	1	1	1	0	30	0	1	1	1	0
15	1	1	1	1	0	Not used	1	1	1	1	0

Note ON is 1 OFF is 0

■ Terminal Block Terminal Layout

The following diagram shows the layout of terminals on the Pulse Output Module's terminal block

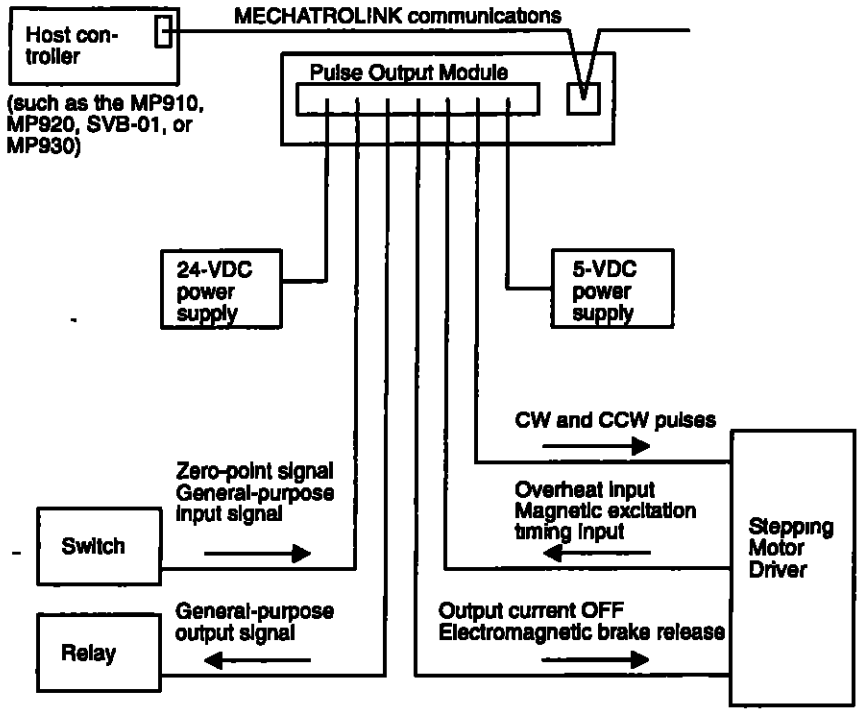


Terminal No	Signal Name	Signal Function
1	FG	Frame ground
2	CCW2	Channel 2 CCW pulse output
3	CCW1	Channel 1 CCW pulse output
4	CW2	Channel 2 CW pulse output
5	CW1	Channel 1 CW pulse output
6	C-OFF2	Channel 2 output current OFF
7	C-OFF1	Channel 1 output current OFF
8	B-FREE2	Channel 2 brake signal release
9	B-FREE1	Channel 1 brake signal release
10	OVER2	Channel 2 overheat input
11	OVER1	Channel 1 overheat input
12	TIMING2	Channel 2 magnetic excitation timing input
13	TIMING1	Channel 1 magnetic excitation timing input
14	0 (5V)	External power supply 0 V
15	+5V	External power supply 5 V
16	OUT2	Channel 2 general-purpose output
17	OUT1	Channel 1 general-purpose output
18	ZERO2	Channel 2 zero point signal
19	ZERO1	Channel 1 zero point signal
20	IN2	Channel 2 general-purpose output
21	IN1	Channel 1 general-purpose output
22	024V	External power supply 0 V
23	+24V	External power supply 24 V

8.3 System Configuration

8.3 1 Example of System Configuration

The following diagram shows an example of a system configuration

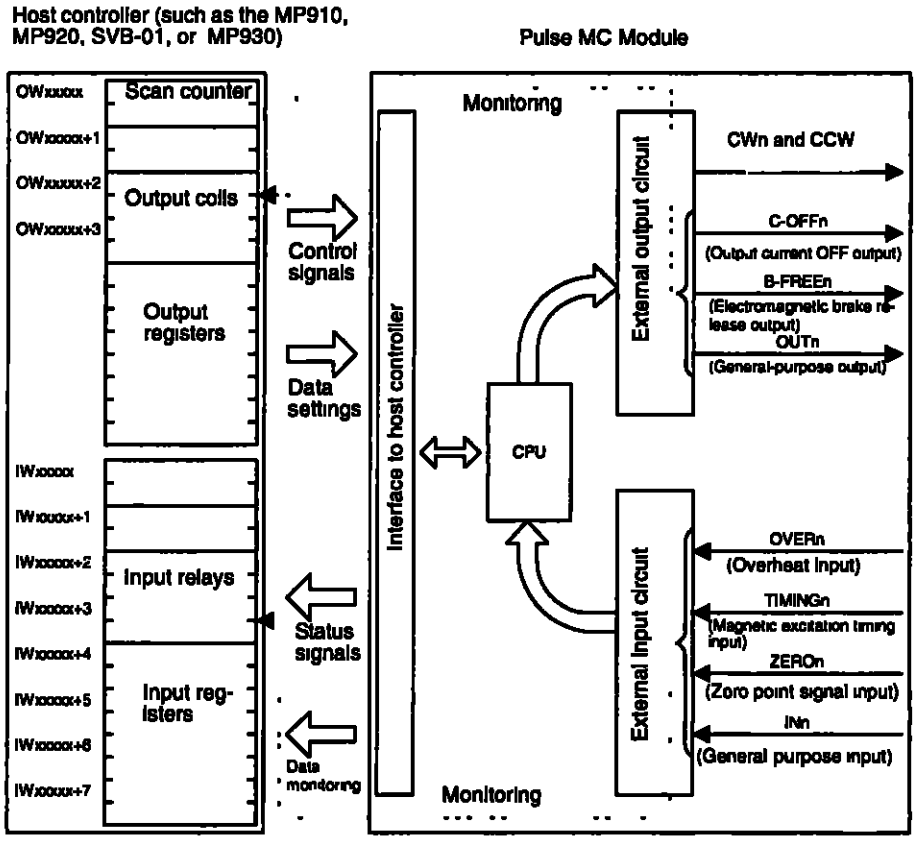


Theoretically, up to 30 Modules can be connected to a MECHATROLINK communications line The maximum number of Modules that can be used, however, is limited by the host controller specifications

You can connect the Modules to any point on the MECHATROLINK communications network

8.3.2 Interface with the Host Controller

The following diagram shows the interfaces between the Pulse Output Module and the host controller and between the Pulse Output Module and external devices



The following table explains the signals

Name	Explanation	Reference
Output coils	The output coils are control signals from the host controller to the Pulse Output Module	*8.5.2 Output Coils*
Output registers	The output registers are used together with the output coils to set numeric values from the host controller to the Pulse Output Module	*8.5.4 Output Registers*
Input relays	The input relays are status signals from the Pulse Output Module to the host controller	*8.5.5 Input Relays*
Input registers	The input registers are used together with the output coils when monitoring numeric values in the Pulse Output Module	*8.5.6 Input Registers*

8.4 Specifications

8.4 1 General Specifications

The general specifications of the Pulse Output Module are shown below

Item		Specifications
Environmental Conditions	Ambient Operating Temperature	0 to 60°C
	Storage Temperature	-25 to 85°C
	Operating Humidity	30% to 95% (with no condensation)
	Storage Humidity	5% to 95% (with no condensation)
	Pollution Level	Pollution level 1 according to JIS B 3501
	Corrosive Gas	No corrosive gas
	Operating Altitude	Less than 2,000 m above sea level
Mechanical Operating Conditions	Vibration Resistance	10 to 57 Hz with half-amplitude of 0 075 mm 57 to 150 Hz at fixed acceleration of 9 8 m/s^2 10 sweeps in the X, Y, and Z directions (sweep period 1 octave/min) (conforming to JIS B 3502)
	Shock Resistance	Peak acceleration of 147 m/s^2 twice for 11 ms in X, Y, and Z directions (conforming to JIS B 3502)
Electrical Operating Conditions	Noise Resistance	1 000 Vp-p in normal mode with pulse widths of 100 ns and 1 µs and rise time of 1 ns (with impulse noise simulator) (conforming to JIS B 3502)
Dielectric Strength		1,500 VAC for 1 min or 1,800 VAC for 1 s between the I/O terminals and internal circuit, between I/O commons
Insulation Resistance		100 MΩ min at 500 VDC between I/O terminals and internal circuit and between output commons (at room temperature and humidity)
Installation Requirements	Ground	Ground to 100 Ω or less
	Installation Orientation	The Module can be mounted in three directions Refer to *5 1 2 Mounting Orientation* for details
	Cooling Method	Natural cooling
	Mass	Approx 350 g
	Dimensions (mm)	161 × 44 × 79 (W × H × D) (Not including the terminal block)

8 4 2 Hardware Specifications

The hardware specifications of the Pulse Output Module are shown below

Item	Specifications
Name	Pulse Output Module (2 Channels)
Model Description	V_POUT-2AXIS
Model Number	JAMSC-120MMB20230
Functions	Pulse positioning JOG operation, zero point return
Number of Circuits	2 circuits
Communications Protocol	MECHATROLINK
I/O Allocations	Digital outputs 32 points Output registers 4 registers Digital inputs 32 points Input registers 4 registers
Internal Current Consumption	24 V 100 mA, 5 V 300 mA
Hot Swapping	Not permitted
Maximum Heating Value	1 8 W

8 4 3 Performance Specifications

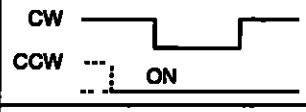
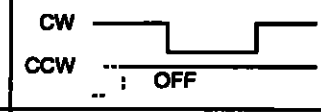
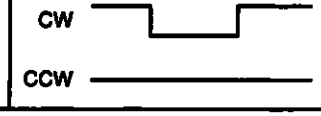
The performance specifications of the Pulse Output Module are shown below

Item		Specifications
Pulse Output	Pulse Output Method	• Set the pulse output method in the control program as the Pulse Output Mode • There are two pulse output methods • CW and CCW pulses • Sign and pulses
	Maximum Output Speed	500 kpps
	Pulse Output Voltage	5 VDC
	Pulse Input Circuits	Open collector outputs External power supply 5 VDC, 10 mA/circuit
	External Control Signals	The following signals can be input from and output to external devices such as Stepping Motor Driver Units • Overheat input 5 VDC, sourcing input • Magnetic excitation timing input 5 VDC sourcing input • Output current OFF 5 VDC, sinking output • Electromagnetic brake release 5 VDC, sinking output • Zero point signal input 24 VDC, sourcing input • General-purpose input 24 VDC, sourcing or sinking input • General-purpose output 24 VDC, sinking output Refer to *8.4 4 External I/O Signals* for details on these I/O signals

Item	Specifications
Monitor Functions	The following signals can be monitored from the control program • READY ON when the Pulse Output Module is operating normally • PACK ON when parameter settings have been completed normally • PNACK ON when parameter settings have not been completed normally (setting error)

■ Pulse Output Timing

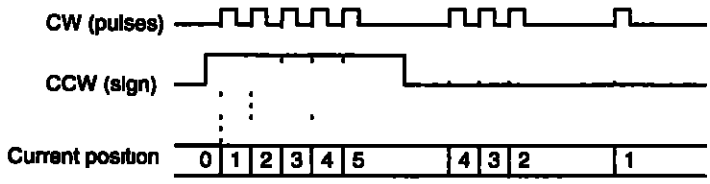
The following timing charts show the forward and reverse timing of pulse outputs, which

Pulse Output Mode	Forward Timing	Reverse Timing
Sign and Pulses		
CW and CCW pulses		

Note The maximum pulse output speed is 500 kpps

■ Pulse Output Operation Example

The following timing chart shows operation in the "sign and pulses" output mode



Note The position range is -2,147,483,648 to 2 147,483,647

■ External Output Signal Specifications

The specifications of external output signals are shown below

Item		Specifications
CW and CCW Pulse Outputs	Pulse Output Modes	CCW (forward) and CW (reverse), or sign and pulses
	Maximum Output Frequency	500 kpps
	Load Voltage	5 V
	Maximum Load Current	18 mA/point
	Output Voltage Drop	0 35 V max (typ)
Output Current OFF and Electromagnetic Brake Release Outputs	Rated Voltage	5 VDC
	Allowable Voltage Range	4 75 to 5 25 VDC
	Output Format	Sinking
	Maximum Load Current	17 mA
	Output Voltage Drop	1 0 V max (typ)
	Output Delay Times	OFF to ON 0 2 ms max ON to OFF 0 2 ms max
	Leakage Current When OFF	0 4 μA max
	Output Type	Photocoupler output
	Number of Commons	1
	Output Protection	Unprotected outputs according to JIS B 3501
General-purpose Outputs	Rated Voltage	24 VDC
	Allowable Voltage Range	19 2 to 30 VDC
	Output Format	Sinking
	Maximum Load Current	100 mA
	Output Voltage Drop	1 0 V max (typ)
	Output Delay Times	OFF to ON 0 2 ms max ON to OFF 0 2 ms max
	Leakage Current When OFF	1 mA max
	Output Type	Transistor output
	Number of Commons	1
	Output Protection	Unprotected outputs according to JIS B3501

■ External Input Signal Specifications

The specifications of external input signals are shown below

Item		Specifications
Overheat and Magnetic Excitation Timing	Rated Voltage	5 VDC
	Allowable Voltage Range	4 75 to 5 25 VDC
	Input Format	Sourcing
	Rated Current	7 0 mA
	Input Impedance	470 Ω
	Standard Operating Range	Min ON voltage 2 13 VDC Max OFF voltage 1 14 VDC
	Input Delay Times	OFF to ON 0 5 ms max ON to OFF 0 8 ms max
	Isolation Method	Photocoupler
Zero Point Signal	Rated Voltage	24 VDC
	Allowable Voltage Range	19 2 to 30 VDC
	Input Format	Sourcing
	Rated Current	10 0 mA
	Input Impedance	2 2 kΩ
	Standard Operating Range	Min ON voltage 6 9 VDC Max OFF voltage 4 8 VDC
	Input Delay Times	OFF to ON 0 5 ms max ON to OFF 0 5 ms max
	Isolation Method	Photocoupler
General-purpose Inputs	Rated Voltage	24 VDC
	Allowable Voltage Range	19 2 to 30 VDC
	Input Format	Sourcing
	Rated Current	5 0 mA
	Input Impedance	4 7 kΩ
	Standard Operating Range	Min ON voltage 13 1 VDC Max OFF voltage 6 3 VDC
	Input Delay Times	OFF to ON 0 5 ms max ON to OFF 0 5 ms max
	Isolation Method	Photocoupler

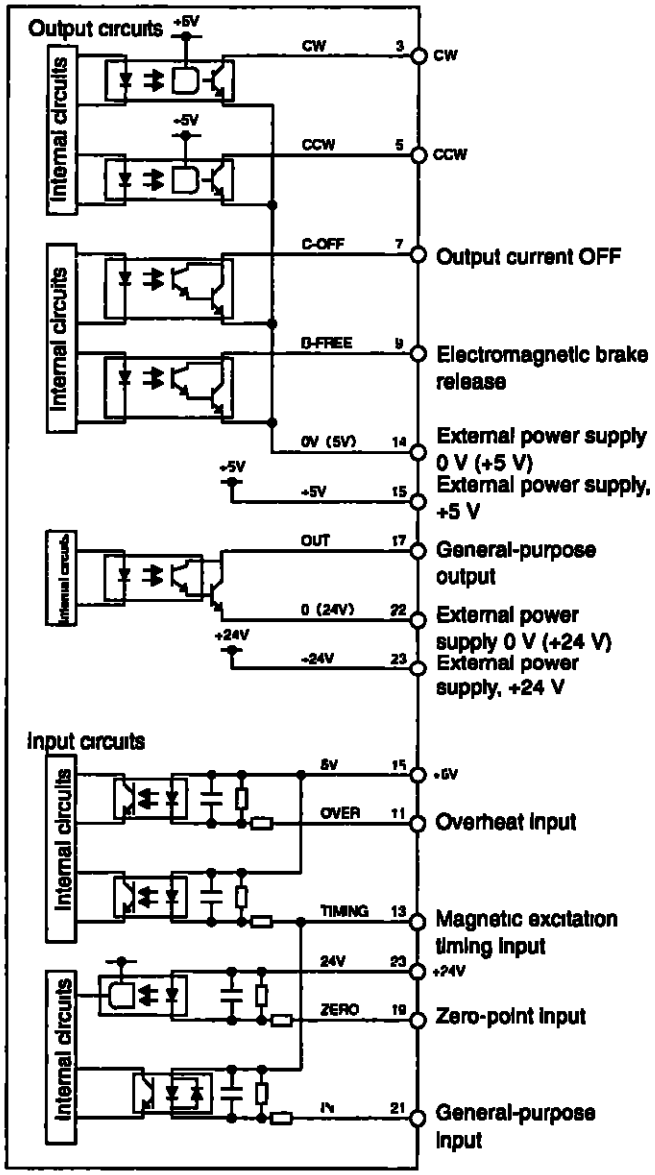
■ Circuit Configuration

⚠ Caution

- The output circuit is not equipped with a built-in fuse Connect a fuse which is appropriate for the load specifications in series with the load

Failure to connect a fuse may result in fire, damage to equipment, or damage to the output circuits if there is a load short-circuit or overload

The following diagram shows the circuit configuration of external I/O signals



8 4.4 External I/O Signals

The following table summarizes the external I/O signals

Signal Name		Specifications
Output Signals	CWn CCWn	Pulses are output from the CW or CCW terminal There are two pulse output modes • CW and CCW pulses method • Sign and pulses method (The sign signal is output to the CCW and pulses are output to the CW) This setting is made with the Module's Pulse Output Mode setting
	C-OFFn (Output Current OFF Output)	Connects to the current OFF input terminals of an external device such as a Stepping Motor Driver Unit This signal is controlled by turning output coil COFFn ON and OFF This signal is turned OFF automatically by the system when an error occurs in the Pulse Output Module or when the overheat input is turned ON
	B-FREEn (Electromagnetic Brake Release Output)	Connects to the electromagnetic brake release input terminals of an external device such as a Stepping Motor Driver Unit This signal is controlled by turning output coil BFREEn ON and OFF
	OUTn (General-purpose Output)	This signal is controlled by turning the general-purpose output terminal output coil OUTn ON and OFF
Input Signals	OVERn (Overheat Input)	Connects to the overheat output terminals of an external device such as a Stepping Motor Driver Unit This signal is monitored with input relay OVERn
	TIMINGn (excitation timing input)	Connects to the magnetic excitation timing output terminals of an external device such as a Stepping Motor Driver Unit This signal is monitored with input relay TIMINGn
	ZEROn (zero-point signal input)	Used as the zero-point signal when a zero point return is performed This signal is monitored with input relay ZEROn
	INn (general-purpose input)	This signal is monitored with the general-purpose input terminal input relay INn

Note The letter "n" at the end of the signals denotes channel number 1 or 2

8.5 References

8.5.1 I/O Allocations

This section explains the Pulse Output Module I/O allocations

For details, refer to the *MP9□□ Machine Controller User's Manual Programming Panel Software (for simple operation/standard operation)* (SIEZ-C887-2 3 and SIEZ-C887-2 4) (to be prepared)

■ The Purpose of I/O Allocations

The correspondence between the Pulse Output Module's internal signals and I/O registers must be defined in order for the Pulse Output Module to input signals from input devices and the CPU Module or output signals to output devices and the CPU Module Set the I/O register numbers to define this correspondence for the Pulse Output Modules

Allocate I/O with a Programming Device (CP-717) The results of the allocation are stored in the CPU Module's memory as an I/O allocation table

■ I/O Allocation Settings

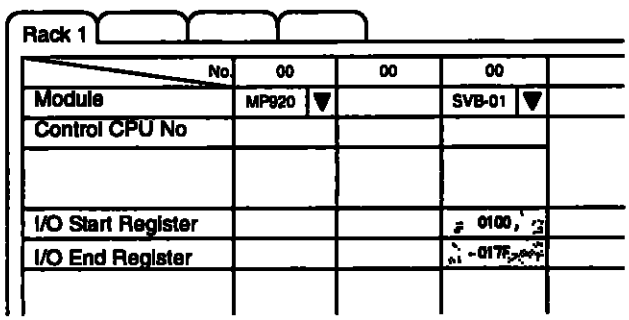
Setting the Leading and End I/O Register Numbers

The range of consecutive I/O register numbers allocated to the MECHATROLINK Driver Module are set in the Module configuration definitions window

The names of the Driver Modules varies as shown in the following table, but the settings themselves are the same

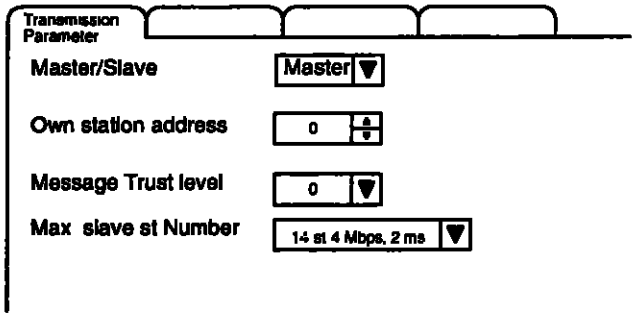
Model	Driver Module Name
MP910	SVB-01
MP920	SVB-01
MP930	MC350 or IO350
MP940	

◀EXAMPLE▶ In the example Module definitions window shown below, the I/O register range for an MP920 SVB-01 has been set to 0100 to 017F The I/O registers allocated to the Pulse Output Module are set within this range



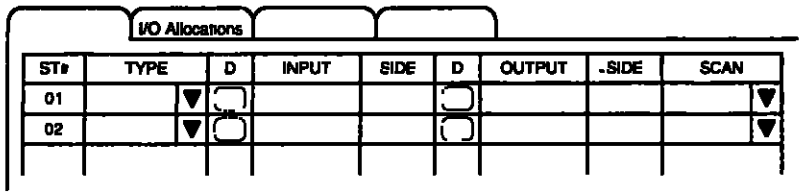
Transmission Cycle Settings

Set the MECHATROLINK transmission cycle in the **Parameter Settings** Tab of the MECHATROLINK definitions window Use the initial setting if there is no particular need to change the setting



Allocation of I/O Register Numbers

Set the Pulse Output Module's leading I/O register number in the **I/O Allocations** Tab of the MECHATROLINK definitions window

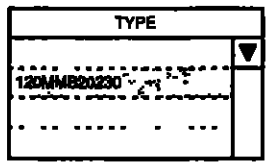


The following table shows the registers used for the interface between the CPU Module and the Pulse Output Module

I/O registers		Signal Direction
Name	Points or Registers	
Output coils	32	CPU Module — Output → / ← Input — Pulse Output Module
Output registers	4	
Input relays	16	
Input registers	4	

■ I/O Allocations

Set the following items in the **I/O Allocations** Tab

Item	Contents
ST#	Allocate station numbers to the devices connected to the MECHATROLINK network Set station numbers in order beginning at 01
TYPE	Set the model of MECHATROLINK Module connected at each station Open the pull-down menu in the TYPE field and select 120MMB20230 
D	This field enables or disables inputs Click the box to display a check-mark and disable inputs Click the box again to remove the check-mark and enable inputs
INPUT SIZE	Set the leading input register number (IWxxxx) The number of registers in the SIZE field is set to 7 automatically
D	This field enables or disables outputs Click the box to display a check-mark and disable outputs Click the box again to remove the check-mark and enable outputs
OUTPUT SIZE	Set the leading output register number (OWxxxx) The number of registers in the SIZE field is set to 8 automatically
SCAN	Adjusts I/O timing • Select "High" for high-speed scan • Select "Low" for low-speed scan

8.5.2 Output Coils

An output coil is a control signal sent from the host controller to the Pulse Output Module The following table lists the output coils

Address	Channel		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
OWxxxxx +2	1	Lower byte	PRM13	PRM12	PRM11	PRM10	PSET1	MONSEL1	CAN1	ARST1
		Upper byte	OUT1	BFREE1	COFF1	-	REV1	ZRN2	JOG1	MOV1
OWxxxxx +3	2	Lower byte	PRM23	PRM22	PRM21	PRM20	PSET2	MONSEL1	CAN2	ARST2
		Upper byte	OUT2	BFREE2	COFF2	-	REV2	ZRN2	JOG2	MOV2

The following table summarizes the function of each signal

Byte	Bit No	Symbol	Signal Name	Details
Lower byte	0	ARSTn	Alarm Reset	This is the alarm reset reference The signal operates when it goes from OFF to ON
	1	CANn	Cancel	Cancels axis movement The signal operates when it goes from OFF to ON
	2	MONSELn	Monitor Selector	Switches the monitor mode • OFF Current position monitor • ON Parameter monitor
	3	PSETn	Parameter Set/ Monitor Selector	Sets or monitors parameters
	4 to 7	PRMn0 to PRMn3	Parameter Number Selectors	Selects the parameter number

Byte	Bit No	Symbol	Signal Name	Details
Upper byte	1	MOVn	Positioning	Starts positioning operation The signal operates when it goes from OFF to ON
	2	JOGn	JOG Operation	This reference controls JOG operation • OFF Stop • ON Run
	3	ZRNn	Zero Point Return	This reference starts the zero point return operation The signal operates when it goes from OFF to ON
	4	REVn	JOG/Zero Point Return Direction	This reference determines the starting direction for JOG operation and zero point return operation • OFF Forward • ON Reverse
	5	COFFn	Output Current OFF	Controls the status of the output current OFF terminal When this signal is OFF, the output current OFF terminal is OFF and when this signal is ON, the output current OFF terminal is ON
	6	BFREEn	Electromagnetic Brake Release	Controls the status of the electromagnetic brake release output terminal When this signal is OFF, electromagnetic braking is used and when this signal is ON, electromagnetic braking is released
	7	OUTn	General-purpose Output	Controls the status of the general-purpose output terminal When this signal is OFF, the general-purpose output terminal is OFF and when this signal is ON, the general-purpose output terminal is ON

Note The letter "n" at the end of the signals donates channel number 1 or 2

8.5.3 Parameters

Output coils PRMn0 to PRMn3 are set by the parameters

The Pulse Output Module s parameters are shown in the following table

Parameter No	Parameter No Setting				Name	Setting Range*	Units	Initial Setting
	PRM n3	PRM n2	PRM n1	PRM n0				
00	OFF	OFF	OFF	OFF				
01	OFF	OFF	OFF	ON	Output mode Bit 0 output mode	0 CW, CCW pulses 1 Sign and pulses		0
02	OFF	OFF	ON	OFF	JOG speed	1 to 50000	10 pps	500
					JOG acceleration/ deceleration time	50 to 5000	100 ms	100
03	OFF	OFF	ON	ON	Zero point return speed	1 to 50000	10 pps	500
					Zero point return acceleration/ deceleration time	50 to 5000	100 ms	100
04	OFF	ON	OFF	OFF	Zero point return approach speed	1 to 50000	10 pps	100
					Zero point return creep speed	1 to 50000	10 pps	50
05	OFF	ON	OFF	ON	Positioning speed	1 to 50000	10 pps	500
					Positioning acceleration/ deceleration time	50 to 5000	100 ms	100

Parameter No	Parameter No Setting				Name	Setting Range*	Units	Initial Setting
	PRM n3	PRM n2	PRM n1	PRM n0				
06	OFF	ON	ON	OFF	Reserved for future use			
07	OFF	ON	ON	ON	Reserved for future use			
08	ON	OFF	OFF	OFF	Acceleration/ declaration mode	0 to 2 0 Single-stage symmetric 1 Two-stage symmetric 2 Single-stage asymmetric		0
09	ON	OFF	OFF	ON	Two-stage acceleration/ deceleration switching speed	1 to 50000	10 pps	500
					Second-stage acceleration/ deceleration time	50 to 5000	100 ms	100
10	ON	OFF	ON	OFF	Asymmetrical acceleration/ deceleration acceleration time	50 to 5000	100 ms	100
					Asymmetrical acceleration/ deceleration deceleration time	50 to 5000	100 ms	100
11	ON	OFF	ON	ON	Asymmetrical acceleration/ deceleration bias speed	0 to 50000	10 pps	0
12	ON	ON	ON	OFF	Reserved for future use			
13	ON	ON	ON	ON	Reserved for future use			
14	ON	ON	ON	OFF	Reserved for future use			
15	ON	ON	ON	ON	Reserved for future use			

* Write the setting in the output register

Note The letter "n' at the end of the signals denotes channel number 1 or 2

8.5.4 Output Registers

Output registers are used together with output coils when setting numeric values from the host controller to the Pulse Output Module

Output registers are used to make the following settings

- Target position setting
- Parameter settings

IMPORTANT The same output registers are used to set different data at different times, so be careful that the setting signals do not overlap

The following table lists the output registers

Register Address	Channel	Parameter Number*1				
		01	02	03	04	05
OWxxxxx+4	1	Output Mode*2	JOG speed	Zero point return speed	Zero point return approach speed	Positioning speed
		Used by system				
OWxxxxx+5			JOG acceleration/ deceleration time	Zero point return acceleration/ deceleration time	Zero point return creep speed	Positioning acceleration/ deceleration time
OWxxxxx+6	2	Output Mode *2	JOG speed	Zero point return speed	Zero point return approach speed	Positioning speed
		Used by system				
OWxxxxx+7			JOG acceleration/ deceleration time	Zero point return acceleration/ deceleration time	Zero point return creep speed	Positioning acceleration/ deceleration time

* 1 Output coils PRMn0 to PRMn3 (parameter number selectors) specify the parameters

* 2 The output mode occupies the lower-place byte of the register

8.5.5 Input Relays

Input relays are status signals sent from the Pulse Output Module to the host controller

The following table lists the input relays

Address	Channel		Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
IWxxxxx+2	1	Lower byte	-	-	PNACK1	PACK1	-	MONSEL1	-	RDY1
		Upper byte	IN1	ZRN1	TIMING1	OVER1	-	ZRN1L	JOG1L	MOV1L
IWxxxxx+3	2	Lower byte	-	-	PNACK2	PACK2	-	MONSEL2	-	RDY2
		Upper byte	IN2	ZRN2	TIMING2	OVER2	-	ZRN2L	JOG2L	MOV2L

The following table summarizes the function of each signal

Byte	Bit No	Symbol	Signal Name	Details
Lower byte	0	RDYn	Ready	Indicates the results of the Module's self-diagnostic tests Normal ON Abnormal OFF
	2	MONSELn	Monitor Parameters	Indicates that the parameters are being monitored
	4	PACKn	Parameter settings normal	Indicates that the setting operation was completed normally The "NACK" signal stays ON while the set reference is ON
	5	PNACKn	Parameter setting error	Indicates that an error occurred in the setting operation The "NACK" signal stays ON while the set reference is ON
Upper byte	0	MOVnL	Positioning	Indicates that the positioning operation is being performed
	1	JOGnL	JOG operation	Indicates that a JOG operation is being performed
	2	ZRNnL	Zero point return	Indicates that a zero point return operation is being performed
	4	OVERn	Overheat input status	Indicates the status of the external overheat input terminal
	5	TIMINGn	Magnetic excitation timing input status	Indicates the status of the external magnetic excitation timing input terminal
	6	ZRNn	Zero point signal input status	Indicates the status of the external zero point signal input terminal
	7	INn	General-purpose input status	Indicates the status of the external general-purpose input terminal

Note The letter "n" at the end of the signals denotes channel number 1 or 2

8.5.6 Input Registers

Input registers are used when monitoring various kinds of information from the Pulse Output Module Input registers are used for monitoring the following information

- Current Position
- Parameter Settings

IMPORTANT The same input registers are used to monitor different data at different times, so be careful that the monitor signals do not overlap

The input registers are listed in the following table

Register Address	Channel	Monitored Data						
		Current Position	Alarm	Parameter Number *				
				01	02	03	04	05
IWxxxxx+4	1	Current position (lower bytes)	Alarm code	Output mode	JOG speed	Zero point return speed	Zero point return approach speed	Positioning speed
IWxxxxx+5			Alarm history	Used by system				
IWxxxxx+6	2	Current position (upper bytes)	Alarm code		JOG accel/ decel time	Zero point return accel/ decel time	Zero point return creep speed	Positioning accel/decel time
IWxxxxx+7			Alarm history					

* Output coils PRMn0 to PRMn3 (parameter number selectors) specify the parameters

8 5.7 Monitoring Data

■ Overview

The following three kinds of data in the Pulse Output Module can be monitored

- Current position
- Alarm status
- Parameter settings

Input relays and output coils are used together to monitor data Eight consecutive bytes of input registers are used to monitor various types of data sent from the Pulse Output Module to the host controller

The input registers used for monitoring data are listed in the following table

INFO The register numbers are as follows

- Channel 1 1st byte to 4th byte
- Channel 2 5th byte to 8th byte

■ Monitoring the Current Position

To monitor the current position, turn OFF the MONSELn output coil

Monitored Data	Input Registers	
Current Position	1st byte and 5th byte	Current position (lower word, lower byte)
	2nd byte and 6th byte	Current position (lower word upper byte)
	3rd byte and 7th byte	Current position (upper word lower byte)
	4th byte and 8th byte	Current position (upper word, upper byte)

Note Bytes 1 to 4 are for channel 1 and bytes 5 to 8 are for channel 2

■ Monitoring the Alarm

To monitor the Pulse Output Module alarms, set the MONSELn PRMn0 to PRMn3, and PSETn output coils as follows

- MONSELn ON
- PRMn0 to PRMn3 OFF
- PSETn ON

Monitored Data	Input Registers	
Alarms	1st byte and 5th byte	Alarm current value
	2nd byte and 6th byt	Alarm history
	3rd byte and 7th byt	Alarm history
	4th byte and 8th byte	Alarm history

Note Bytes 1 to 4 are for channel 1 and bytes 5 to 8 are for channel 2

The following table shows the Module's alarm codes

Code	Details	Time when Alarm is Detected
00	Normal status	--
01	Incorrect parameter value	When parameters are set
02	Overheat input	Each scan
03	Move reference when output current is OFF	When the move reference is specified
04	Positioning target position error	When the positioning reference is specified (out of the _32-bit range)
05	Communications error during pulse output	When the communications error occurs

- When an alarm is reset, the current alarm code is copied to the alarm history before it is reset to 0 Consequently, the alarm code remains in the alarm history even after the alarm is reset
- The alarm history will not be updated if the new alarm code is the same as the previous alarm code

■ Monitoring Parameters

To monitor the Pulse Output Module's parameter settings, set the MONSELn, PRMn0 to PRMn3, and PSETn output coils as follows

- MONSELn ON
- PRMn0 to PRMn3 Set the desired parameter number
- PSETn ON

INFO

The register numbers are as follows

- Channel 1 1st byte to 4th byte
- Channel 2 5th byte to 8th byte

Monitored Data	Input Registers				
Output Mode	Parameter No	PRMn0	PRMn1	PRMn2	PRMn3
	1	OFF	OFF	OFF	ON

1st byte and 5th byte	Output mode
2nd byte and 6th byte	Used by system
3rd byte and 7th byte	Not used
4th byte and 8th byte	Not used

Jog Speed and Jog Accel Time	Parameter No	PRMn0	PRMn1	PRMn2	PRMn3
	2	OFF	OFF	ON	OFF

1st byte and 5th byte	JOG speed (lower byte)
2nd byte and 6th byte	JOG speed (upper byte)
3rd byte and 7th byte	JOG acceleration/deceleration time (lower byte)
4th byte and 8th byte	JOG acceleration/deceleration time (upper byte)

<table>
<tr><th>Monitored Data</th><th colspan="5">Input Registers</th></tr>
<tr><td rowspan="6">Zero Point Return Speed and Zero Point Return Accel/ Decel Time</td><td>Parameter No</td><td>PRMn0</td><td>PRMn1</td><td>PRMn2</td><td>PRMn3</td></tr>
<tr><td>3</td><td>OFF</td><td>OFF</td><td>ON</td><td>ON</td></tr>
<tr><td>1st byte and 5th byte</td><td colspan="4">Zero point return speed (lower byte)</td></tr>
<tr><td>2nd byte and 6th byte</td><td colspan="4">Zero point return speed (upper byte)</td></tr>
<tr><td>3rd byte and 7th byte</td><td colspan="4">Zero point return acceleration/deceleration time (lower byte)</td></tr>
<tr><td>4th byte and 8th byte</td><td colspan="4">Zero point return acceleration/deceleration time (upper byte)</td></tr>
<tr><td rowspan="6">Zero Point Return Approach Speed and Zero Point Return Creep Speed</td><td>Parameter No</td><td>PRMn0</td><td>PRMn1</td><td>PRMn2</td><td>PRMn3</td></tr>
<tr><td>4</td><td>OFF</td><td>ON</td><td>OFF</td><td>OFF</td></tr>
<tr><td>1st byte and 5th byte</td><td colspan="4">Zero point return approach speed (lower byte)</td></tr>
<tr><td>2nd byte and 6th byte</td><td colspan="4">Zero point return approach speed (upper byte)</td></tr>
<tr><td>3rd byte and 7th byte</td><td colspan="4">Zero point return creep speed (lower byte)</td></tr>
<tr><td>4th byte and 8th byte</td><td colspan="4">Zero point return creep speed (upper byte)</td></tr>
<tr><td rowspan="6">Positioning Speed and Positioning Accel/Decel Time</td><td>Parameter No</td><td>PRMn0</td><td>PRMn1</td><td>PRMn2</td><td>PRMn3</td></tr>
<tr><td>5</td><td>OFF</td><td>ON</td><td>OFF</td><td>ON</td></tr>
<tr><td>1st byte and 5th byte</td><td colspan="4">Positioning speed (lower byte)</td></tr>
<tr><td>2nd byte and 6th byte</td><td colspan="4">Positioning speed (upper byte)</td></tr>
<tr><td>3rd byte and 7th byte</td><td colspan="4">Positioning acceleration/deceleration time (lower byte)</td></tr>
<tr><td>4th byte and 8th byte</td><td colspan="4">Positioning acceleration/deceleration time (upper byte)</td></tr>
</table>

<table>
<tr><th>Monitored Data</th><th colspan="6">Input Registers</th></tr>
<tr><td rowspan="4">Acceleration/ Deceleration Mode</td><td>Parameter No</td><td></td><td>PRMn0</td><td>PRMn1</td><td>PRMn2</td><td>PRMn3</td></tr>
<tr><td>8</td><td></td><td>ON</td><td>OFF</td><td>OFF</td><td>OFF</td></tr>
<tr><td>1st byte and 5th byte</td><td colspan="5">Acceleration/deceleration mode</td></tr>
<tr><td>2nd byte and 6th byte
3rd byte and 7th byte
4th byte and 8th byt</td><td colspan="5">Not used
Not used
Not used</td></tr>
<tr><td rowspan="4">Two-stage Accel/Decel Switching Speed and Second-stage Accel/Decel Time</td><td>Parameter No</td><td></td><td>PRMn0</td><td>PRMn1</td><td>PRMn2</td><td>PRMn3</td></tr>
<tr><td>9</td><td></td><td>ON</td><td>OFF</td><td>OFF</td><td>ON</td></tr>
<tr><td>1st byte and 5th byte</td><td colspan="5">Two-stage acceleration/deceleration switching speed (lower byte)</td></tr>
<tr><td>2nd byte and 6th byte
3rd byte and 7th byte
4th byte and 8th byte</td><td colspan="5">Two-stage acceleration/deceleration switching speed (upper byte)
Second-stage acceleration/deceleration time (lower byte)
Second-stage acceleration/deceleration time (upper byte)</td></tr>
<tr><td rowspan="4">Asymmetrical Acceleration/ Deceleration Acceleration and Deceleration Times</td><td>Parameter No</td><td></td><td>PRMn0</td><td>PRMn1</td><td>PRMn2</td><td>PRMn3</td></tr>
<tr><td>10</td><td></td><td>ON</td><td>OFF</td><td>ON</td><td>OFF</td></tr>
<tr><td>1st byte and 5th byte</td><td colspan="5">Asymmetrical acceleration/deceleration acceleration time (lower byte)</td></tr>
<tr><td>2nd byte and 6th byte
3rd byte and 7th byte
4th byte and 8th byte</td><td colspan="5">Asymmetrical acceleration/deceleration acceleration time (upper byte)
Asymmetrical acceleration/deceleration deceleration time (lower byte)
Asymmetrical acceleration/deceleration deceleration time (upper byte)</td></tr>
</table>

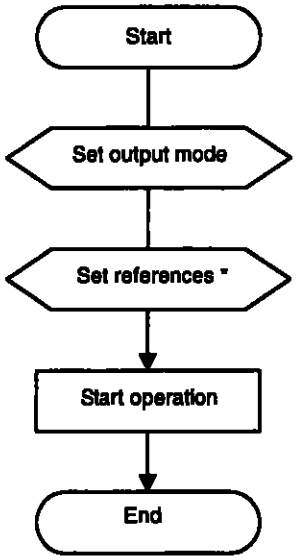
Monitored Data	Input Registers				
Asymmetrical Acceleration/ Deceleration Bias Speed	Parameter No		PRMn0	PRMn1	PRMn2	PRMn3
	11		ON	OFF	ON	ON

1st byte and 5th byte	Asymmetrical acceleration/deceleration bias speed (lower byte)
2nd byte and 6th byte	Asymmetrical acceleration/deceleration bias speed (upper byte)
3rd byte and 7th byte	Not used
4th byte and 8th byte	Not used

8.6 Module Operation

8.6.1 Operation Flowchart

The following flowchart outlines the flow of operation for the Pulse Output Module



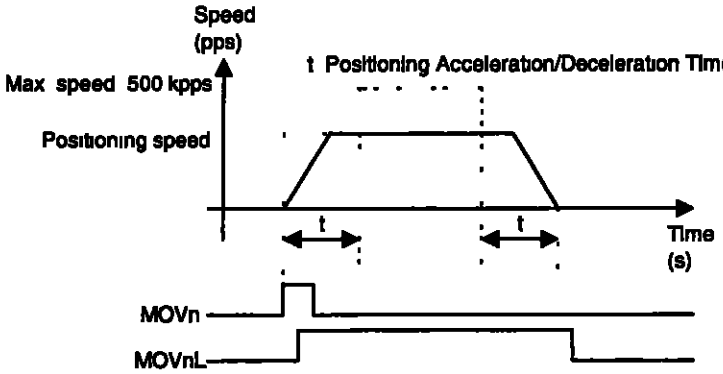
* Set output coils and output registers

8.6.2 Positioning Function

■ Overview

When the MOVn signal turns ON, pulses are output to move from the current position to the target position at the set speed

The speed and acceleration/deceleration time are set in the parameters



■ Related References

Use the following I/O data to execute instructions

Output Coils

Symbol	Signal Name	Details
MOVn *	Positioning reference	This reference starts the positioning operation The signal operates when it goes from OFF to ON

* The letter "n" denotes the channel number 1 or 2

Parameters

Parameter No	Parameter No Setting				Name	Setting Range	Units	Default Setting
	PRMn 3	PRMn 2	PRMn 1	PRMn 0				
05	OFF	ON	OFF	ON	Positioning speed	1 to 50000	10 pps	500
					Positioning Acceleration/ Deceleration Time	50 to 5000	100 ms	100

Input Relays

Symbol	Signal Name	Details
MOVnL *	Positioning	Indicates that the positioning operation is being performed

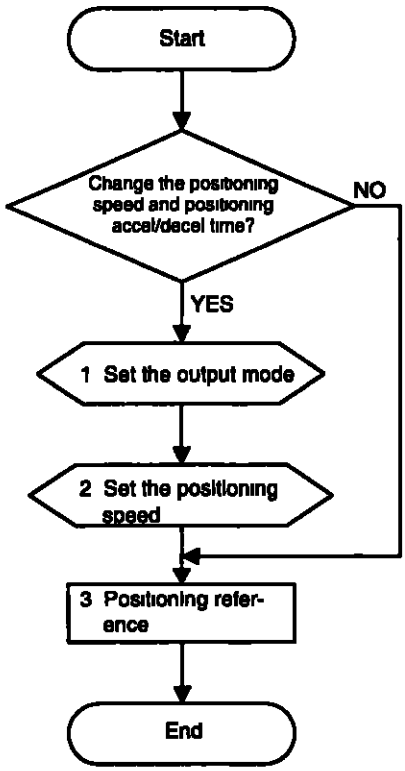
* The letter "n ' denotes channel number 1 or 2

Output Register Configuration

Register No		Details
Channel 1	Channel 2	
1st byte	5th byte	Positioning speed (lower byte)
2nd byte	6th byte	Positioning speed (upper byte)
3rd byte	7th byte	Positioning acceleration/deceleration time (lower byte)
4th byte	8th byte	Positioning acceleration/deceleration time (upper byte)

■ Operation

Use the following procedure to perform positioning operations



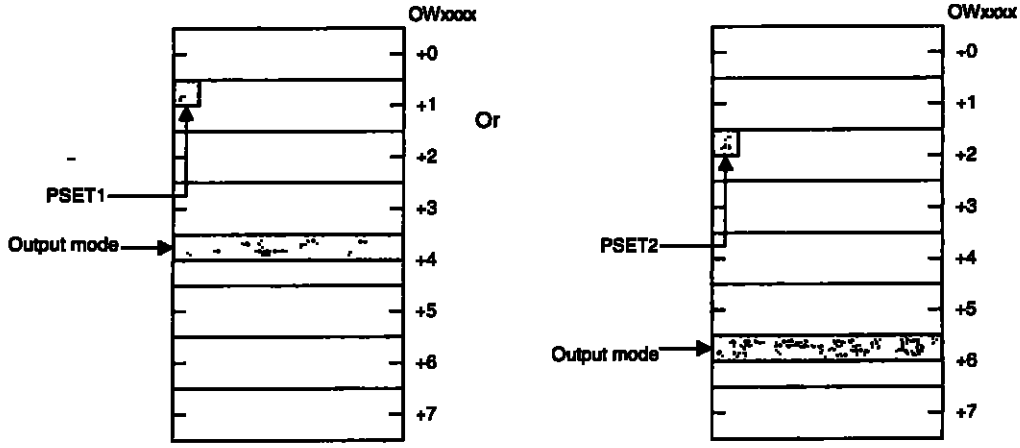
INFO

Once the output mode (step 1) and positioning speed (step 2) have been set, it is not necessary to set them again until there are changes

1 Selecting the Output Mode

a) Set the parameter number to 1 in the Parameter Number Selector output coils (PRMn0 to PRMn3)

b) Set the output mode in the lower byte of output register Owxxxxx+4 (for channel 1) or Owxxxxx+6 (for channel 2)

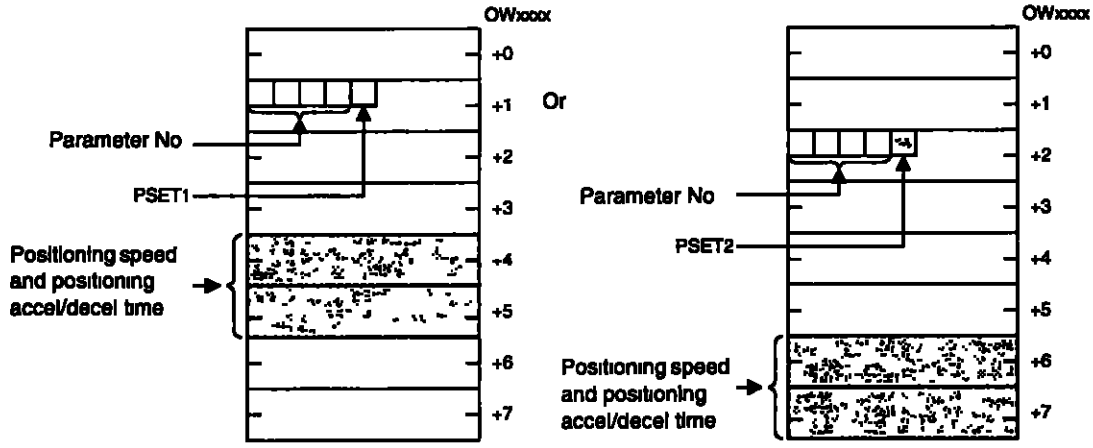


c) Turn the Parameter Set/Monitor Selector output coil (PSETn) from OFF to ON

2 Setting the positioning speed and positioning acceleration/deceleration time

a) Set the parameter number to 5 in the Parameter Number Selector output coils (PRMn0 to PRMn3)

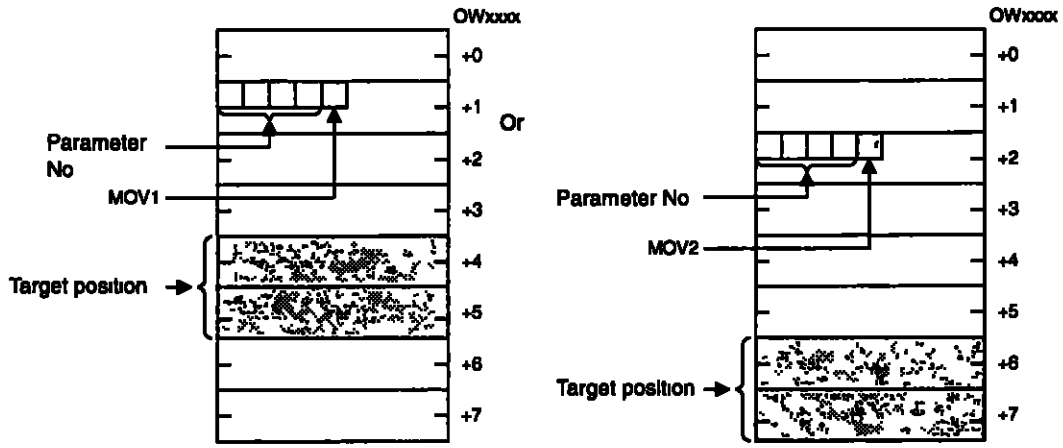
b) Set the positioning speed in the lower byte of output register Owxxxxx+4 (for channel 1) or Owxxxxx+6 (for channel 2)
Set the positioning acceleration/deceleration time in the lower byte of output register Owxxxxx+5 (for channel 1) or Owxxxxx+7 (for channel 2)



c) Turn the Parameter Set/Monitor Selector output coil (PSETn) from OFF to ON

3 Positioning Reference

a) Set the positioning target position in output registers Owxxxxx+4 and Owxxxxx+5 (for channel 1) or Owxxxxx+6 and Owxxxxx+7 (for channel 2)



b) Turn OFF the following output coils

- Cancel (CANn)
- JOG Operation (JOGn)
- Zero Point Return (ZRNn)

c) Turn the Positioning Reference output coil (MOVn) from OFF to ON

d) Cancel

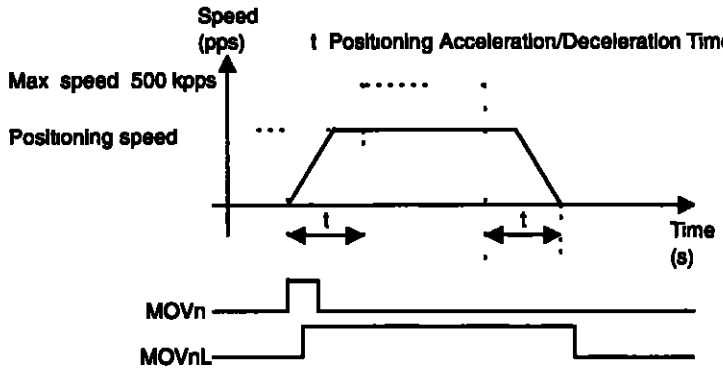
To cancel positioning, turn the Cancel output coil (CANn) from OFF to ON during positioning

4 Positioning completed

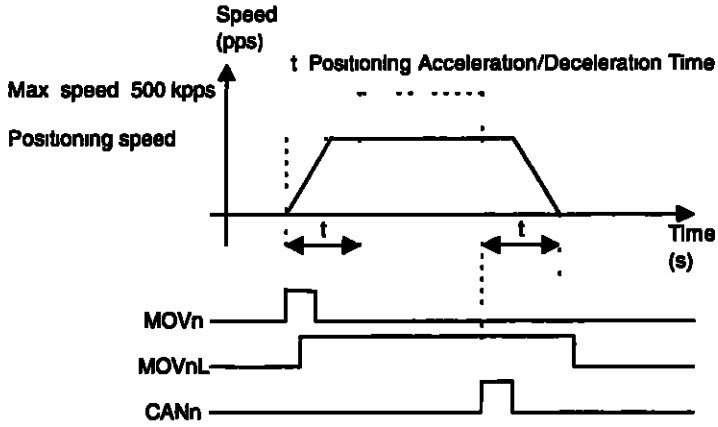
■ Timing Charts

The following timing charts show the operation of the positioning function

Keep MOVn ON until MOVnL goes from OFF to ON Turn MOVn OFF after MOVnL has gone ON



The following timing chart shows the cancel operation



■ Sample Program

A sample positioning program is shown below

```
MPS101 "1"
        "Program for CH1,
        ,
        ow32=2000h,          "Reset output coils
        ob324=1,             "Set positioning parameters
        ob326=1,

        ow34=mw30020,        "Positioning speed
        ow35=mw30021,        "Positioning accel/decel time
        ,
        ob323=1,             "ON to set parameters
        iow ib224==1,        "Parameter settings completed

        ob323=0,             "OFF to stop setting parameters
        ,
        ob324=0,
        ob326=0,
        ,
        ,
        tim t4,
        o134=m130022,        "Set target position
        tim t2,,

        ob328==1,            "Start positioning
        "tim t2,,,
        IOW IB228==1,        ,
```

```
ob328=0,
iOW IB228==0,        "Wait to reach target position
o134=0,              "Reset target position to 0
ret,
```

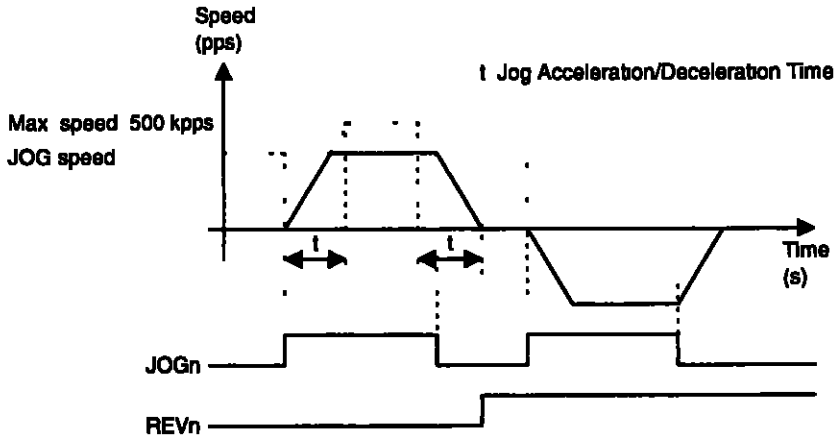
8.6.3 Jog Operation

■ Overview

Outputs pulses at the set speed and direction while the JOGn signal is ON

The acceleration/deceleration time is set in the parameters

The JOG speed and JOG direction are specified by the REVn signal



■ Related References

Output Coils

Use the following I/O data to execute instructions

Symbol	Signal Name	Details
JOGn *	JOG Operation	This reference controls JOG operation JOG operation stops when this signal is OFF and operates when it is ON

* The letter 'n" denotes the channel number 1 or 2

Parameters

Parameter No	Parameter No Setting				Name	Setting Range	Units	Default Setting
	PRMn 3	PRMn 2	PRMn 1	PRMn 0				
02	OFF	OFF	ON	OFF	JOG speed	1 to 50000	*10 pps	500
					JOG acceleration/ deceleration time	50 to 5000	*100 ms	100

Input Relays

Symbol	Signal Name	Details
JOGnL *	JOG operation	Indicates that a JOG operation is being performed

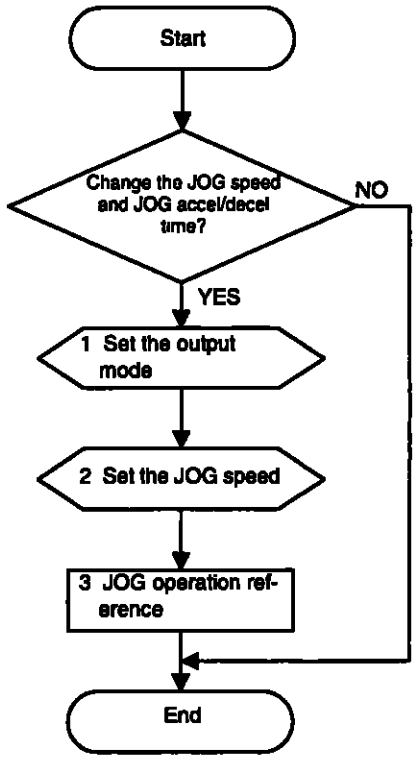
* The letter 'n' denotes the channel number 1 or 2

Command Data Configuration

Register No		Details
Channel 1	Channel 2	
1st byte	5th byte	JOG speed (lower byte)
2nd byte	6th byte	JOG speed (upper byte)
3rd byte	7th byte	JOG acceleration/deceleration time (lower byte)
4th byte	8th byte	JOG acceleration/deceleration time (upper byte)

■ Operation

Use the following procedure to perform JOG operations

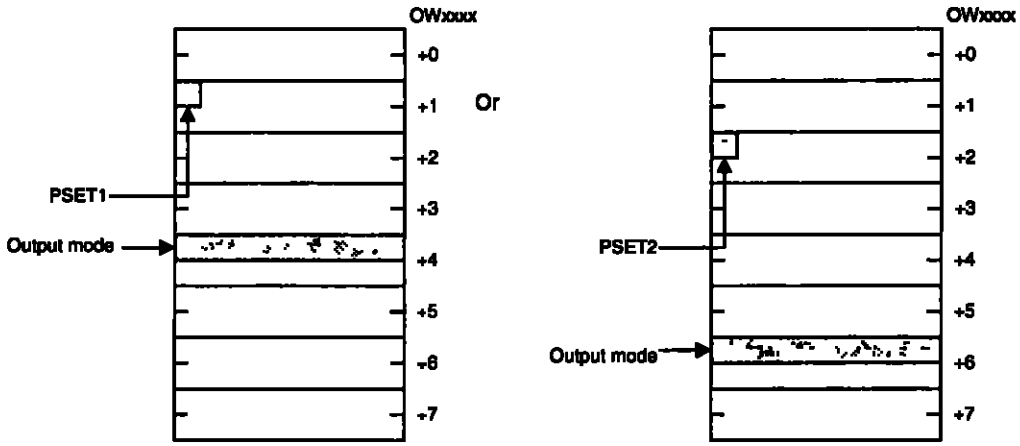


INFO Once the output mode (step 1) and JOG speed (step 2) have been set it is not necessary to set them again until there are changes

1 Selecting the Output Mode

a) Set the parameter number to 1 in the Parameter Number Selector output coils (PRMn0 to PRMn3)

b) Set the output mode in the lower byte of output register Owxxxxx+4 (for channel 1) or Owxxxxx+6 (for channel 2)



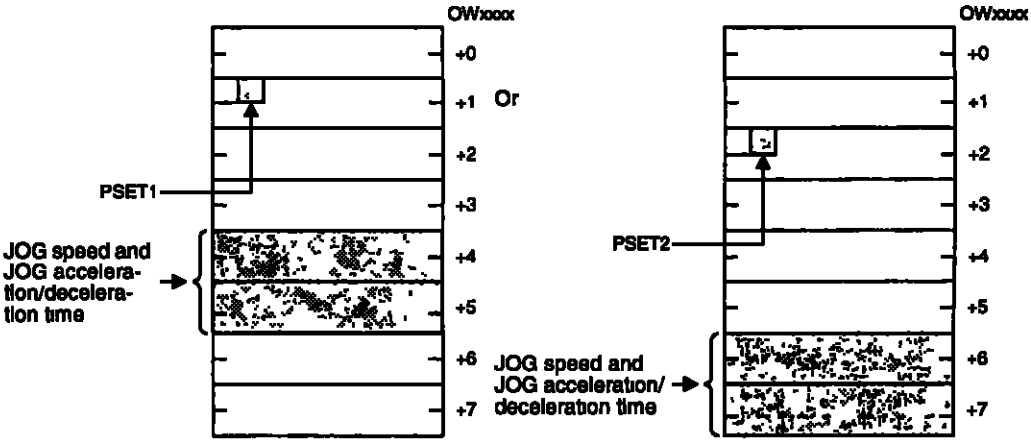
c) Turn the Parameter Set/Monitor Selector output coil (PSETn) from OFF to ON

2 Setting the JOG Speed and JOG Acceleration/Deceleration Time

a) Set the parameter number to 2 in the Parameter Number Selector output coils (PRMn0 to PRMn3)

b) Set the JOG speed in the lower byte of output register Owxxxxx+4 (for channel 1) or Owxxxxx+6 (for channel 2)

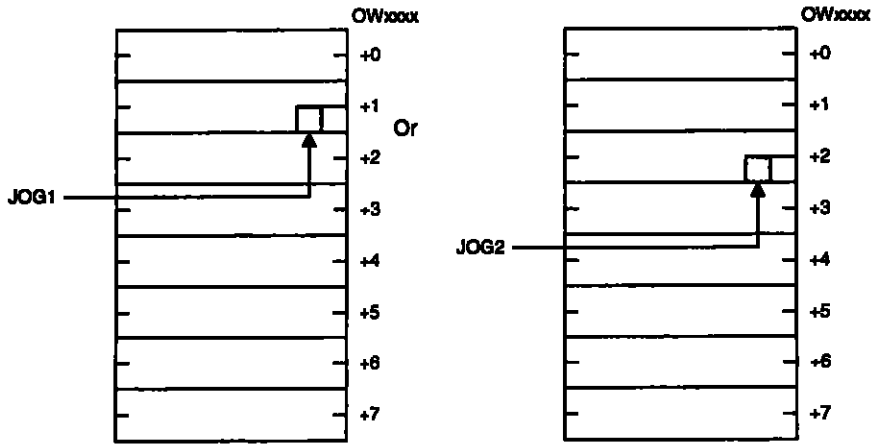
Set the JOG acceleration/deceleration time in the lower byte of output register Owxxxxx+5 (for channel 1) or Owxxxxx+7 (for channel 2)



c) Turn the Parameter Set/Monitor Selector output coil (PSETn) from OFF to ON

3 JOG Operation Reference

a) Turn the JOG Operation output coil (JOGn) from OFF to ON



b) Turn OFF the following output coils

- Cancel (CANn)
- Positioning (MOVn)
- Zero Point Return (ZRNn)

c) Cancel

To cancel jogging, turn the Cancel output coil (CANn) from OFF to ON during the JOG operation

4 Positioning completed

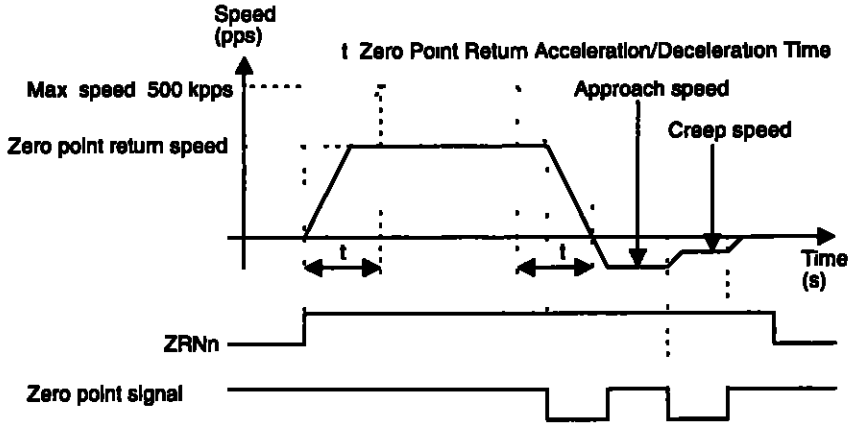
8.6.4 Zero Point Return

■ Overview

Outputs pulses at the set speed and direction when the ZRNn signal turns ON

The acceleration/deceleration time, approach speed, and creep speed are set in the parameters

The direction is specified by the REVn signal



■ Related References

Use the following I/O data to execute instructions

Symbol	Signal Name	Details
ZRNn *	Zero point return	This reference starts the zero point return operation

* The letter n denotes the channel number 1 or 2

Parameters

Parameter No	Parameter No Setting				Name	Setting Range	Units	Default Setting
	PRMn 3	PRMn 2	PRMn 1	PRMn 0				
03	OFF	OFF	ON	ON	Zero point return speed	1 to 50000	*10 pps	500
					Zero point return accel/decel time	50 to 5000	*100 ms	100
04	OFF	ON	OFF	OFF	Zero point return approach speed	1 to 50000	*10 pps	100
					Zero point return creep speed	1 to 50000	*10 pps	50

Digital Inputs

Symbol	Signal Name	Details
ZRNnL *	Zero return	Indicates that a zero point return operation is being performed

* The letter 'n" denotes channel number 1 or 2

Command Data Configuration

- Zero point return speed and zero point return acceleration/deceleration time

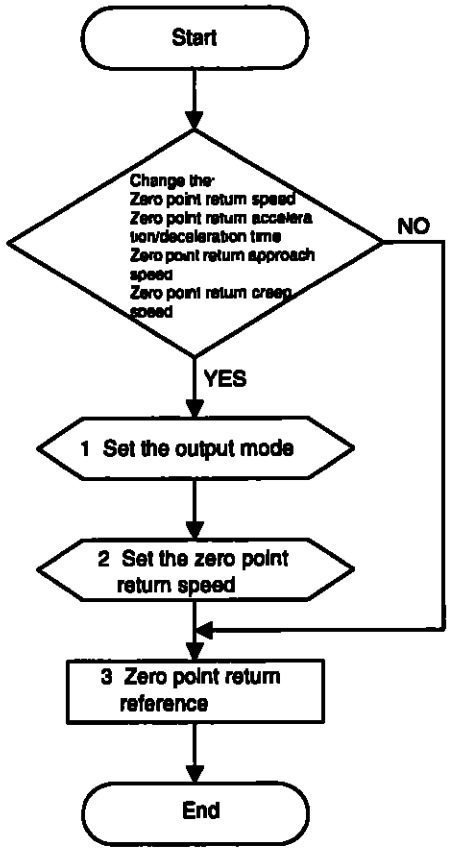
Register No		Details
Channel 1	Channel 2	
1st byte	5th byte	Zero point return speed (lower byte)
2nd byte	6th byte	Zero point return speed (upper byte)
3rd byte	7th byte	Zero point return acceleration/deceleration time (lower byte)
4th byte	8th byte	Zero point return acceleration/deceleration time (upper byte)

- Zero point return approach speed and zero point return creep speed

Register No		Details
Channel 1	Channel 2	
1st byte	5th byte	Zero point return approach speed (lower byte)
2nd byte	6th byte	Zero point return approach speed (upper byte)
3rd byte	7th byte	Zero point return creep speed (lower byte)
4th byte	8th byte	Zero point return creep speed (upper byte)

■ Operation

Use the following procedure to perform the zero point return operation



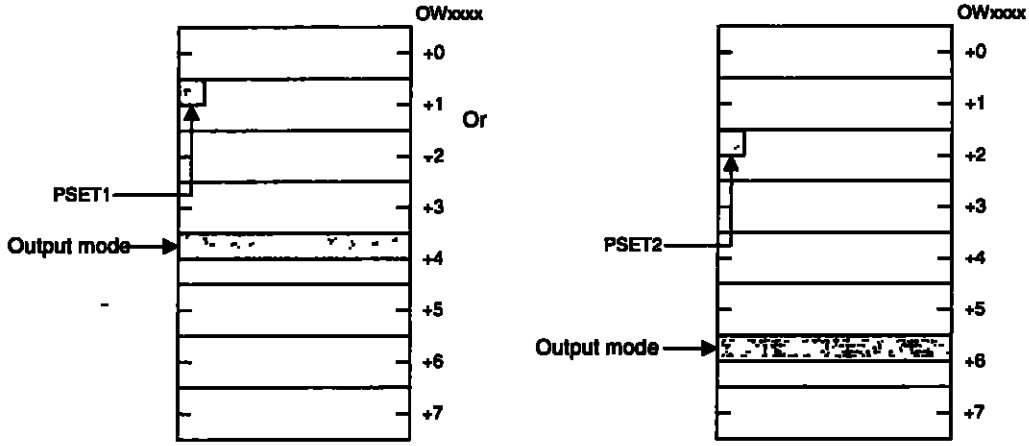
INFO

Once the output mode (step 1) and zero point return speed (step 2) have been set, it is not necessary to set them again until there are changes

1 Selecting the Output Mode

a) Set the parameter number to 1 in the Parameter Number Selector output coils (PRMn0 to PRMn3)

b) Set the output mode in the lower byte of output register Owxxxxx+4 (for channel 1) or Owxxxxx+6 (for channel 2)



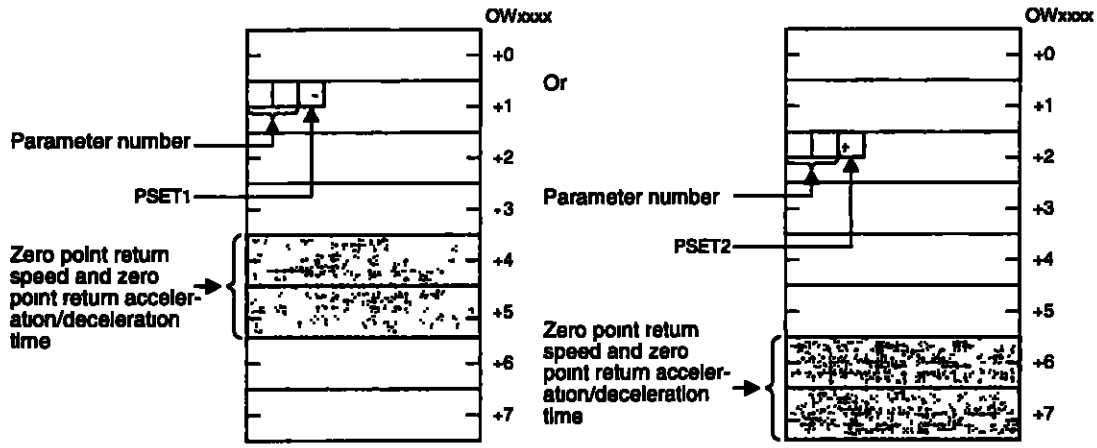
c) Turn the Parameter Set/Monitor Selector output coil (PSETn) from OFF to ON

2 Setting the Zero Point Return Speed and Zero Point Return Acceleration/Deceleration Time

a) Set the parameter number to 3 in the Parameter Number Selector output coils (PRMn0 to PRMn3)

b) Set the zero point return speed in output register Owxxxxx+4 (for channel 1) or Owxxxxx+6 (for channel 2)

Set the zero point return acceleration/deceleration time in output register Owxxxxx+5 (for channel 1) or Owxxxxx+7 (for channel 2)



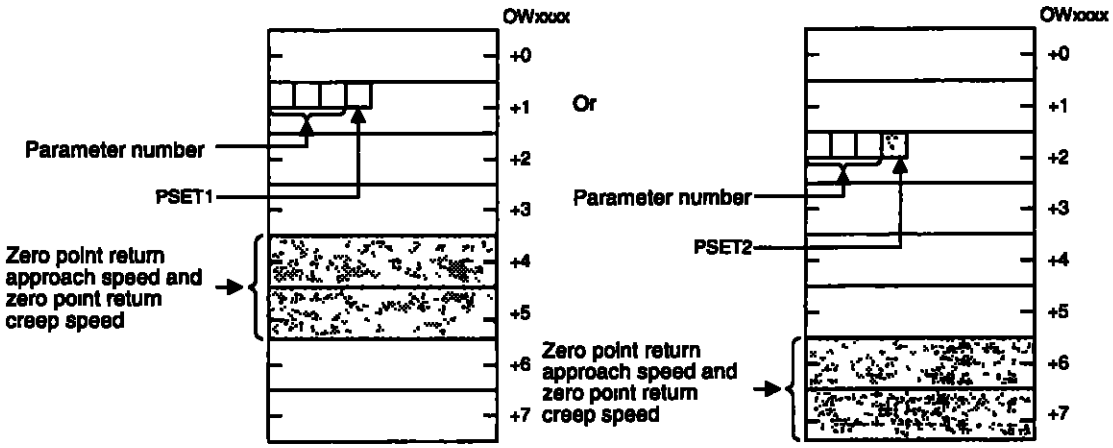
c) Turn the Parameter Set/Monitor Selector output coil (PSETn) from OFF to ON

3 Setting the Zero Point Return Approach Speed and Zero Point Return Creep Speed

a) Set the parameter number to 4 in the Parameter Number Selector output coils (PRMn0 to PRMn3)

b) Set the zero point return approach speed in output register Owxxxxx+4 (for channel 1) or Owxxxxx+6 (for channel 2)

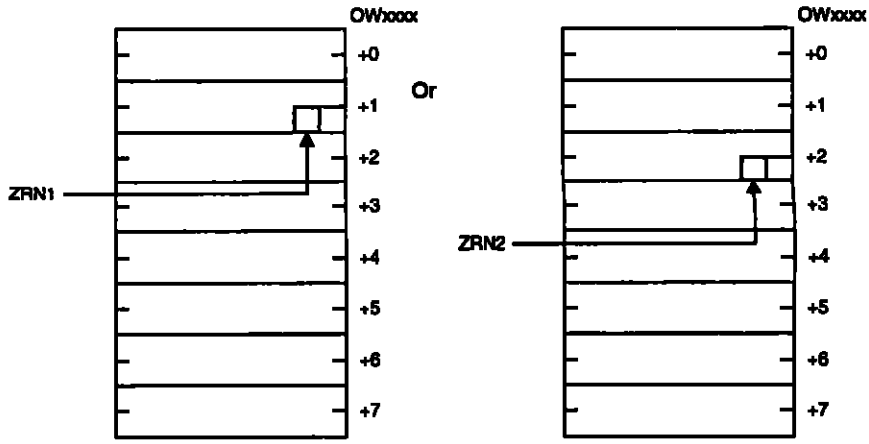
Set the zero point return creep speed in output register Owxxxxx+5 (for channel 1) or Owxxxxx+7 (for channel 2)



c) Turn the Parameter Set/Monitor Selector output coil (PSETn) from OFF to ON

4 Zero Point Return Reference

a) Turn the Zero Point Return output coil (ZRNn) from OFF to ON



b) Turn OFF the following output coils

- Cancel (CANn)
- Positioning (MOVn)
- JOG Operation (JOGn)

c) Cancel

To cancel the zero point return, turn the Cancel output coil (CANn) from OFF to ON during the operation

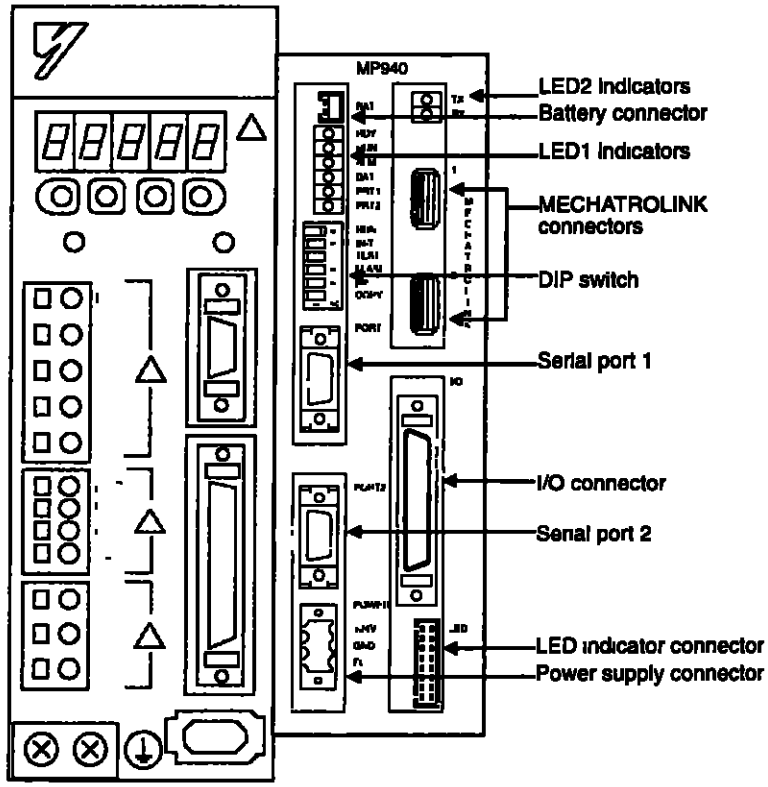
5 Positioning completed

9 MP940 Module

This chapter provides an outline of the MP940 Module, which can be connected using a MECHATROLINK Interface

9.1 External Appearance and Configuration

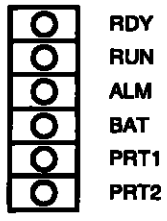
The following diagram shows the MC400-Series MP940 Module's external parts



■ LED Indicators

LED1

LED1 indicators show the Module s status



Indicator Name	Indicator Color	Meaning When Lit or Flashing
RDY	Green	System operating normally
RUN	Green	Program running
ALM	Red	Lit Minor system failure occurred Flashing System fault or failure occurred
BAT	Red	Battery needs replacing
PRT1	Green	Serial port 1 sending data
PRT2	Green	Serial port 2 sending data.

LED2

LED2 indicators show the MECHATROLINK's status

Indicator Name	Indicator Color	Meaning When Lit
TX	Green	Sending data
RX	Green	Receiving data

■ Battery Connector

Connects a backup battery for the program memory

- Connector model DF3-2P-2DS (HIROSE)
- Battery ER6VLY + DF3 CONNECTOR

Terminal Name	Function
BAT IN	Battery input
GND	Terminal ground

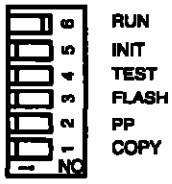
■ DIP Switch

The DIP switch consists of six pins The pins are numbered from 1 to 6, as shown in the diagram

Each pin turns ON when it is moved to the right

The pin settings are enabled the next time that the power supply is turned ON

Each pin's function is shown in the following table



Pin No	Name	Setting	Function	Default
6	RUN	ON	Program executed	ON
		OFF	Program stopped	
5	INIT	ON	SW4 OFF ON Memory cleared	OFF
		OFF	SW4 OFF ON Setting prohibited	
4	TEST	ON	Terminal mode/initialization mode	OFF
		OFF	Online	
3	FLASH	ON	Program copied from flash memory to RAM	OFF
		OFF	Program not copied from flash memory to RAM	
2	PP	ON	Defaults for serial port 1 only *	OFF
		OFF	Serial port 1 is a CP-717 connection port when this pin is OFF	
1	COPY (only valid when pin 3 is ON)	ON	M-register copy from flash memory provided	OFF
		OFF	M-register copy from flash memory not provided	

* Turn ON this pin when communicating with a MEMOBUS device using the communications parameters defined in the Module configuration. If this pin is ON but the communications parameters have not been defined, the default setting (i.e., CP-717 connection port settings) will be used.

■ Serial Port 1

The MP940 can communicate with communications devices on the MEMOBUS Network by means of RS-232C via serial port 1.

You can also connect to serial port 1 a CP-717 Programming Device (a personal computer equipped with an RS-232C interface) (PP operation).

■ Serial Port 2

Use this port for RS-422/485 connections.

■ Power Supply Connector

Use this connector to supply a 24-VDC power supply to the MP940 Module.

■ MECHATROLINK Connector

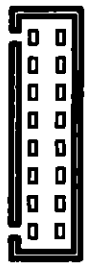
Use this connector to connect distributed I/O via MECHATROLINK.

■ I/O Connectors

Use the I/O Connectors to connect the MP940 Module to external input signals, analog outputs and pulse inputs.

■ LED Connectors

By connecting to the LED indicator block shown below, you can display the DI/DO status connected to the I/O Connectors.



LED

No	Signal Name	Remarks	No	Signal Name	Remarks
1	VCC	5-V power supply	2	-	
3	-		4	LED0*	
5	LED1*		6	-	
7	LED2*		8	LEDPW0	
9	LEDPW3		10	LEDPW2	
11	LED3*		12	LED4*	
13	LED5*		14	LEDPW1	
15	LED7*		16	LED6*	

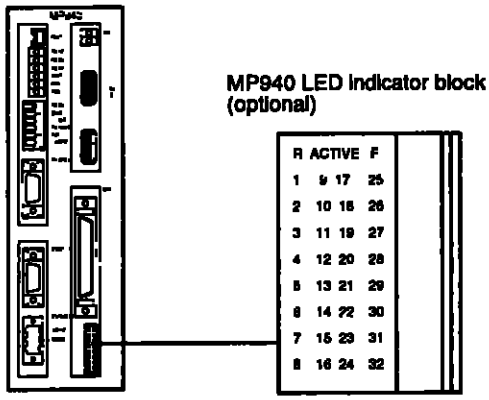


Fig 9 1 LED Indicator Block Diagram

9.2 Specifications and Functions

■ General Specifications

The general specifications of the MP940 Module are shown below

Table 9 1 General Specifications of MP940 Modules

Item		Specifications
Environmental Conditions	Ambient Operating Temperature	0 to 55°C
	Storage Temperature	-20 to 85°C
	Operating Humidity	30% to 95% (with no condensation)
	Storage Humidity	5% to 95% (with no condensation)
	Pollution Level	Pollution level 1 according to JIS B 3501
	Corrosive Gas	No combustible or corrosive gas
	Operating Altitude	Less than 2,000 m above sea level
Electrical Operating Conditions	Noise Resistance	1 500 Vp-p in either normal or common mode with pulse widths of 100 ns and 1 μs and rise time of 1 ns (with impulse noise simulator) (conforming to JIS B 3502)
Mechanical Operating Conditions	Vibration Resistance	10 to 57 Hz with half-amplitude of 0 075 mm 57 to 150 Hz at fixed acceleration of 9 8 m/s^2 10 sweeps in the X, Y, and Z directions (sweep period 1 octave/min) (conforming to JIS B 3502)
	Shock Resistance	Conforming to JIS B 3502 Peak acceleration of 147 m/s^2 twice for 11 ms in the X Y and Z directions
Installation Requirements	Ground	Ground to 100 Ω max
	Cooling Method	Natural cooling

■ Hardware Specifications

The hardware specifications of the MP940 Module are shown in the following table

Table 9 2 Hardware Specifications of the MP940 Module

Item	Specifications
Name	MP940 Module
Model Number	JEPMC-MC400

Item		Specifications
Communi-cation Ports	RS-232C 1 port	Baud rate 9 6 K or 19 2 Kbps MDR-14 (special pin assignments) Protocols MEMOBUS, No-protocol, or MELSEC communications
	RS-422/485 1 port	Baud rate 9 6 K or 19 2 Kbps MDR-14 (special pin assignments) Protocols MEMOBUS, No-protocol, or MELSEC communications
Indicators (LED)	Module Status LED Indicators	READY (Green) RUN (Green) ALM (Red) BATALM (Red) PRT1 (Green) PRT2 (Green)
	MECHATROLINK Operation Status LED Indicators	RX (Green) TX (Green)
Setting Switches		Mode setting DIP switch RUN/STOP INITIAL TEST FLASH PP_INIT MREG_CPY
Input Signal	Number of Inputs	8 points/common
	Input Format	Sinking or sourcing
	Input Type	Type 1 (JIS-B3501)
	Isolation Method	Photocoupler
	Working Voltage	17 4 to 28 8 VDC 35 VDC (peak)
	Rated Current	5 3 mA
	Input Impedance	Approx 4 4 kΩ
	Operating Voltages	ON voltage 15 VDC min OFF voltage 5 VDC max
	OFF Current	0 9 mA max
	Response Time	OFF to ON 0 5 ms or less ON to OFF 1 5 ms or less

Item		Specifications
Output Signals	Number of Outputs	8 points/common
	Output Format	Sinking
	Output Type	Transistor output
	Isolation Method	Photocoupler
	Load Voltage	19 2 to 28 8 VDC 35 VDC (peak)
	Load Current	0 1 A/circuit 0 8 A/common
	ON Voltage	1 0 V max
	External Power Supply	24 VDC ±20%, 15 mA
	Output Protection	1 fuse per common
	Fuse Rating	1 5 A (opening time 5 seconds max at 3A)
	Response Time	OFF to ON 0 25 ms or less ON to OFF 1 ms or less
Pulse Inputs	Input Circuit	5 V differential maximum 1 MHz input
	Input Method	Phase-A and phase-B inputs (×1, ×2, or ×4 multiplication), A/B mode, sign mode, up-down mode
	Counter Latch	External signal can be switched between 5 V, 12 V, and 24 V
Analog Inputs		SGDH SERVOPACK
Analog Outputs	Resolution	16 bits
	Output Range	0 to ±10 V
Power Supply Input	Input Signal	24 VDC ±20% (19 2 to 28 8 VDC)
	Input Current	0 4 A
	Fuse Rating	1 5 A
	Safety Standards	Conforming to UL and CSA standards
Dimensions (mm)		44 × 142 × 128 (W × H × D)

■ Motion Control Function Specifications

The motion control function specifications of the MP940 are shown in the following table

Table 9 3 MP940 Motion Control Function Specifications

Item		Specifications
Number of Controlled Axes		1 axis
Control Specifications	PTP Control	Linear, rotary, and infinite-length axes
	Interpolation	Linear
	Speed Reference Output	Available
	Torque Reference Output	Available
	Position Control	Positioning, external positioning, zero point return, interpolation, interpolation with position detection function, fixed speed feed, fixed length feed
	Phase Control	Available
Position Control	Reference Unit	mm inch deg, pulse
	Reference Unit Minimum Setting	1, 0 1, 0 01, 0 001, 0 0001, 0 00001
	Maximum Programmable Value	-2147483648 to +2147483647 (signed 32-bit value)
	Speed Reference Unit	mm/min, inch/min, deg/min, pulse/min
	Acceleration/ Deceleration Type	Linear, asymmetric, S-curve
	Overnde Function	0 01% to 327 67%
Coordinate System		Rectangular coordinates
Zero Point Return		Eight types • DEC1 + phase C • DEC1+ZERO • DEC2 + phase C • DEC2+ZERO • DEC1+LMT • DEC1+LMT+ZERO • Phase C • ZERO
Programming	Language	Special motion language ladder program
	Number of Tasks	Up to eight programs can be executed in parallel
	Number of Programs	Up to 32
	Program Capacity	80 Kbytes
Applicable SERVOPACK		Analog SGDH-□□AE
Encoder		Incremental or absolute
Speed Control	Speed Reference	-327 68% to 327 67%/Rated speed Torque control function available
	Acceleration and Deceleration Type	Linear, assymmetrical, S-curve (travel average)
Torque Control	Torque Reference	-327 68% to 327 67%/Rated torque Speed control function available

Item		Specifications
Phase Control	Speed Reference Units	-327.68% to 327.67%/Rated speed
	Speed Compensation	-327.68% to 327.67%/Rated speed
	Position Compensation	-2147483648 to 2147483647 pulse
Commands		Axis Move Commands 5 commands MOV, MVS, ZRN, SKP, EXM Basic Control Commands 5 commands ABS, INC, POS, MVM, PLD Speed and Acceleration/Deceleration Commands 8 commands ACC, DCC, SCC, VEL IAC, IDC, IFP FMX High-level Control Commands 4 commands PFN INP SNG UFC Control Commands 10 commands MSEE, TIM IOW, END RET, EOX, IF ELSE IEND WHILE WEND, SFORK JOINTO SJOINT Math and Sequence Control Commands 32 commands = +, -, * /, MOD | ^, & !, (), S{}, R{}, SIN COS, TAN, ASN, ACS ATN SQRT, BIN, BCD == <>, >, <, >=, <=, SFR SFL, BLK CLR

10 Connections

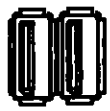
This chapter explains the connections between MECHATROLINK devices

10.1 Connections between MECHATROLINK Devices

10 1 1 MECHATROLINK Connectors

■ Connector Types

As shown in *1 3 MECHATROLINK Driver Module*, the MECHATROLINK connectors for Driver Modules differ as shown below

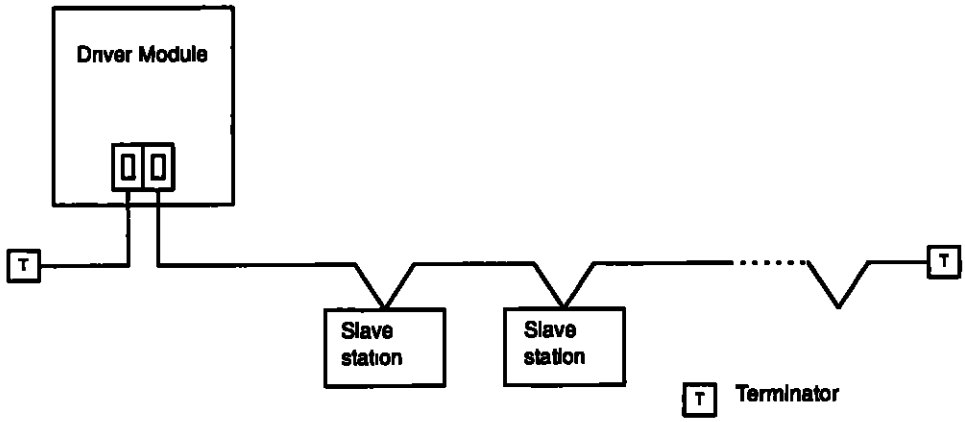
		Number of Connectors	Appearance	Connector Name	Master Station	Slave Station
MP910	ISA	2		PORT1 PORT2	Y	Y
	C-PCI	4		PORT1 PORT2	Y	Y
MP920 (SVB-01)		2		CN1	Y	Y
MP930		1		CN1	Y	\
MP940		2		MECHATROLINK1 MECHATROLINK2	Y	Y

INFO

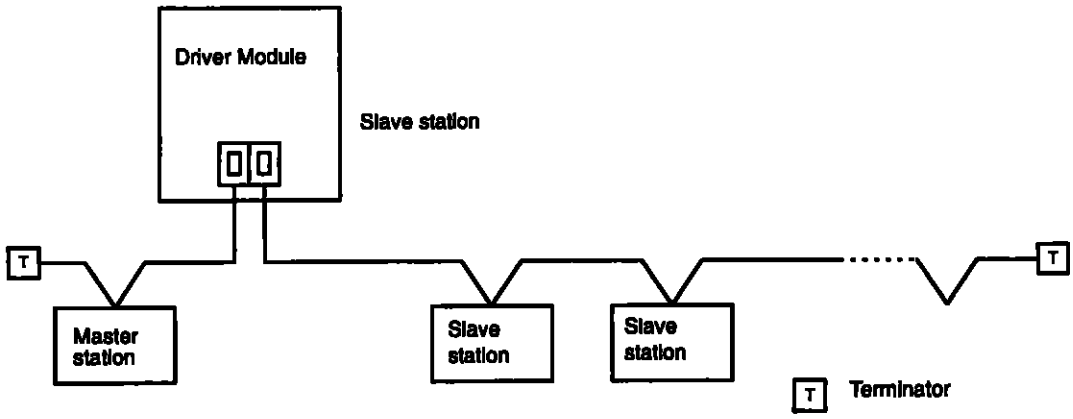
- The MP930 can be used only as a master, and not as a slave
- There are two of each type of connector built into the MP910, so you can create two independent MECHATROLINK networks
- There are two designs of MECHATROLINK connector, those that connect top and bottom, and those that connect left and right Their function, however, remains the same

■ Connection Types

Master Station



Slave Station



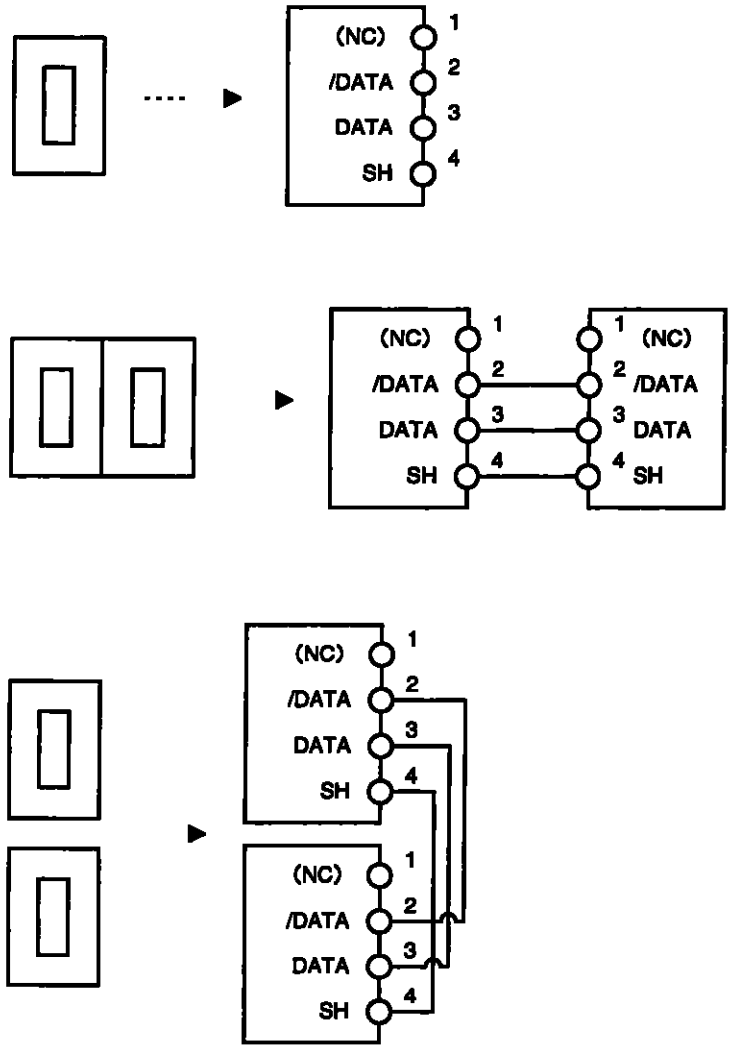
INFO

- If there is only one connector, a terminator is not required
- If there are two connectors, you can connect either Connectors that operate top to bottom and connectors that operate left to right both function the same

10

10.1.2 MECHATROLINK Cable

■ Connectors



Insert a JEPMC-W6020 USB Terminator into unused ports

Connector Specifications

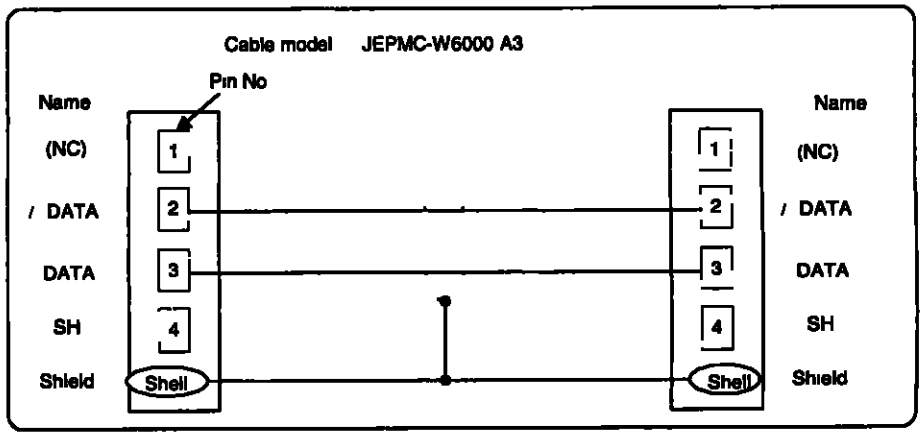
The specifications for the above connectors are shown below

Name	Number of Pins	Connector Model			Cable Model
		Module Connector	Cable Connector	Manufacturer	
MECHATROLINK Connector	4	DUSB-APA42-T11	• USB to USB type • Connector Unit DUSB-APA41-B1-C50	DDK	JEPMC-W6000-A3
			• USB to loose wire type • Connector Unit DUSB-APA41-B1-C50	DDK	JEPMC-W6010-01 JEPMC-W6010-03 JEPMC-W6010-05
			• USB Terminator • Connector Unit DUSB-APA41-B1-C50	DDK	JEPMC-W6020

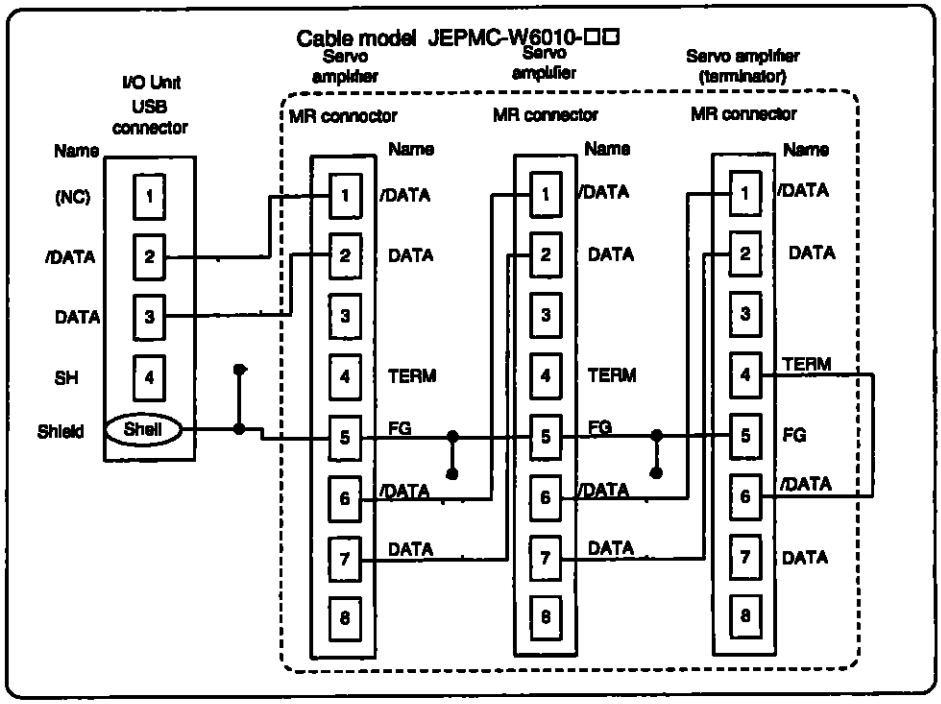
■ Cable

The internal cable connections between the following Modules are shown below

- Between Device Module and I/O Unit
- Between I/O Unit and I/O Unit
- Between Device Module and Device Module



A 1 N MECHATROLINK cable internal connection and multiple SERVOPACK connections to the Driver Module are shown below



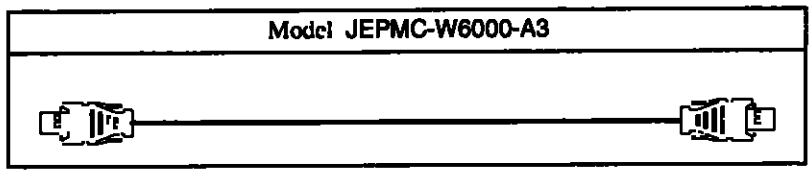
Note 1 JEPMC-6010-□□□ connects using a USB connector and a single-sided loose wire Create the 1 N cable using the MR connector and the wire material

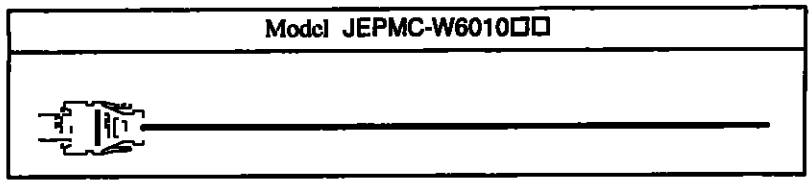
2 Red lead DATA
Black lead /DATA

3 Normally you can also wire the shield as specified in the SERVOPACK manual, but if combining the shield with the MP9□□ Series, we recommend connection as shown in the diagram

Cable Appearance

MECHATROLINK Cable





USB Terminator

Model JEPMC-W6020

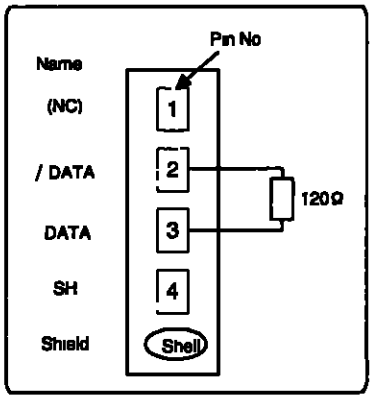



Fig 10 1 USB Terminator Wiring Diagram

■ Standard Cables List

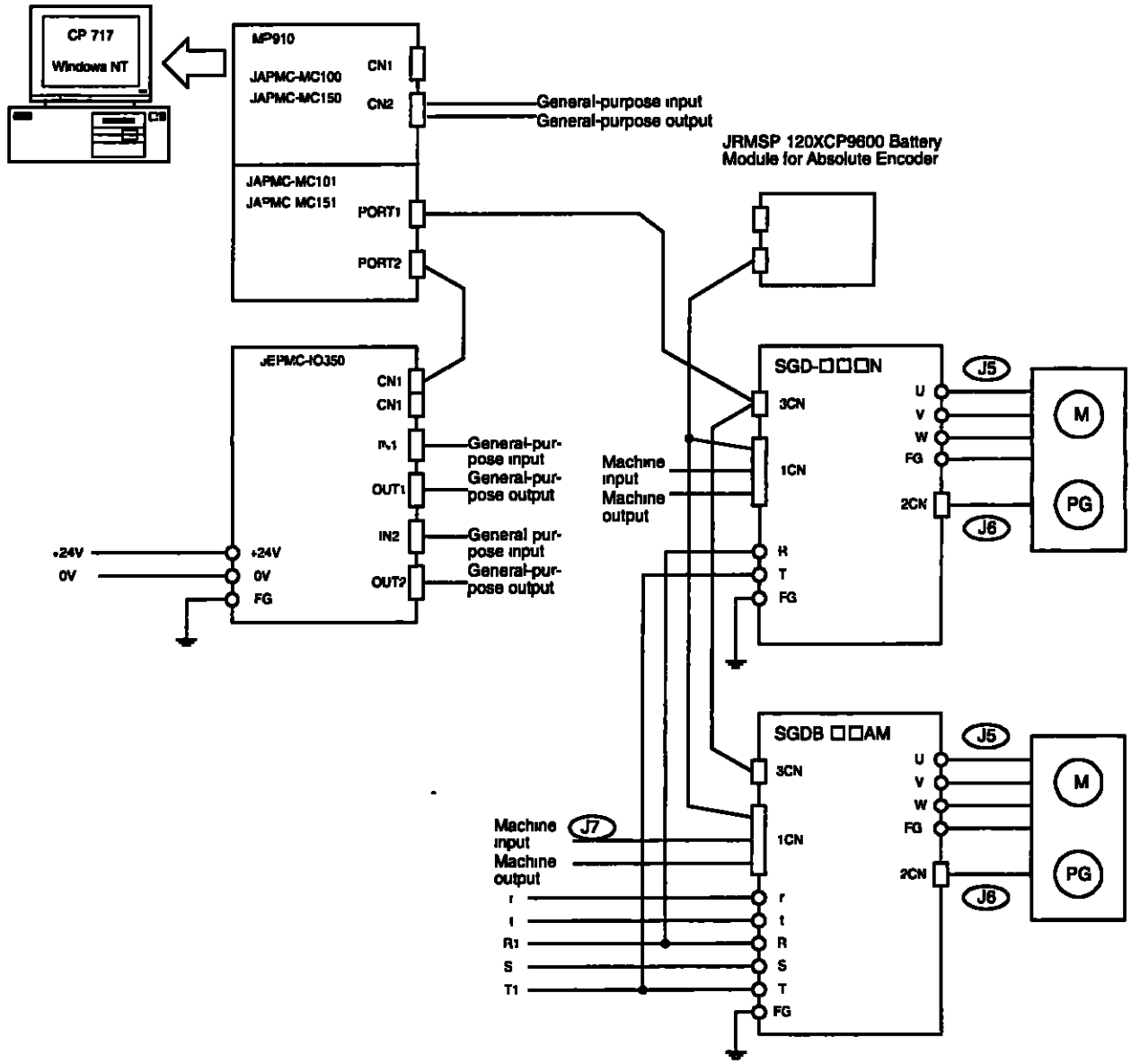
Yaskawa manufactures the following standard cables

No	Cable Name and Specifications	Model	Length
J4	MECHATROLINK Cable (MC Unit to SERVOPACK and I/O Unit to SERVOPACK) USB Connector to Loose Wire	JEPMC-W6010-01	1 m
		JEPMC-W6010-03	3 m
		JEPMC-W6010-05	5 m
	SERVOPACK Connector Kit MR Connector (8-pin, female), 1-axis	DE9411357	-
	MECHATROLINK Cable Cable wire	DE9411358-1	10 m
		DE9411358-2	20 m
		DE9411358-3	30 m
		DE9411358-4	40 m
		DE9411358-5	100 m
		DE9411358-6	200 m

10.1 3 Connection Example

■ MP910 Connection Example

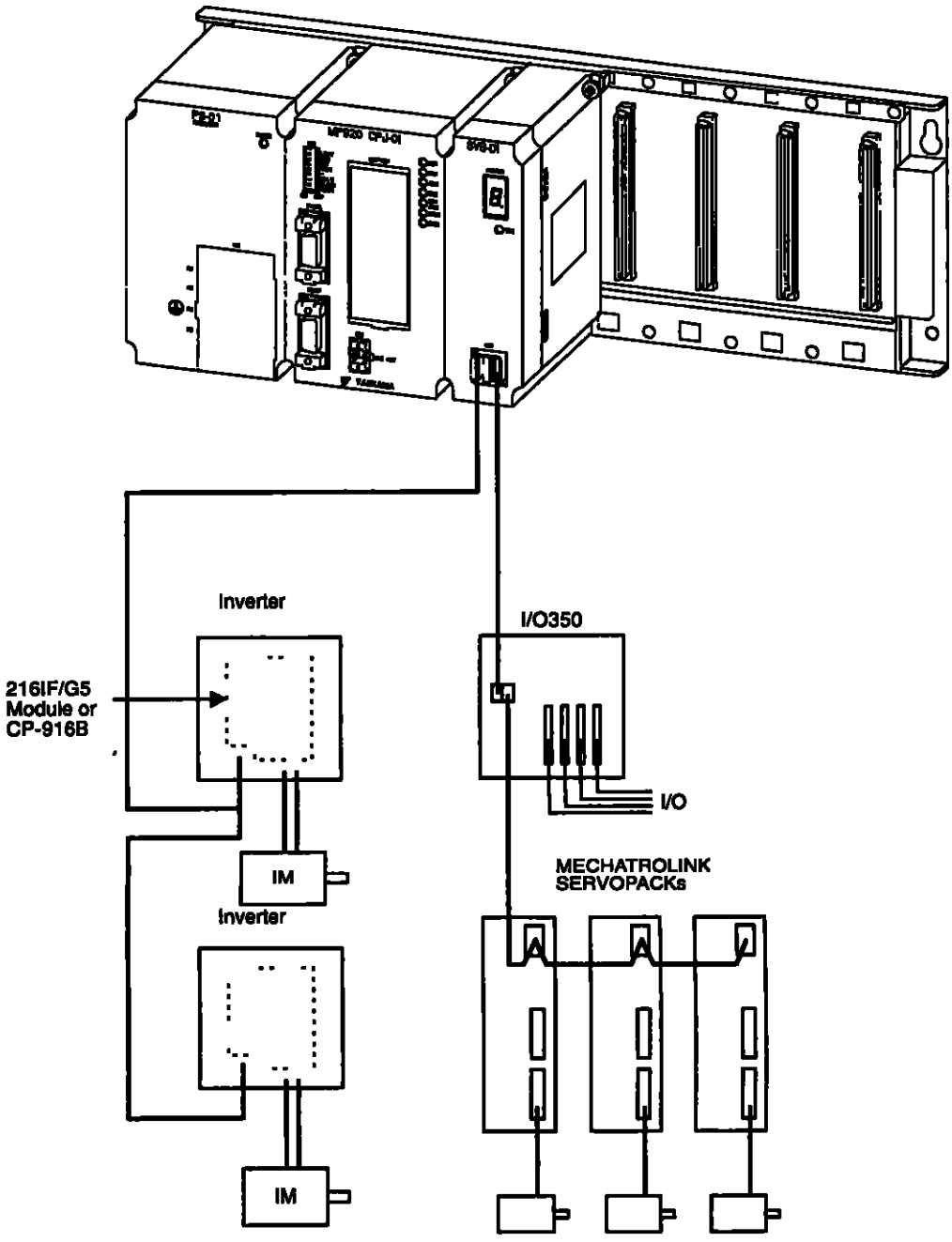
A connection example for a system using the MP910 is shown below



■ MP920 (SVB-01) Connection Example

A connection example for a system using the SVB-01 is shown below

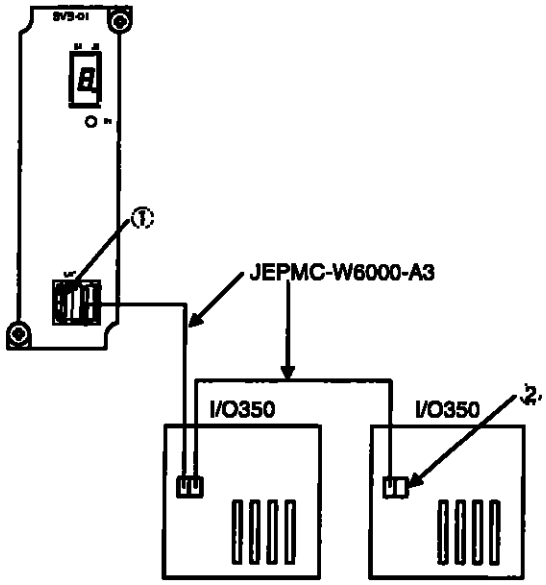
Connecting MECHATROLINK Devices



IMPORTANT

There are two connectors on the SVB-01 Module, but only one input port on MECHATROLINK Both right and left sides of the connector are the same, so it does not matter which side you connect A maximum of 14 stations can be connected

Connecting an IO350 Unit to an SVB-01 Module



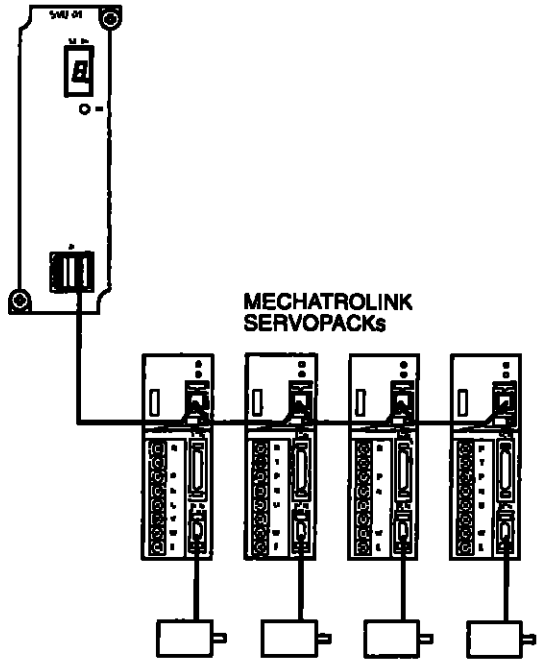
If connecting an IO350 Unit to an SVB-01 Module, or an IO350 Unit to an IO350 Unit, use a JEPMC-W6000-A3 Standard Cable

IMPORTANT

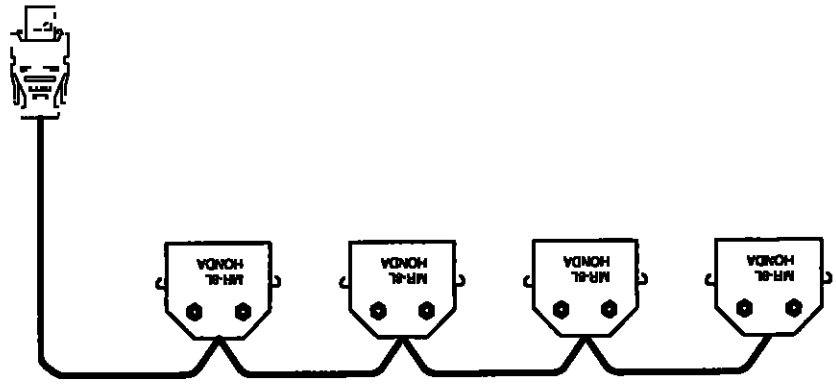
Make sure to insert a JEPMC-W6020 USB Terminator into the terminal connector (1 and 2 in the above diagram)

Refer to *10 1 2 MECHATROLINK Cable* for appearance and internal connection diagrams

Connecting Multiple MECHATROLINK SERVOPACKs



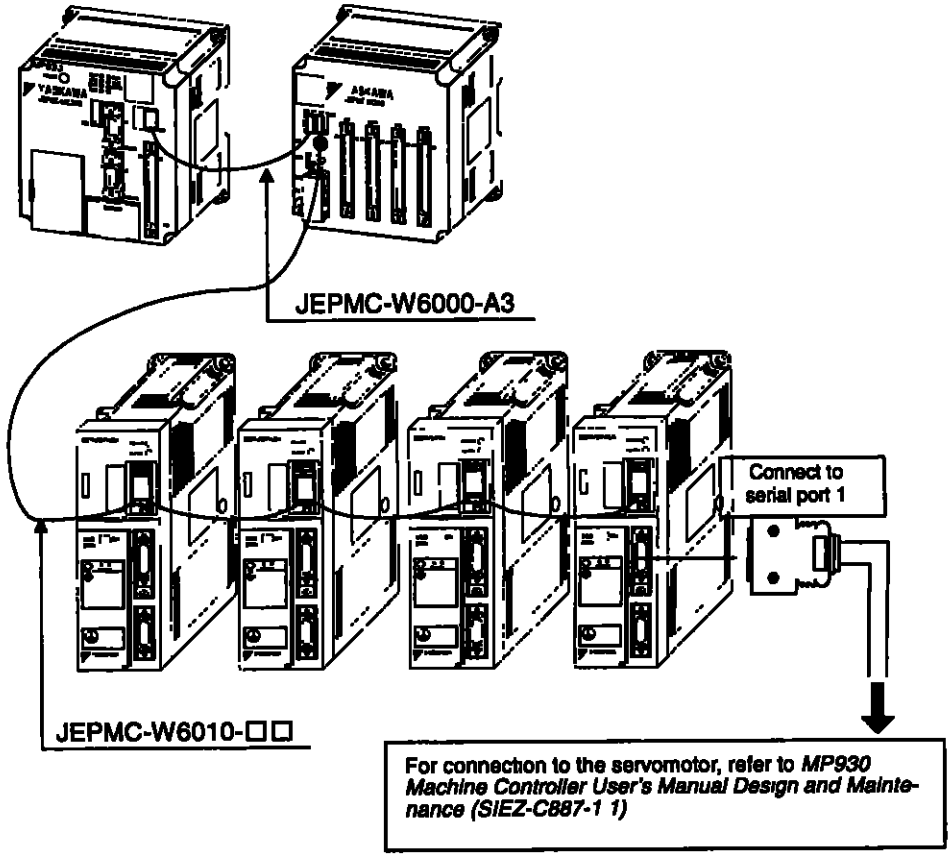
Create the connection between the SVB-01 Module and MECHATROLINK SERVOPACKs using the JEPMC-W6010-** Standard Cables, MR Connectors, and wiring material, as shown below



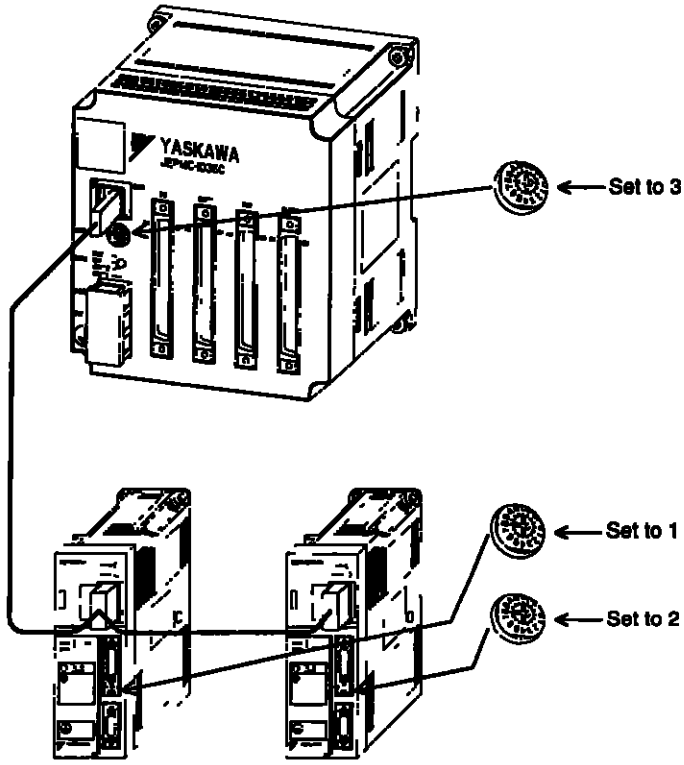
Refer to *10 1 2 MECHATROLINK Cable* for appearance and internal connection diagrams

■ MP930 Connection Example

Connect the MC Unit to the I/O Unit, and the I/O Unit to the SERVOPACKs using the following MECHATROLINK cables



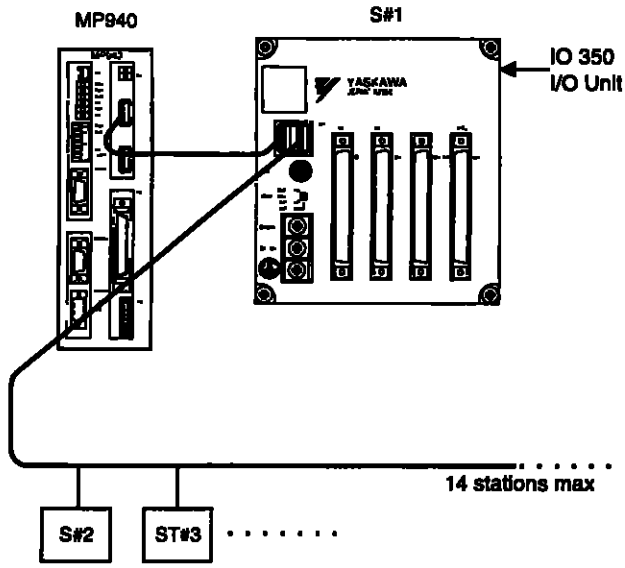
Set the SERVOPACK and I/O Unit station numbers according to the MECHATROLINK settings.



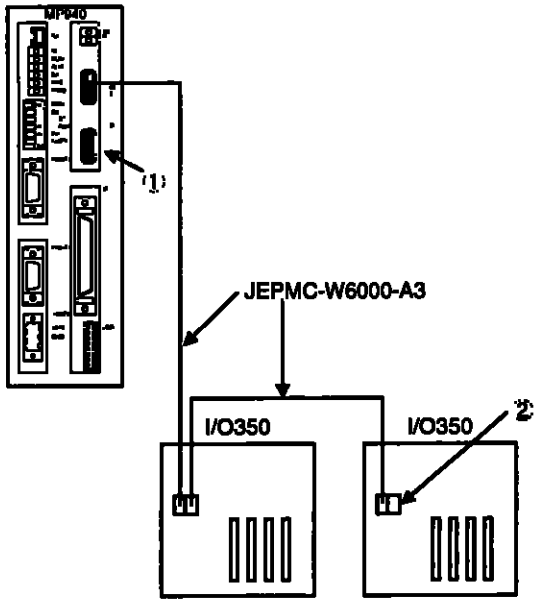
■ MP940 Connection Example

Connecting an MP940 to an I/O Unit

A connection example for the MP940 Machine Controller and a network-compatible I/O Module is shown below.



The following example shows how to connect two IO350 Units to an MP940 Module



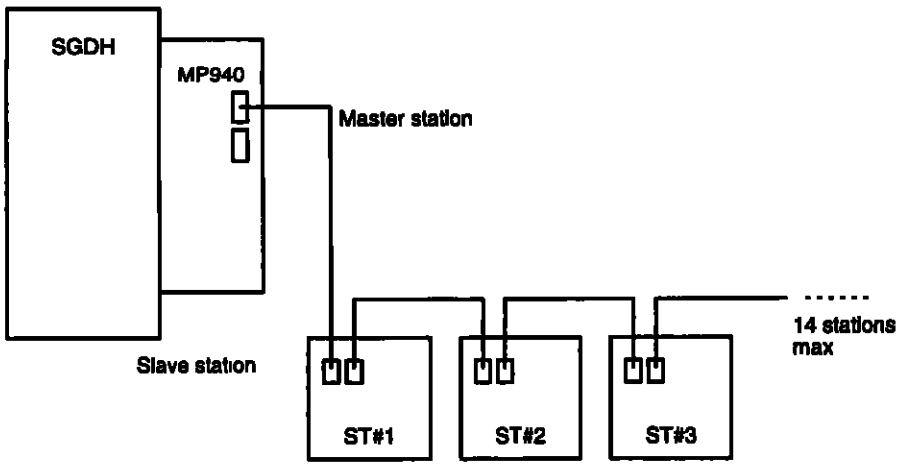
If connecting an IO350 Unit to an MP940 Module or an IO350 Unit to an IO350 Unit, use a JEPMC-W6000-A3 Standard Cable

IMPORTANT

Make sure to insert a JEPMC-W6020 USB Terminator into the terminal connector (1 and 2 in the above diagram)

Refer to *10 1 2 MLCHATROLINK Cable* for appearance and internal connection diagrams

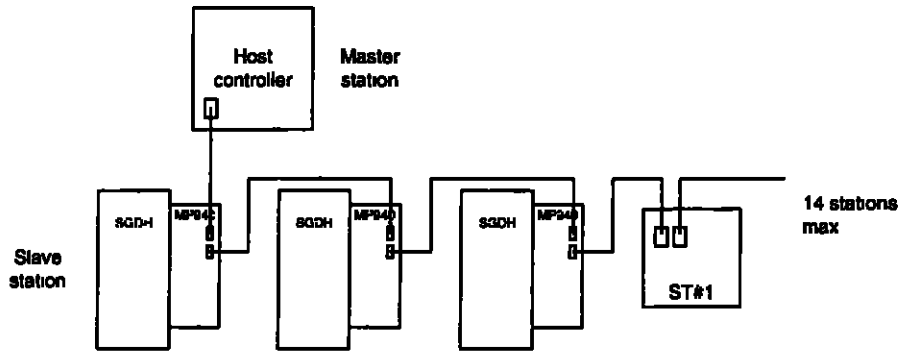
Using an MP940 as the Master Station



IMPORTANT

- Simple I/O is the only function supported by the MECHATROLINK MP940 You cannot connect a MECHATROLINK Servo or 216IF Inverter
- For connectable slaves, refer to *Chapter 1 System Overview*

Using an MP940 as a Slave



IMPORTANT If you select an MP940 as a slave, you cannot connect an IO350, Distributed I/O Unit, or other such devices

10.2 External Wiring

This section explains the external wiring

10.2.1 Wiring in a Panel

As shown below, separate the communications cable from other wiring, and wire the communications cable separately

■ Separation from Low-voltage Cables

Keep the communications cable completely separate from the low-voltage cable (recommended distance 100 mm min)

■ Separation from Operation Circuit Cables

Keep the communications cable completely separate from the operation circuit cable (recommended distance 100 mm min)

■ Separation from Main Circuit Cables

Keep the communications cable completely separate from the main circuit cables (refer to the table below), or shield the main circuit cables

Table 10 1 Recommended Separation Distance

Main Circuit	Recommended Distance
125 V, 10 A	300 mm min
250 V, 50 A	450 mm min
440 V, 200 A	600 mm min
3 to 6 kV, 800 A	1,200 mm min

10.2.2 Indoor Wiring Between Panels

This section explains how to separate the wiring when wiring between panels indoors

1 Pass the communications cable independently through a metal conduit or metal duct with no other wiring before installation

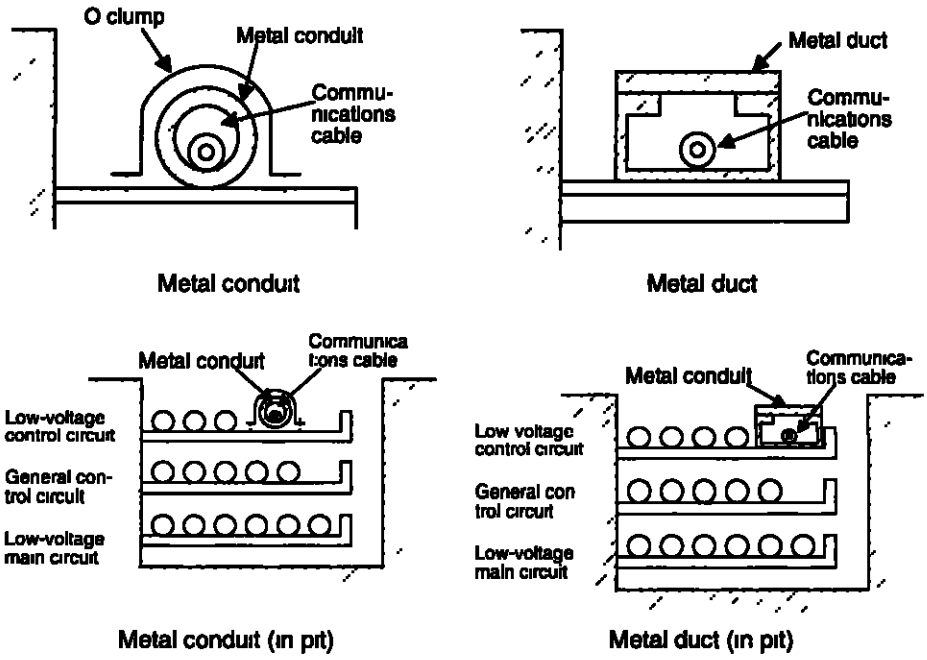


Fig 10 2 Laying the Communications Cable

2 Make sure to ground both ends of the metal conduit or metal duct, and also ground as many points as possible in between

10.2.3 Outdoor Wiring Between Panels

⃠ Prohibited

- The Distributed I/O Driver Module is not protected against lightning surge, so do not wire it overhead

There is a risk of lightning damaging the device

■ Laying the Communications Cable

For laying the communications cable, refer to *10 2 2 Indoor Wiring Between Panels* Pay particular attention to the following points

- If laying the communications cable outdoors, make sure to lay it along overground structural elements, such as a steel framing

  If there are no overground structural elements, lay the cable through an underground pit or underground tunnel, or lay an underground railing or similar structure

  The following diagram shows an example of laying a communications cable between buildings

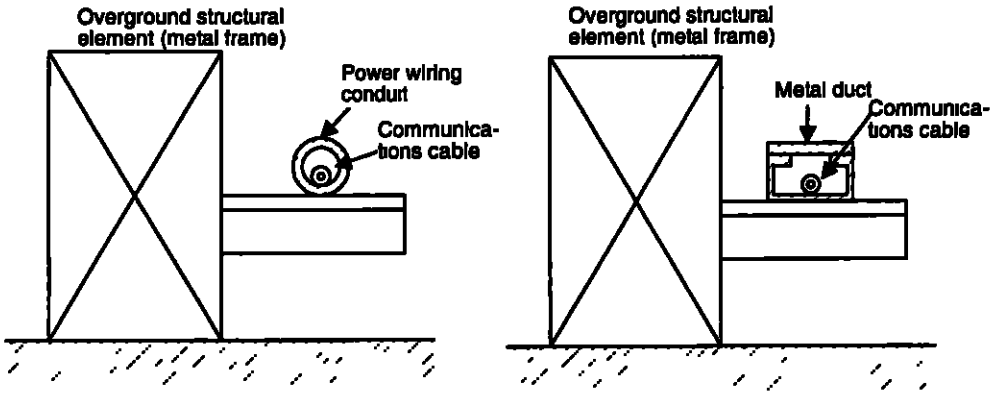


Fig 10 3 Laying the Cable Alongside Structural Elements

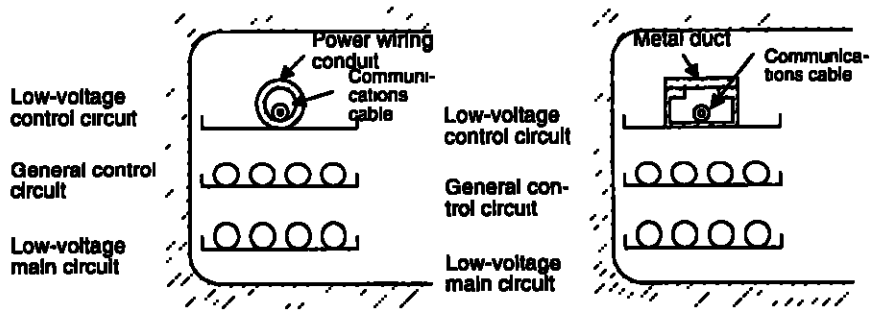


Fig 10 4 Wiring Using an Underground Pit or Underground Tunnel

- Do not string the bare communications cable overhead, because it may pick up inductive noise from airborne electrical waves, resulting in communications errors

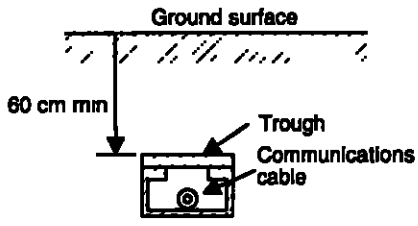


Fig 10 5 Laying the Communications Cable Underground

10 2 4 Grounding

■ Grounding Method

Mounting the Device

For the mounting base to which to mount the PLC Modules, use a base (frame) that is of one-piece metal construction

Ground Wire

Install an " E" terminal for grounding to the control panel, and then connect terminal E to the control panel case Next, connect terminal E to terminal FG on the Power Supply Module

Make sure to use a ground wire that is 8 mm^2 minimum (8 AWG) between terminal E and the ground pole, and make the wiring as short as possible

If the distance of the wiring to the ground pole is long, use a thicker ground wire to make sure that the sum total of the grounding resistance and the ground wire resistance is maintained at 100 Ω

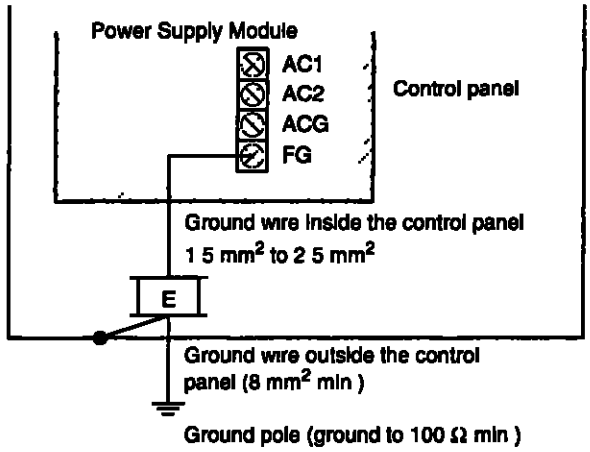


Fig 10 6 Ground Wiring

Ground Pole

Install the ground pole as close as possible to the control panel controlling the PLC and as far as possible (15 m min) from the ground poles for other power panels (Group B in the following table)

Make sure the grounding resistance is 100 Ω max

Shared Ground

As a rule, ground each PLC independently If the ground wire and ground pole need to be shared with other control panels, however, refer to the following table

Table 10 2 Shared Ground Wires and Ground Poles

Classification	Compatible Devices	Shared Ground
Group A	Computer panels, instrument control panels, I/O relay panels, general control circuits, etc	Possible
Group B	High-voltage main control panels, high capacity thyristors, etc	Not possible

Communications Cables

Use a single ground for the communications cable shield table

Metal Power Wire Conduit and Metal Ducts

Make sure to ground both ends of the metal power wire conduit or metal duct, and also ground as many points as possible in between

10 2 5 Grounding Control Panels

■ Grounding Power Panels

Do not mount PLC panels side-by-side with power panels (refer to Group B in the table on the preceding page) If grounding PLC panels near power panels is unavoidable, ground the PLC panel as far as possible from the power panel (60 cm min), and separate as far as possible the ground wire and ground pole for each

Make sure the ground wires are separated by 60 cm minimum and that the ground poles are separated by approximately 15 m

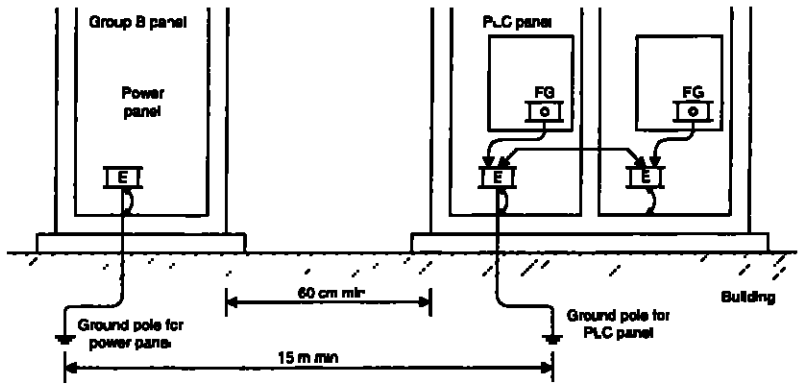


Fig 10 7 Separation from Power Panel

■ Side-by-side Mounting with Other Control Panels

You can mount PLC panels next to the Group A panels listed in the table on the previous page

If mounting panels side-by-side, however, the control panels pass power using a channel base, so to make sure of the grounding, connect a wire that is 8 mm^2 minimum between the E Terminals on the control panels

Next, wire a ground pole to one of the E terminals

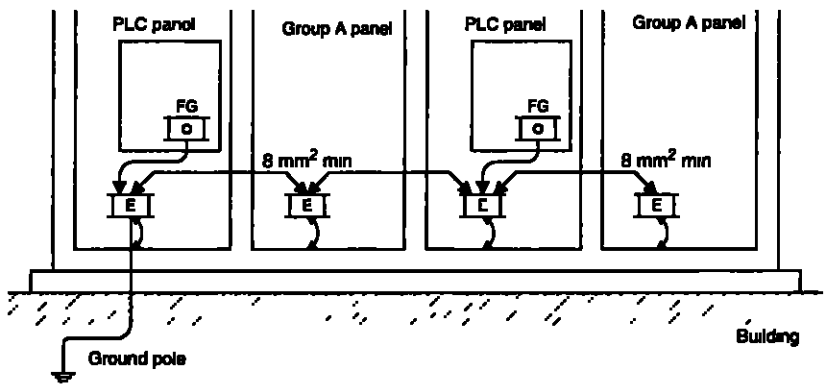


Fig 10 8 Mounting Group A Panels Side-by-side

■ PLC Panel Isolation

If grounding the PLC panel to a steel-framed building, the PLC panel will be grounded via the building, but this does not normally hinder the panel from functioning

If the PLC panel is located close to a power panel, however ground each control panel on the PLC panel separately to the building to prevent ground noise due to the ground current from the power panel

Connect terminal E on the PLC panel to the special ground pole for the PLC panel

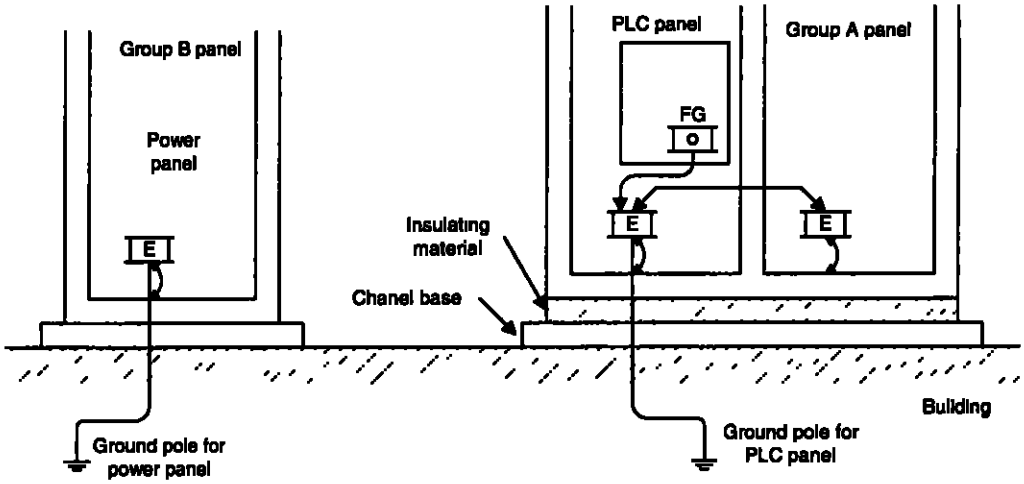


Fig 10 9 PLC Panel Isolation

A External Appearances

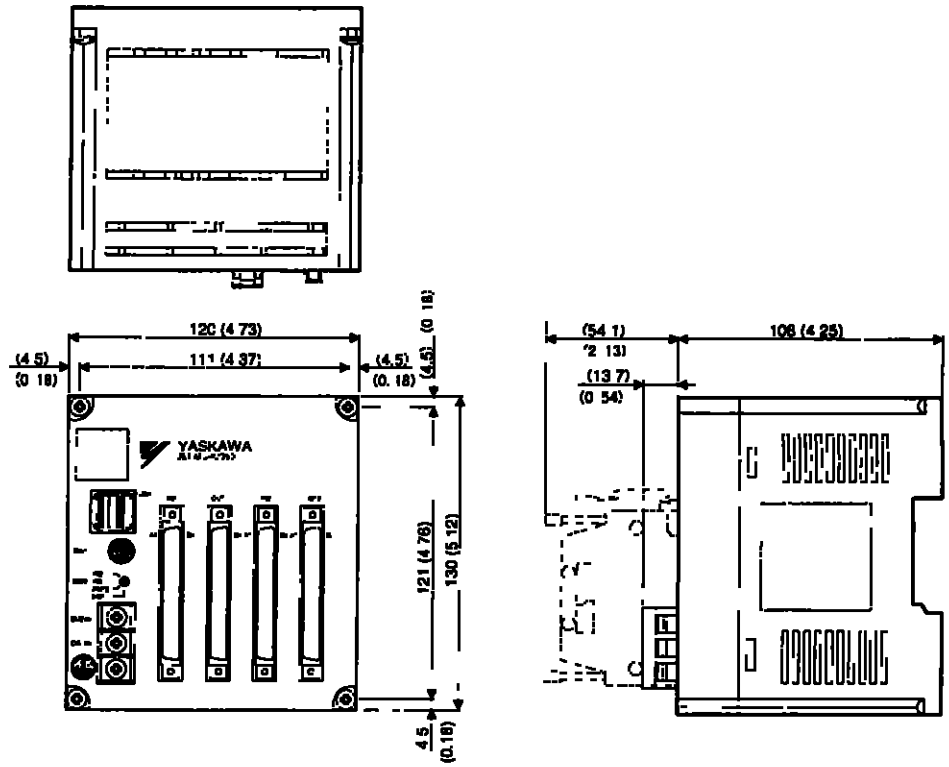
This appendix shows the external appearance of each Module

A 1 Digital I/O Modules

This section shows the external appearances of the Digital I/O Modules

■ 64-point I/O Module

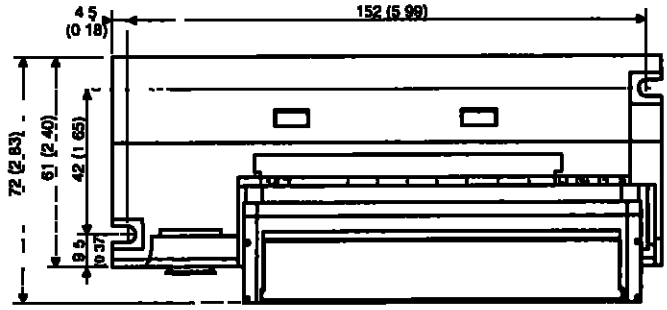
Model Number JEPMC-IO350

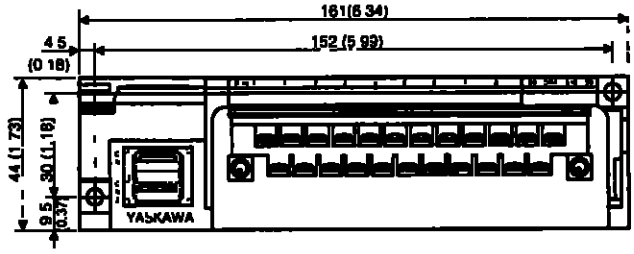


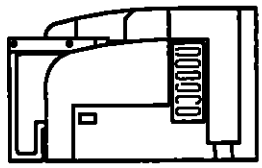
Dimensions in mm (inch)

■ Wide-voltage 8-point Output Module

Model Number JAMSC-120DRA83030



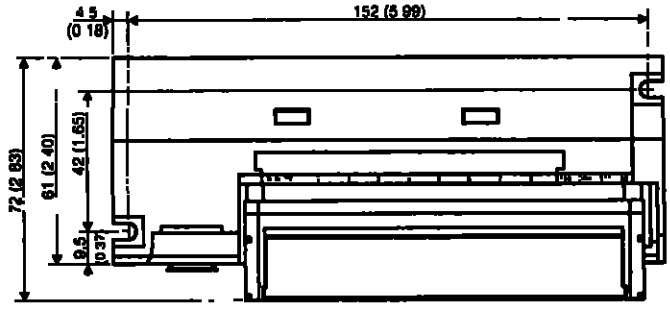


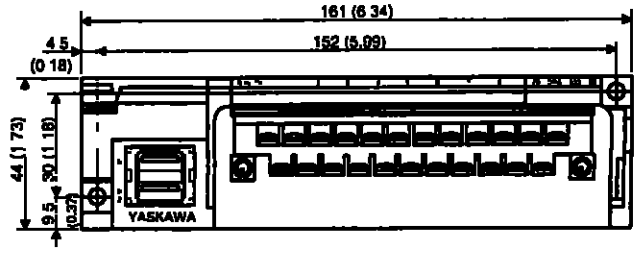


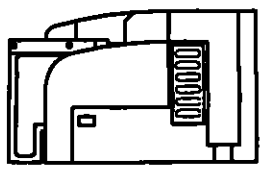
Dimensions in mm (inch)

■ 100-VAC 8-point Input Module

Model Number JAMSC-120DAI53330



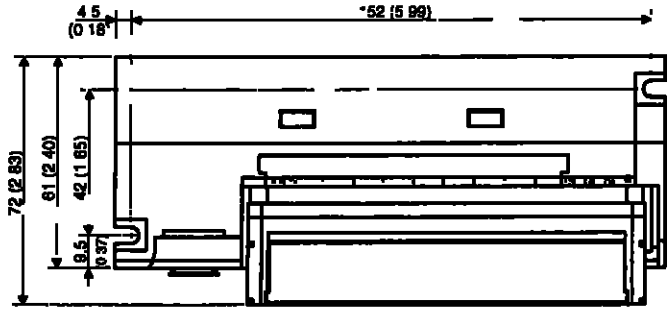


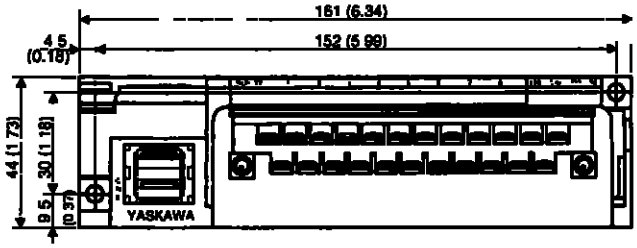


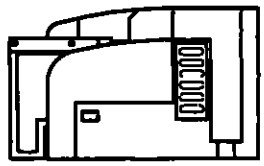
Dimensions in mm (inch)

■ 200-VAC 8-point Input Module

Model Number JAMSC-120DAI73330



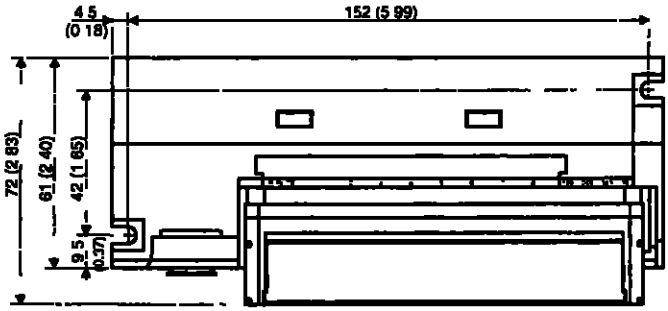


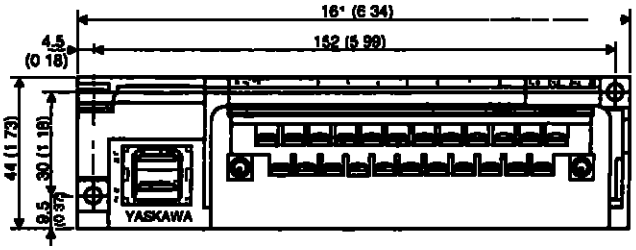


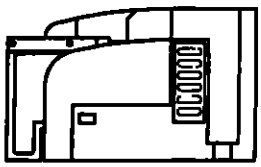
Dimensions in mm (inch)

■ 12/24-VDC 16-point Input Module

Model Number JAMSC-120DDI34330



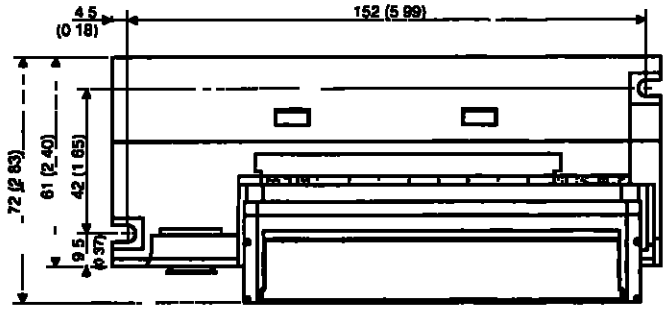


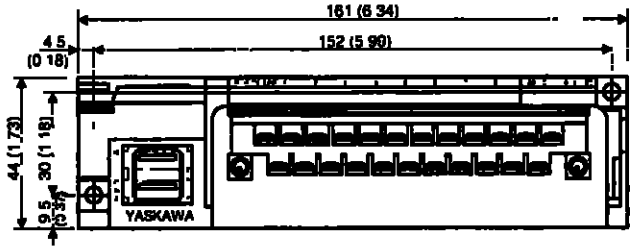


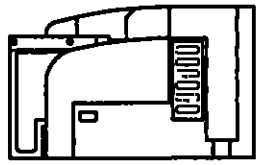
Dimensions in mm (inch)

■ 100/200-VAC 8-point Output Module

Model Number JAMSC-120DAO83330



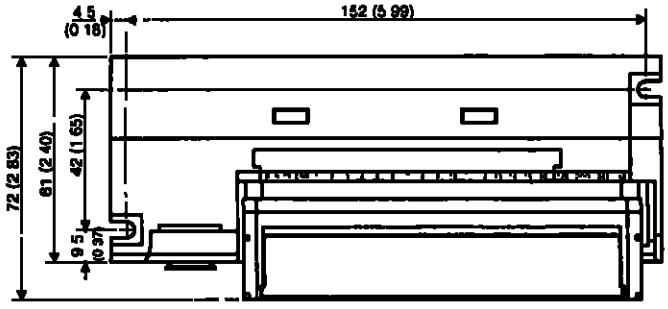


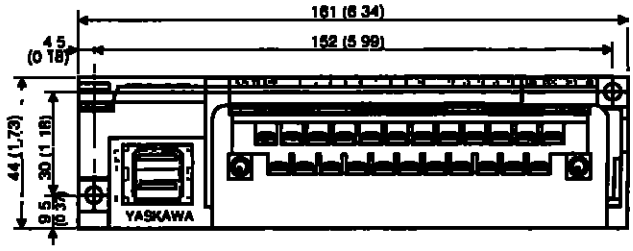


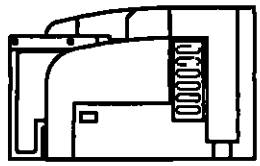
Dimensions in mm (inch)

■ 12/24-VDC 16-point Output Module

Model Number JAMSC-120DDO34340







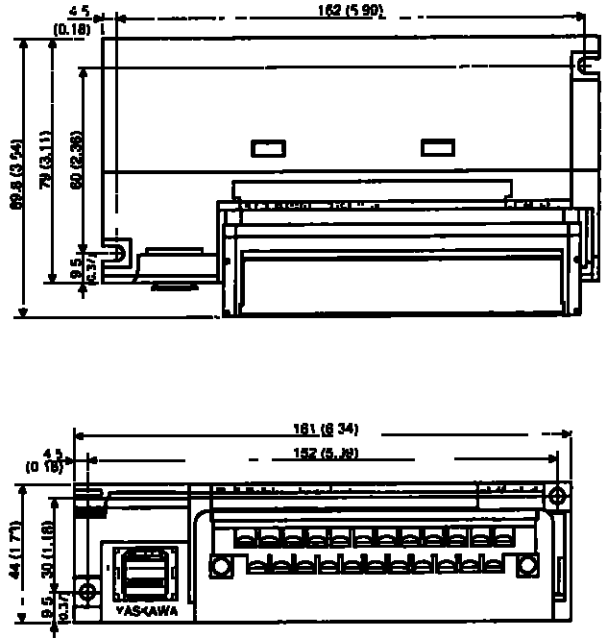
Dimensions in mm (inch)

A.2 Analog I/O Modules

This section shows the external appearances of the Analog I/O Modules

■ Analog Input Module (±10 V, 4 Channel)

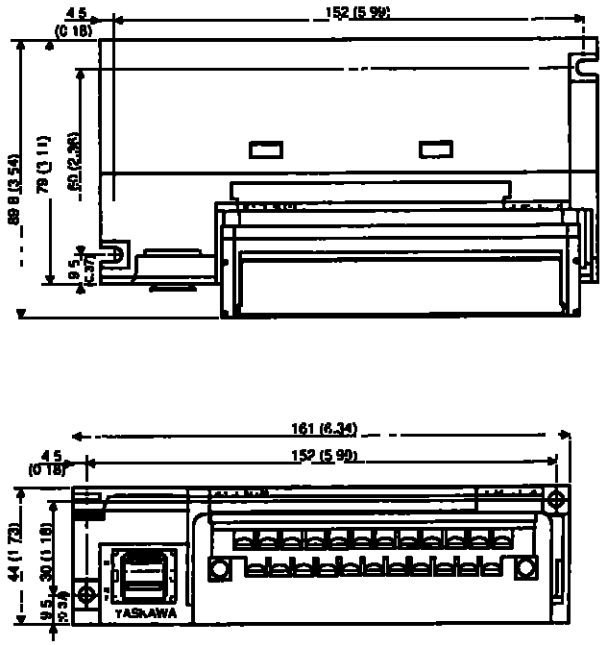
Model Number JAMSC-120AVI02030



Dimensions in mm (inch)

■ Analog Output Module (±10 V, 2 Channels)

Model Number JAMSC-120AVO01030



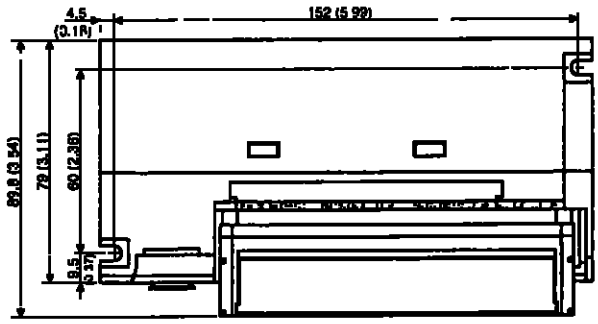
Dimensions in mm (inch)

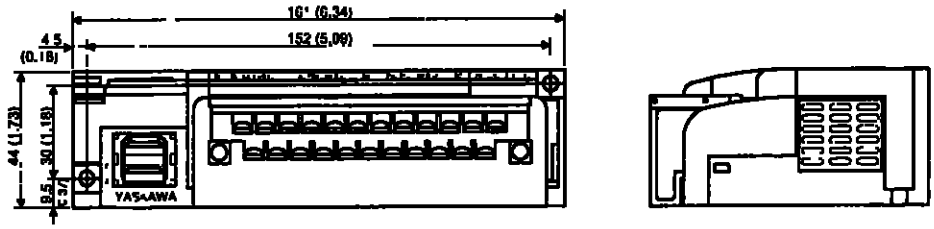
A.3 Special Purpose Modules

This section shows the external appearances of the Special Purpose Modules

■ Reversible Counter Module with Preset Function

Model Number JAMSC-120EHC21140

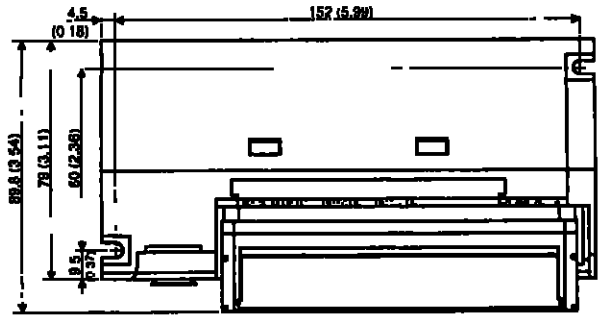


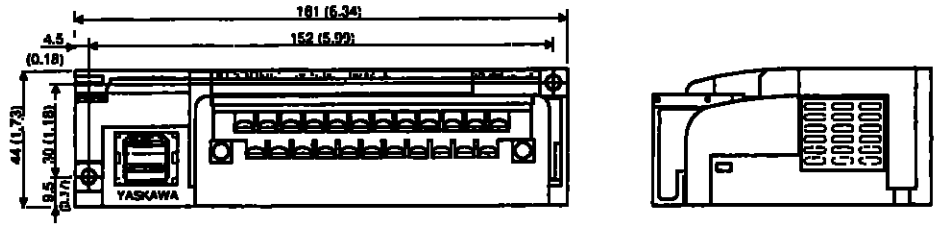


Dimensions in mm (inch)

■ Pulse MC Module

Model Number JAMSC-120MMB20230





Dimensions in mm (inch)

Machine Controller MP900 Series
MECHATROLINK System
USER'S MANUAL

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